

**'PROMISING WATER RESOURCES MANAGEMENT
APPROACHES IN THE DRINKING WATER SUPPLY AND
SANITATION SECTOR'**

**EVALUATION DOCUMENT FOR THE MGENI CATCHMENT
MANAGEMENT PLAN**

UMGENI WATER

SOUTH AFRICA

WATER QUALITY DEPARTMENT

SCIENTIFIC SERVICES DIVISION

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EXECUTIVE SUMMARY

Since the early 80's a lot has been done world wide on the improvement of drinking water supply facilities; also sanitation and health education have received increased attention. However, faecal contamination from urban areas and peri-urban settlements which are expanding, excessive algal growth in dams caused by over exploitation of agricultural resources, soil loss and sedimentation from commercial crop lands and dense rural settlements, decreased river flows, flood damage due to uncontrolled urbanisation and reduced water availability due to invasion by alien vegetation, afforestation and irrigation expansion have led to progressive depletion and degradation of fresh water resources.

In response to these developments, the International Water and Sanitation Centre (IRC) together with the United Nations Development Programme (UNDP) initiated the project 'Promising Water Resources Management Approach in the Drinking Water Supply and Sanitation Sector'. This project is set out to assess, document and disseminate project experiences with the principles agreed in Dublin related to water resources management. The underlying aim of this project is to contribute to improve WRM practices. Participating practices came from different parts of the world.

The Mgeni Catchment Management Plan (MCMP) highlights the following problems for the catchment; bacterial contamination, nutrient loading, inefficient water use and soil erosion. The plan also recognises that to mitigate these problems there is a need for the holistic management of these resources with an emphasis on a user driven process and management of the source of the impact on the water rather than on the treatment of the problems. The plan does suggest that stakeholder fora be established which will feed into a Management Unit Advisory committee.

The plan, as yet, has identified water source and catchment protection as a need due to the dwindling water resource and the continuous deterioration in its water quality. It has also identified and indeed practised agreements between stakeholders within a national context for

water allocation. The efficient use of water by the different users and the question of water conservation have been highlighted and a number of projects have been initiated to estimate the amount of water loss from many sectors, enhancing public awareness to save water, etc.

The practised community participation and consultation with regard to management decisions but has in most cases proved to be a long and expensive process due to the disparities in education, language and overall degree of awareness. The involvement of all stakeholders could have been successful if these parties do not consider development issues as political ones. The plan has not allowed for any description of representation in stakeholder fora. Neither does it identify gender sensitive programs which will need to be put in place to ensure that the attention of the women in the Mgeni catchment is focused.

The plan has also attempted to hand in projects to communities by developing their skills but has proved to be an expensive and always resulted in time lag between the completion of projects and the complementary capacity building. This resulted in Water Resources Management (WRM) development organisations carrying on the load for longer hindering other projects of similar nature due to the lack of personnel. Lastly, the fact that water has an economic value is not disputed amongst decision makers but not the same can be said about the end users. Numerous incidents have occurred where communities fail to pay for their water forcing water suppliers to discontinue service. This is not only in KwaZulu-Natal but in South Africa as a whole.

Structured yardsticks, agreed upon internationally, based on which WRM organisations can evaluate their performance is a necessity at this stage. The fact that every macro-locality has its own unique set of conditions that govern its WRM has been satisfactorily considered when the principles, the subject matter, have been structured. Each principle is broad enough to encompass all disparities be it due to political, socio-economic, environmental or even ecological settings.

From this assessment exercise, the eight principles have proved to be sufficient to monitor performance in WRM-related projects. Future attempts should also be made to structure a global Water Resource Management Approach. The information communicated in the second

workshop should be made available to as large an audience as possible to allow for integration of experiences from different countries.

PREFACE

Information included in this report has been researched and collated by the following Water Quality Officers under the Supervision of Dr John Howard;

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Thanks are also extended to the IRC and Umgeni Water for facilitating the participation of South Africa in the project.

INTRODUCTION

Integrated Water Resources Management and Integrated Catchment Management, in South Africa are still in their infancy. However, the importance of water resource protection to ensure sustainable use has been identified by the government at both national and local levels. The new policies and legislation dealing with water-related issues have emphasised the need for holistic management of water resources for the present and future generations.

The purpose of this document is to compile the findings of the evaluation of the Mgeni Catchment Management Plan (MCMP) against a set of principles put forward by the IRC/UNDP. This is appropriate in view of the fact that the National Department of Water Affairs and Forestry (DWAf) has accepted the usefulness of Integrated Catchment Management (ICM) and is currently involved in a process that will ensure that ICM forms part of the new Water Law in the Republic of South Africa.

The document will provide useful indicators on the appropriateness of actions currently being implemented as part of the MCMP. Whilst this document focuses mainly on the MCMP, a number of other programmes which are related to the Plan such as the Umgeni Water Rural Areas Water and Sanitation Plan (RAWSP) are also examined because they follow the requirements and objectives of MCMP. The report from this study will serve as a basis for improving the manner in which ICM is practised within Umgeni Water's operational area.

The Mgeni Catchment Management Plan was initiated in 1993 by Umgeni Water and the DWAf. The development of MCMP came as a result of the realisation that long term sustainable development of the Mgeni Catchment required holistic management of the resources and a recognition of the inter-connectedness of the elements of fresh water and impact on its quality and quantity.

The traditional emphasis on separate elements of the environment and other related issues had to be replaced by an integrated approach. The approach to WRM on catchment basis entails

considering the water quality and quantity, groundwater and surface water and all recognised water users.

This report highlights the key findings with regard to the importance of: water source and catchment protection, agreement between stakeholders for water allocation, efficient water use, management at the lowest appropriate levels, the involvement of all stakeholders, gender balance, capacity building and the economic value of the water resource.

The principles have been dealt with successfully. Simple primary research was conducted for some of the questions where time permitted but in some, the lack of records did not allow for better responses. However, the principles were evaluated as comprehensively as possible.

There have been a number of successes and weaknesses identified by evaluation of the principles providing key learning points for future WRM projects both nationally and internationally. A number of open issues remain unresolved.

CHAPTER 1 BACKGROUND

1.1 The Socio-economic Setting:

The total population of the Mgeni catchment is about 1.5 million, with an average density of about 350 people/km², concentrated around Pietermaritzburg, Durban and other smaller towns. In the last decade, considerable demographic changes have taken place due to the rapid rural and urban development and these trends are likely to continue.

About 46% of the houses in the catchment are formal, while about 20% are informal and just over 34% are traditional. There is a 50-50 formal-traditional dwelling split in the farming areas, traditional dwellings dominate in the rural settlements, and most houses in the urban areas are formal with some informal. About one fifth of the households have no access to minimum RDP (Reconstruction and Development Programme) levels of water supply and sanitation services, most of which are concentrated in the rural subsistence and commercial farming areas. Less than a quarter of the households have full household water supply and sanitation. About one third of the population have no waste disposal service, whereas only another third have regular household waste collection. The average household is about 4.6 people, with larger households in the farming area and smaller households in formal urban areas.

Informal and rural settlements have grown considerably and are a major cause for concern in terms of the limited water supply, poor sanitation and waste disposal services causing water quality and health problems which accompany uncontrolled growth. The formal industrial and residential areas represent the greatest part of the current water use in the catchment while RDP upgrading and future settlements will represent a major part of the future water demand.

About 30% of the total households in the Mgeni catchment have a monthly income less than the subsistence level of R 750/ month. These are usually the households without access to water supply and sanitation infrastructure which reduces the possibility of cost recovery.

Total economic production in the Mgeni catchment area has estimated at about 55% service based, 30% manufacturing and construction, 3% agriculture, with an estimated 12% informal sector. 70% of the total Gross Geographic Product (GGP) in the province of KwaZulu-Natal is based on the Mgeni River water supply.

1.2 Physical Setting:

The Mgeni River's source is in the Mgeni vlei which forms one of the wetlands of the Mgeni sponge situated on the highland plateau in the KwaZulu-Natal Midlands, at about 1900 m above sea level. As the river drops off the plateau, the gradient steepens significantly with small waterfalls and rapids. Removal of riparian vegetation and invasion by exotic plants and trees (e.g. wattles) have contributed to erosion of the river banks throughout the upper Mgeni River.

The gradient flattens out as the Mgeni River flows through the rolling valleys of the Midlands towards the plain around Midmar Dam. The grass and tree lined river channel alternates between sand-bed pools and shale-rapids, while a large number of farm dams regulate the flow and result in additional water losses to evaporation. The river then meanders out onto the flat plain formed by the Eccca series and through a wetland just upstream of Midmar Dam which is the most upstream major impoundment on the Mgeni River. The catchment and channel characteristics of the Lions River, rising near the town of Nottingham Road, the Karkloof River and upper Msunduzi River are similar in the upper Mgeni. The catchment and banks of the Msunduzi River above Henley Dam have been destabilised with increased erosion by informal livestock, grazing and watering.

Although the headwaters of these rivers are not all wetland based, wetlands do occur in places. The upper parts of the Mgeni and Msunduzi River catchments tend to have deep, permeable, well-drained and fertile yellow and red soils, making them agriculturally productive. The relatively low erodibility of the soils, gentle slopes and generally good vegetation reduces the natural erosion in this area.

Immediately downstream of Midmar Dam, the Mgeni River flows through the town of Howick. A dolerite dyke forms a small escarpment which cuts across the catchment, from the headwaters of the Mpolweni River in the north, through the Karkloof and Howick Falls to the Msunduzi River around Henley Dam in the south. This results in the many waterfalls and steep gorges on the rivers along and downstream of this escarpment. The gradients of the Mgeni and Msunduzi rivers flatten as they flow onto the plain below the escarpment. The Mgeni then meanders in a grass and tree lined channel over a silt bed before flowing into Albert Falls Dam.

The Msunduzi River and its tributaries flowing through Pietermaritzburg have been highly modified and redirected. This has contributed to degraded ecological health and a reduction in the natural ability of the rivers to assimilate waste. Camps Drift was constructed to provide flood control and recreation in Pietermaritzburg, but it has also become a receptor for pollutants from Edendale Township.

As the Mgeni and Msunduzi Rivers enter the Valley of a Thousand Hills, the gradients steepen and the rivers become wide and braided, on coarse sandy beds with rocks and boulders. The incised river banks are covered with dense scrub-bush and dry grass. The Mgeni River flows into Nagle Dam just above its confluence with the Msunduzi River. The Mqeku River rises on the north-eastern plateau and flows south through small rapids and pools until it reaches a waterfall at the edge of the Valley of a Thousand Hills. Down-stream of the confluence with the Mqeku River, the Mgeni River flows into Inanda Dam. The soil depth, permeability and fertility decrease eastward down the catchment towards and into the Valley of a Thousand Hills where the soils and vegetation are not well developed resulting in very high natural erodibility.

Most of the tributaries on the coastal plain are highly modified urban channels from the headwaters in Pinetown and Kwa Mashu to the Mgeni River flowing through Springfields Flats. They tend to flow sluggishly between wide artificial grass and reed lined banks in which the ecological health is reduced. The estuary is wide and shallow and accumulates silt deposits when the mouth is closed. Those may be flushed out during large summer floods.

The soil depths, permeability and fertility of the grey and red sands on the coastal plain are also low, albeit higher than those in the Valley of a Thousand Hills but are less erodible.

1.3 Environmental Setting

The water, land and air in a catchment provide the natural resource base upon which all life and economic development depend. Sustainable use of these resources requires management to maintain their productive potential and to avoid degradation of the environmental capacity to assimilate waste. In general, the quality of the natural resource base in the Mgeni River catchment is good although specific issues and areas should be highlighted:

1.3.1 Air

Generally air quality tends to be good except in Pietermaritzburg and Durban due to the high concentration of vehicle and industrial emissions, not all of which originate from within the catchment. The local air quality in and around informal households which depend upon wood, coal and paraffin for cooking and heat tends to be very bad with resulting respiratory problems in the inhabitants.

1.3.2 Land

The quality and status of the land is influenced by both its natural potential and actual use. Agricultural potential and status of land is good in the upper and central Mgeni catchment. Soil erosion and overgrazing in Vulindlela above HenleyDam has degraded the condition of this area. Climate and topography limit the land potential in the Valley of a Thousand Hills which is further reduced by soil erosion and overgrazing. Urbanisation around Durban and Pietermaritzburg is encroaching onto prime agricultural land. Spills of hazardous materials and disposal of waste onto the land surface degrade the soil and groundwater quality, particularly around industrial urban areas.

Most of the catchment is already developed with about a third under natural vegetation much of which is grazed commercially. Only 3% of the catchment is formally conserved in

provincial parks and nature reserves. Headwater areas contribute a large quantity of water to the Mgeni River so these should be protected or conserved, particularly for the Mgeni, Lions, Karkloof and Mpolweni Rivers.

1.3.3 Aquatic

Conditions other than the quantity and quality of water also influence the aquatic ecology. Internationally, wetlands represent one of the most threatened ecosystems due to encroachment of agricultural production. Within the Mgeni River catchment only the Mgeni Vlei has conservation status. Riparian riverine environments in the upper and central Mgeni River catchment are under threat from invasive aliens, crop cultivation, timber plantations and commercial livestock. The riverine environments the rural areas of Vulindlela and the Valley of a Thousand Hills have been heavily impacted and destabilised by livestock. The rivers in the urban areas of Pietermaritzburg and Durban are highly modified, have significantly re-routed for development and are scoured by the changing urban flood hydrology. The Mgeni estuary has been highly modified and re-routed as a result of development and reduction in the flow regime.

CHAPTER 2

OVERALL ASSESSMENT METHOD

The assessment was shared between four Water Quality Officers each dealing with two of the principles depending upon their expertise. There were periodic meetings with the Departmental Head to monitor progress and to discuss difficulties. Water Quality Officers continued with their routine work throughout the assessment.

The time spent to answer the guiding questions to all principles was spread over approximately five months. Meetings and interviews with key stakeholders in the catchment and other Departments within Umgeni Water were co-ordinated by the Officers for all to take part in the discussion of all principles. Some documents had to be sent out to describe the objective of the project and in some cases, questions were also sent out to Interviewees prior to the meetings to save time. Documents, reports and different research papers were consulted by the team.

Case studies within the Mgeni catchment had to be reviewed in some of the principles e.g. 5, 6 and 7 since it was difficult to answer the questions for the whole of the catchment. The list of schemes considered are by no means exhaustive but only those that were properly documented could fulfil the criteria for evaluation.

Time constraints to conduct primary research for some of the issues did not allow for answering some of the quantitative questions especially those that deal with stakeholders' perceptions and the percentage of satisfaction amongst the different water users.

There were several incidents of failing to motivate high officials not directly related to catchment management issues to part with information from their respective institutions or Departments. This could be because of their busy time schedule or because the aim of the project was not directly related to their jobs.

CHAPTER 3

WATER RESOURCE MANAGEMENT PRINCIPLES ADDRESSED

Principle 1: Water Resource Protection is Essential

3.1 Background

Over the past two decades, the widespread and growing concern over South Africa's scarce water resources has been accompanied by a growing awareness of the complexity of the processes and interactions required to manage these resources so that they can sustain the growing demands made on them (DWAF, 1996a). Since the early 1980's water resource managers nation-wide have come to realise and accept that effective water resource management requires an integrated approach based on logical hydrological units. It was considered appropriate that these units should be whole river basins or catchments.

However, it was also clear that very little information was available which would allow the development of catchment wide water resource management approaches based on Integrated Catchment Management (ICM). This prompted to initiate several major catchment studies which were designed to:

- obtain information on the physical, chemical and ecological characteristics of the water resources available within the catchment;
- identify and quantify the specific catchment processes and activities which affect the spatial and temporal distribution of the water resources;
- quantify the existing and future demand for water, by each water use sector, including specific requirements for water quantity, quality and the timing of these requirements;
- identify those individuals, institutions and organisations which should be consulted or involved in decisions around water resource allocations; and
- define appropriate management strategies and actions which could help to alleviate the effects of frequent droughts, resolve conflicts associated with water allocations and inter-basin transfers.

In a few situations (e.g. the Mgeni catchment, the Wilderness Lakes area, the upper Olifants River sub-catchment and the Sand, Vet and Nkongolwana Catchments) water resource managers in South Africa have been able to ensure that most, if not all, the parties concerned have been widely involved in the decision-making process. In each of these situations, the participants have accepted that the ICM approach is at least partially successful and it is now in the process of formal implementation. Such successful applications could in future be used as a foundation for the design of improved institutional structures and communication processes elsewhere.

3.1.2 Methodology

This principle involved no primary research as water resources and catchment protection issues are well documented. However, the approach adopted was;

- Literature review obtained from Umgeni Water library, the inter-net and the University of Natal library.
- Flow data were obtained from the Water Resource Management data base.
- Water quality data were extracted from LIMS.
- Graphics were plotted using Excel version 7.
- An interview with the Dept of Water Affairs and Forestry to answer the question on the increase in the irrigated areas and the increase in irrigation licenses.
- Umgeni Water's Water Resources Planning Department personnel were interviewed.

This principle will address the following questions:

1. Has water source and catchment protection been identified as a need presently or in the longer term?
2. Are catchment areas negatively influenced by any activities?
3. Is there a marked reduction in flow volume over the last five to ten years?
4. What are the threats to water source and catchment area protection?
5. What protection activities are being undertaken?
6. Temporal variation in landuse attributes over the last few years?

3.1.3 Results

3.1.3.1 *Water source and catchment protection*

The Mgeni Catchment Management Plan study was undertaken to develop an affordable and practically implementable management framework to ensure sustainable water quality for the future generations. Current initiatives are oriented towards increasing the available supply in the Mgeni River catchment through the development of water resource infrastructure. However, water resource management philosophy in South Africa as embodied in the Water Law Principles (DWAF, 1996b) is based on the holistic management of catchments which also includes control of the availability (land use planning) and demand (water conservation) management as well as the impacts on water quality and the ecological functioning of the aquatic environment

The Mgeni Catchment Management Plan, amongst the first of its kind in South Africa, was initiated in 1994 and was an outcome of preliminary studies on the water quality and quantity. In some parts of the catchment it was found that the water quality was deteriorating and was already below the requirements of users in those parts. Even during non-drought periods, the demand is fast approaching the water available in the Mgeni River (DWAF and Umgeni Water, 1996).

3.1.3.2 *Reasons for identifying catchment protection as a need*

- Every year people die, health care costs are significantly increased and many work days are lost due to water borne diseases affecting people who depend upon streams and rivers for domestic purposes or recreation.
- Excessive algal growth in Nagle and Inanda dams increases the water purification costs for household and industrial use substantially. Further deterioration in water quality will result in a significant increase in future treatment costs.

- Evaporation by forest plantations, dryland crops and irrigated areas has reduced the total water available in the catchment by 20% which is equivalent to the increase in bulk water demand until the year 2010.
- Unless efforts are made to reduce bulk distribution system water losses or increase water use efficiency by domestic and industrial water users, the dams and diversion pipelines required to meet the 2010 demand will cost about R750 million, resulting in substantially increased water tariffs in the next 15 years.
- Flooding of the informal settlements and urban areas in and around Pietermaritzburg and Durban has caused hundreds of deaths and millions of rands damage in the last 10 years.
- A quarter of a million tonnes of topsoil are lost per year from the Inanda dam catchment alone, reducing the agricultural productivity, reducing the storage capacity of Inanda dam and increasing the filtration requirements of purification for bulk water users.
- Many of the streams and rivers are so choked by alien plants or have been so modified, regulated or polluted that they no longer function as healthy ecosystems which reduces their recreational quality and ability to provide adequate clean water.
- These conditions will only deteriorate resulting in greater costs and negative health impacts for inhabitants of the Mgeni River catchment area unless something is done to reverse the trend.

3.1.3.3 *By who and when was catchment protection identified as a need*

The government has realised the need to control the quality of water since the Water Act of 1956, however that was not stated as a protection to the resource. The realisation of managing the water resource as a one entity (source and catchment) is only recently (DWAF, 1995a). In the latest publication on the Fundamental Principles and Objectives for a New Law in South Africa in 1996,

the objective of managing the quantity, quality and reliability of the nation's water resources is to achieve optimum, long term, environmentally sustainable social and economic benefit for society from their use.

Speaking in his capacity as chairman of the National Water Regulations drafting Committee, Mr Neil Macleod stated that "the old Water Act of 1956 would be replaced by two new Acts, the Water Services Act and the Water Resources Act which went to Parliament in April, 1997. Once the Water Services Act is in place, it will empower the Minister to make the regulations regarding water use. They could therefore come into being around the middle of 1997". He estimated that within the next 30 years, the amount of water available for each person would have roughly halved after enforcing regulatory restrictions for water uses, (The Mercury, 1/4/1997).

Umgeni Water as a leading organisation in the implementation of environmentally sound operations, adopted its environmental policy in 1993 (Annexure 1, Umgeni Water, Environmental Report, 1996). The DWAF and Umgeni Water jointly initiated and funded an integrated catchment management plan study for the Mgeni River catchment in 1993 aimed at collating information on the area to identify problems and propose approaches to solutions.

3.1.3.4 *Application of catchment protection*

In the Bill of Rights (24), South African Constitution on Environment (1997) "Everyone has the right to:

- (a) an environment that is not harmful to their health or well-being, and
- (b) have the environment protected for the benefit of present and future generations through legislative and other measures that-
 1. Prevent pollution and ecological degradation
 2. Promote conservation
 3. Secure ecologically sustainable development and use of natural resources while promoting justifiable economies and social development"

It is also included in the DWAF Amended Water Act of 1956. Umgeni Water has included it in its Environmental Policy since 1993.

3.3.5 *Negative impacts of landuses*

There are a number of negative impacts in the Mgeni catchment largely due to the type of landuses in the catchment which are briefly reviewed in the following section:

a. Faecal contamination from urban areas and peri-urban settlements, which are expanding.

Faecal matter from humans and warm blooded animals carry large numbers of pathogens which may cause diseases for people who drink or bathe in contaminated water. Serious Faecal contamination problems occur in Pietermaritzburg and Durban, as well as in the settlements in the Valley of a Thousand Hills and Vulindlela (Henley) with as many as 2000 deaths every year associated with water borne diseases. This is mainly due to leakage and blocked sewers in formally serviced residential areas (e.g. Pietermaritzburg and Durban), ill-informed and illegal disposal of waste into stormwater drains and general drainage. Stormwater washoff from impervious surfaces and overflowing sewers resulting in significant contamination during high flow periods.

Moreover, poorly serviced settlements in and around urban centres (e.g. Edendale, Sobantu, Mpophomeni, Vulindlela, Mpolweni, Coolair, Cato Ridge and table Mountain) contribute to low flow contamination through washing and bathing in local streams, seepage from inadequate sanitation and grey-water flowing from communal water supplies. Storm washoff of accumulated human, animal and domestic waste material and overflowing pit-latrines also cause contamination during high flows.

Rural settlements contribute through direct human and livestock activity in the streams as well as seepage from the limited and often poorly constructed sanitation and water supply infrastructure. Example areas that pose these impacts are: Vulindlela and Valley of a Thousand Hills.

The rearing of commercial livestock may be extensive on natural grassland and cultivated pastures, or intensive in confined animal facilities such as piggeries, feedlots, dairies and chicken houses. The impacts of extensive grazing are largely dependent upon the access to

river channels which causes contamination during both low and high flows, but washoff from the land surface during storm events also occurs. Confined animal facilities can be managed to prevent contamination of nearby streams but problems may occur during either low flows or storm events when the contaminant systems are poorly designed or managed. Livestock production, largely cattle grazing and pasturing is the dominant source of faecal contamination in the Midmar and Albert falls dam catchments. Poorly managed dairies and piggeries represent a significant part of this problem.

b. Excessive algal growth in some dams caused by increasing nutrient loads.

A significant load of plant nutrients (particularly phosphorus and nitrogen) to an impoundment due to human activities (called 'cultural eutrophication') can cause excessive growth of algae and larger aquatic plants. Algal growth requires the presence of both phosphate and a nitrogen source; nitrate, ammonia, nitrite or urea in the water body (Walmsley and Buthy, 1980). Land use practices are a significant factor in eutrophication because they alter the pathways and rate of nutrient transport from the landscape. The presence of algae in a water body can be aesthetically unpleasant for recreation, can produce toxic by-products for humans, animals and aquatic biota and can cause biological problems in the impoundment with increased costs for water treatment. Nutrient impacts are usually located in downstream impoundments through 'cumulative effect of nutrient loads'.

Most of the Waste Water Works (WWW) in the Mgeni catchment treat both industrial and domestic effluent which is usually chlorinated to kill faecal pathogens but could result in the production of toxic organic compounds. Darvill WWW treats domestic and industrial effluent from Pietermaritzburg, contributing a significant nutrient load (total phosphorus 15% and soluble phosphorus 50%) to Inanda dam, as well as effluent with a high oxygen demand. Hence, Nagle and Inanda dams periodically suffer from excessive algal 'blooms' which affect the water supply to the coastal region by significantly increasing treatment costs. Mpophomeni WWW contributes a significant nutrient load to Midmar dam which is not eutrophic at the moment but may develop problems with increased settlement and development of the catchment, the raising of the dam wall or inter-basin transfers from the Mooi River (DWAF and Umgeni Water, 1996) Kwa Mashu and Northern WWW's on the

other end, discharge treated domestic and industrial effluent with high nutrient load and oxygen demand which should not cause significant problems provided the Mgeni estuary mouth is kept open.

c. Soil loss and sedimentation from commercial crop lands and dense rural settlements:

Soil erosion from the land surface results in reduced agricultural potential of the land. Once in the streams and rivers, sediment is aesthetically unattractive for recreation, can have a negative impact on the aquatic environment through siltation of stream habitats and eventually settles out in dams and impoundments reducing their storage capacity. This the impact of sediment is cumulative and is related to long term total sediment loads.

Sugar farming and to a lesser extent maize farming, cover a third of the Nagle dam catchment and are major contributors to the sediment at Nagle dam. Timber, on the other hand, covers a quarter of the Nagle catchment and has a significant impact on sediment production during establishment and harvesting periods when the ground is bare and exposed to intense storms. Subsistence farming in rural areas and overgrazing in rugged areas are also two major contributors to soil erosion.

The lower Mgeni catchment (Valley of a Thousand Hills) has naturally high soil erosion due to the steep valleys, erodible soils and poor vegetation cover made worse by the settlements in the area. Inanda dam has the highest sedimentation rate while the streams and rivers in the Valley of a Thousand Hills suffer from siltation. Sedimentation of Nagle dam is reduced through a by-pass facility which contributes about 20% of the sediment load to Inanda.

d Degraded river health due to bank destabilization, decreased river flows and pollution associated with urbanization and agricultural production.

The river flows from Pietermaritzburg and Durban will increase due to greater storm surface runoff and increasing effluent return flows associated with urbanisation. Pesticides have been

observed in some streams and down stream of intensive agricultural catchments, such as Midmar, Albert Falls and Nagle dam catchments. Other toxic chemicals are likely to occur around industrial areas in Pietermaritzburg and Durban. Unfortunately, the vast number of chemicals produced restrict possibilities for their measurement in water bodies.

f. Flood damage and death in certain areas exacerbated by uncontrolled urbanization:

The increased flow from urban areas and storm waters largely occurs during storm periods while low flows are reduced. Therefore, the volume of floods in these areas will increase while the time before the peak will decrease resulting in less warning and greater damage. On the other hand, the health of the streams and tributaries in the urban areas will be further impacted due to the decrease in low flows and the impact on stream banks.

g. Reduced water availability due to alien vegetation, afforestation and irrigation use

The greatest reductions in runoff are associated with afforestation and sugar cane production while farm dams and irrigation reduce the total water availability downstream, particularly for low flows during the dry winter season. The high levels of sugar cane cultivation in the central Mgeni River catchment, compounded by irrigation abstraction, could increase further. The other three Management Units in the Msunduzi and the lower Mgeni River catchments are not currently heavily utilised for large scale commercial agricultural purposes. However, pressure for irrigation to emerging small-holdings associated with the rural settlements may increase.

h. Increasing water demands to supply a growing population with inefficient water use

Urbanization and informal settlements will also have tremendous impacts on the water availability in the Msunduzi and lower Mgeni River catchments. The population of Pietermaritzburg is currently growing which will increase the runoff from the Henley-Pietermaritzburg Management Unit. The increasing demand associated with this demand and the provision of water to previously disadvantaged communities will result in increased waste water return flows. 60% of the demand supplied in Pietermaritzburg is returned to the

Msunduzi River via Darvill Waste Water Works which will result in a further increase in the flow from this Management Unit every year. Durban is undergoing similar development with the associated increased flow into the Mgeni estuary.

3.1.3.6 Temporal and spatial variation in river flow

Almost all water in the Mgeni River comes from surface water which includes springs, streams, rivers and impoundments. There was substantially more water in the Mgeni River before any development occurred in the Mgeni catchment. The greatest proportion of this natural flow was generated in the upper Mgeni and Msunduzi River catchments. On average about 730 million m³ of water flowed out of the Mgeni River mouth every year (DWAF and Umgeni Water, 1996).

According to water inflow records to the five dams in the Mgeni Catchment, there is a general steady flow trend with a slight increase in the volume of water received at those gauging stations (Figure 1). This indicates that the water resource in the Mgeni Catchment is steady. The general belief that the Mgeni River system is not being enough to suffice the demand is mainly because the demand is growing whereas the supply is constant, for the time being.

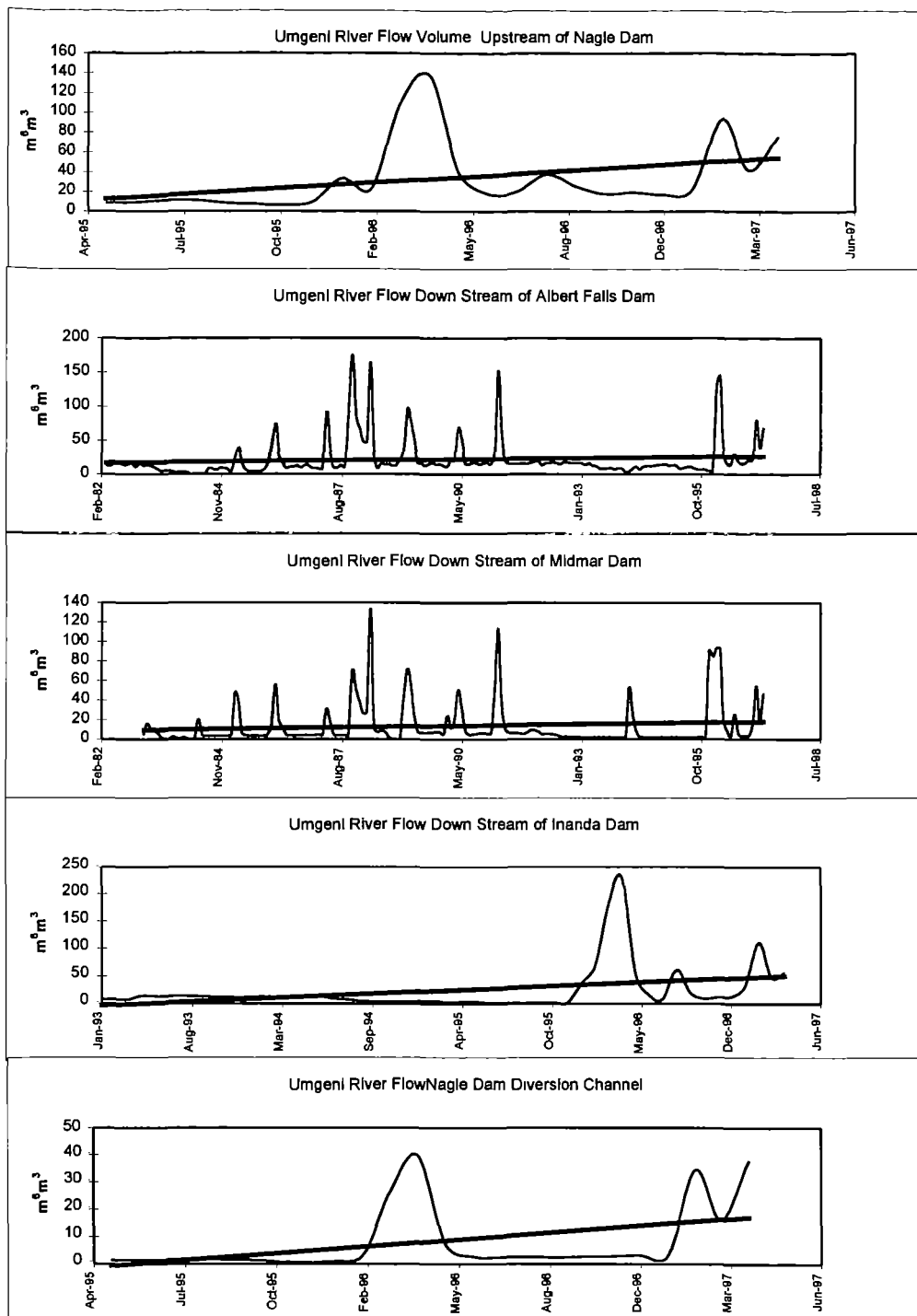


FIGURE 1: Representative Rivers Flow Dynamics

The demands on the bulk water supply system in the Inland Region have been increasing at about 8% per year for the last six years and this trend is likely to continue. The Durban Region has had an average demand increase of about 7% over the last ten years but this is expected to drop to about 5.5% in the future. It is predicted that the total bulk water demand

on the Mgeni River system will increase from about 270 million m³ to about 360 million m³ in the next ten years and to about 620 million m³ by 2025 with about one third of this demand for the Inland system and two thirds for the Durban system. The other demands on the system are not likely to increase significantly so bulk water supply will represent over 90% of all use from the Mgeni River catchment by 2025. The increase in demand is planned to be met by some or all of the following schemes:

1. Raise Midmar dam to increase the storage capacity from 177 million m³ to 255 million m³.
2. Increase the diversion capacity from the Mooi River to Midmar dam through the 6m³/s Wellington-Midmar tunnel.
3. Construct the 150 million m³ Mearns dam and the 140 million m³ Springgrove dam to increase the inter basin transfer from the Mooi River.
4. Develop a 12 m³/s diversion tunnel from Impendle dam on the Mkomazi River to Midmar dam.
5. Construct the 220 million m³ Impendle dam on the Mkomazi River to increase diversions to Midmar dam.
6. Identify and implement further developments by 2024.

3.1.3.7 Frequency of floods

The availability of surface water flows varies considerably seasonally and annually which reduces its reliability. Average summer flows during January and February are generally ten times higher than the winter flows during July and August due to the occurrence of wet summers and dry winters in the Mgeni River catchment. There is also a great variability between years with the wettest years having total flows which are up to twenty times higher than those during the driest years. Currently, the total quantity of water which can reliably be abstracted from the Mgeni River system is only about half of the total average flow, due to the extreme variability of river flows.

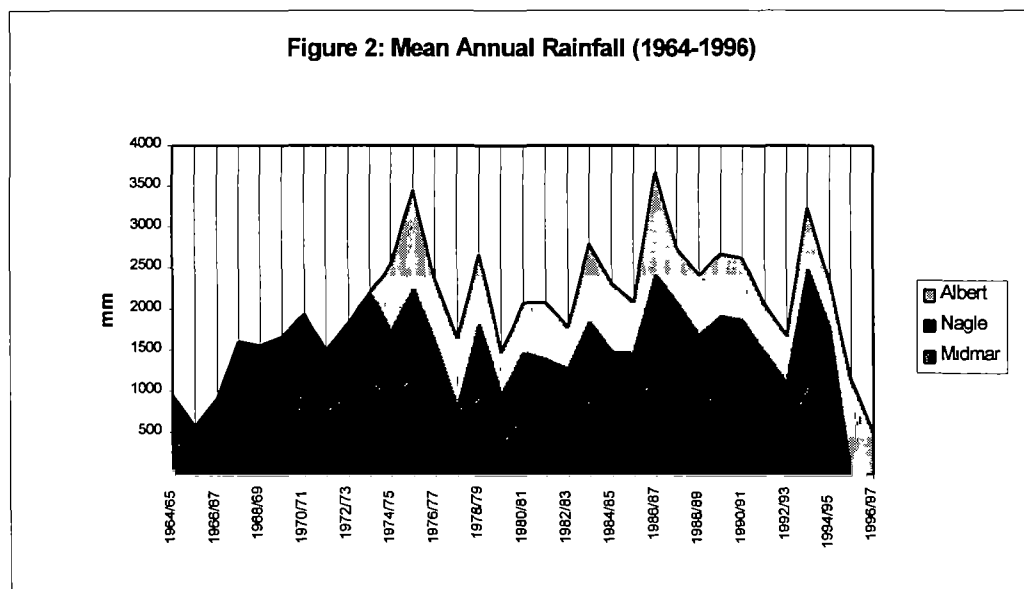
The large flow variability also has implications for flooding during heavy storms. Problems with floods are usually encountered where storm rainfall causes rivers to rise rapidly in

developed areas. Except in cases where there is little warning, floods in rural areas do not usually cause problems because people live away from the river banks and the aquatic vegetation and stream characteristics attenuate the impact.

However, for simplicity sake, peak rainfall events above the mean will be considered as potential flood inducing situation. This is mainly because there is no fixed threshold above which there should be flood damage. This damage will be relative depending on the land use type, the soil type, the rainfall intensity, the duration of the rainfall storm, the topography of the locality, etc.

Average annual rainfall data for the period 1964 to 1996 (Figure 2) show that there is great variability in the total volume of water precipitated.

However, this is quite consistent for all of the sampling sites under study. On average there is an above average rainfall event every three years followed by a below average event. Again the duration of the data is not long enough to draw out more substantial patterns.



Based on a 10 year flood frequency, it was also found out that there is an increase in the frequency of occurrence of floods in the Mgeni Catchment (Figure 3) This could largely be attributed to two major influences. Firstly, the effect of climate change on the hydrological cycles evident on a global scale is a possible cause that induces extreme climate conditions. The same with the cyclic extreme temperatures experienced globally resulting in both very hot summers and very cold winters as part of the anomaly. All are attributed to the collective impact posed on the environment e.g. cutting the rain forests, aerosol emissions, ozone layer depletion, green house effect, sea level rise, etc....

The second could be on a more local scale, the urbanization and deterioration in the physical properties of soils rendering them less impervious to moisture. Urbanisation compounds flooding problems because the development of impervious areas increases the total runoff volume, while reducing the time taken to swell the rivers. The degradation and modification of streams and rivers reduce their attenuating characteristics, so floods are more naturally mitigated. The shortage of land in urban areas causes people to settle close to rivers, within the flooding zone so the impacts of increasing flooding are devastating.

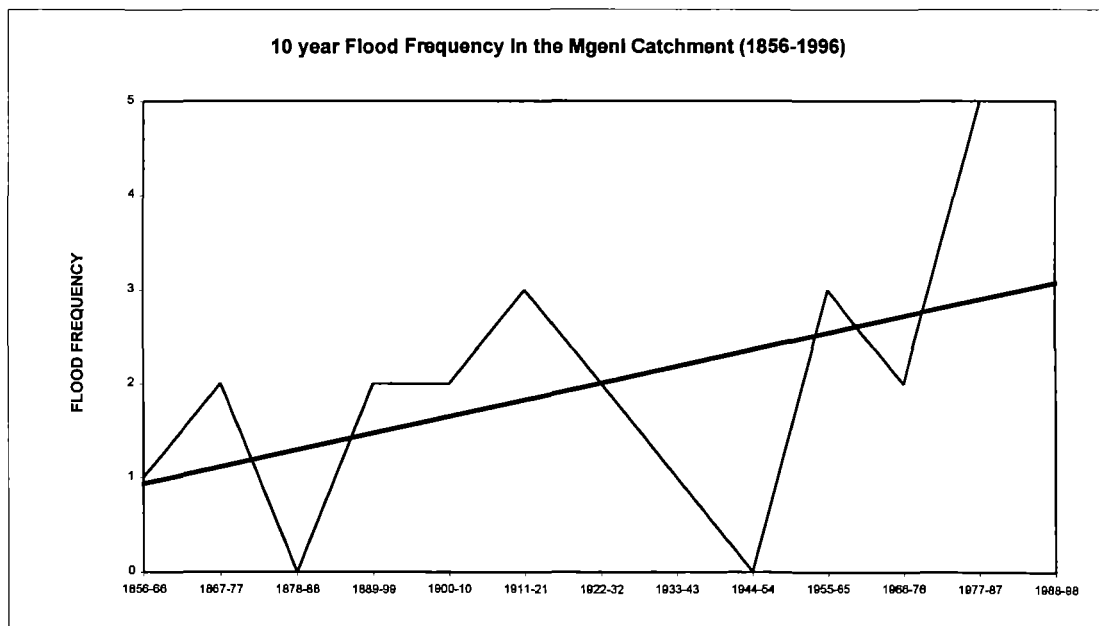


FIGURE 3

3.1.3.8 Water quality change over time

Substances entering water bodies may be associated with natural processes or may be of anthropogenic (human) origin. Even pristine watersheds may have high concentrations of certain substances (e.g. bacteria, sediment, nutrients and dissolved salts). This is considered the ambient (undeveloped) water quality. Human activity within the catchment may either increase the rate of these natural processes (e.g. erosion and sediment yield) or may introduce manufactured compounds (e.g. pesticides), resulting in greater contamination of the system. This represents the anthropogenic component of the water quality contamination and may be associated with point or non-point (diffuse) sources.

Water quality displays marked variation both in space and time on both the micro and macro-scale. The purpose of this outline is to identify spatial gradients both between and within management sub-catchments, as well as temporal gradients at representative sites.

Umgeni Water has invested substantial resources in developing an extensive water quality monitoring network. The available water quality data set is one of the most comprehensive available in South Africa. The two main ways in which water quality is characterised in the Mgeni catchment are through the use of chemical analyses and biotic indices. Biotic index monitoring provides information about the health of aquatic biota, and is primarily an indicator of available oxygen. The chemical analyses performed by Umgeni Water provide information on a wide range of water quality constituents. The present water quality monitoring programme is based on grab samples usually taken on a weekly basis, although some constituents are sampled only monthly or quarterly wherever fit.

Results obtained from reviewing major water quality determinants for the period 1986 to March 1997 in inflow sites to the dams, revealed the following overall situation:

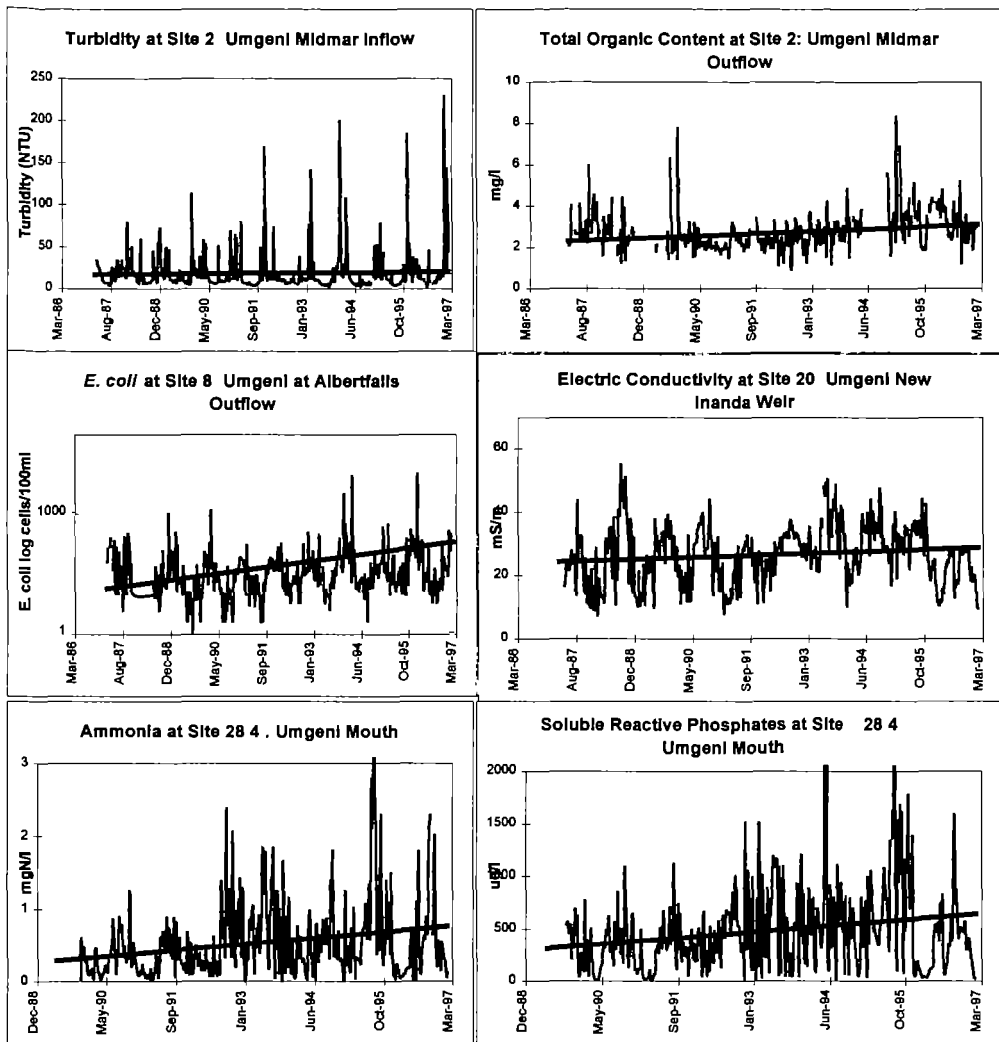


FIGURE 4

Water quality varies in the different localities spatially and temporally. During high rainfall periods, diffuse source pollutants are at their peaks. Screening data for the last eleven years revealed the fact that the water quality in the following sites is deteriorating and is likely to do so if land use activities are not properly managed (Annexure 2, Time series):

Table 1: Major Water Quality Determinants Reviewed in the Report

SITE	DETERMINANT
Site2: Midmar dam outflow	Total Organic Carbon (TOC)
Site 6: Albert Falls dam inflow	Conductivity, TOC
Site 8: Albert Falls dam outflow	<i>E.coli</i> , turbidity, conductivity, suspended solids and TOC
Site 15: Nagle dam inflow	Conductivity, suspended solids and TOC
Site 16: Mgeni below Nagle dam	Conductivity and TOC
Site 58: Duzi inflow to Henley dam	Turbidity and TOC
Site 59: Duzi outflow from Henley dam	Turbidity, ammonia, suspended solids and TOC
Site 20: Mgeni downstream of confluence with Msunduzi River	Conductivity, ammonia and TOC
Site 26: Inflow to Inanda dam	Conductivity
Site 51.1: Inanda dam surface	<i>E.coli</i> and TOC
Site 28.4: Mgeni Mouth	Conductivity, ammonia and Soluble Reactive Phosphates (SRP)

From the above results it is found that there is increasing impact from; industrial effluents, agricultural land (soil erosion and fertilizers) and from the Valley of a Thousand Hills where the *E.coli* contamination is on the increase (Annexure 3, WQ raw data).

3.1.3.9 Threats to water source and catchment area protection

- The relatively narrow segmentation of functions and responsibilities between the different Government departments and the lack of effective inter-departmental collaboration had the result that many land use activities which affect water resources and water quality needed a tremendous amount of co-ordination from Umgeni Water's side. This had and still is a time consuming process that needs to be resolved.

- The existing institutional structures and legal framework are inadequate to deal with the complexity of water resource management. It is anticipated that the current review of South Africa's Water Law will address these critical issues and the new legislation will provide a more suitable legal support for the necessary institutional frameworks and the involvement of the public in decisions around the wider socio-economic implications of development and resource management actions.
- In some situations where the general public either did not understand the issues at stake or were unable to participate properly, either because they were uncertain as to their role and responsibilities or because they lacked appropriate information. In some Public Participation fora, the level of discussion was not always at the lowest level of participants. This was because of the very wide educational status between communities and officials.
- In some water quality aspects especially water-borne diseases which results from the direct use of drinking water from the water source, the lack of proper education and awareness of the health risks, greatly aggravates the situation. Also proper hygiene methods amongst children as well as the elderly is not emphasised enough. Umgeni Water is conducting a number of health educational programmes, some of which are within the Mgeni catchment (Mpolweni and Vulindlela). There must be a national campaign to alleviate poverty through eradicating illiteracy.
- Chemical pollution from industries remains a major problem in big cities e.g. Pietermaritzburg and Durban where legal procedures can drag for years and polluters might be requested to pay a marginal fine as compared to the magnitude of the damage caused.
- There are 12 to 16 million people in South Africa without adequate access to even the most basic of domestic water supplies and sanitation (DWAF, 1995a: National Water Conservation Campaign Launch). The development of water supply infrastructure is very expensive requiring large capital outlay. Other strategies must be found to meet the demands equitably. Alternative sanitation methods should also be adopted e.g. subsidising the construction costs of Ventilated Improved Pit Latrines (VIP), training community

members to construct them and/or encouraging the use of alternative readily available raw materials.

- Although the adverse effects of afforestation on the water quantity and its quality is widely known in most Governmental departments, permits are still issued.

3.1.3.10 Protection activities undertaken

There are new restrictions on domestic water use that will be enforced by June 1997 on a nation-wide scale (The Mercury). Those are;

- A ban on watering gardens, sports fields or lawns between 11 am and 3 p.m. between October and March.
- A total ban on hosing down pavements, forecourts or any other hardened area.
- A ban on flushing urinals which are not user-activated.
- A ban on gates or doors which use pressurised water to operate.
- A ban on installing lavatory cisterns with a capacity greater than 9 litres (many cisterns are 13 litres).
- All new lavatory cisterns will be fitted with dual flushing devices (one of which uses less water for flushing liquids only).
- A ban on installing a shower head with a maximum flow rate greater than 10 litres per minute.
- Hand basins will have a maximum flow of six litres a minute.
- Commercial car washes will have to ensure that 70% of the potable water they use is recycled for use in the car wash.
- All new geysers (water heaters) must be capable of being connected to a solar water heating system.

There are also a number of projects running for the conservation and protection of water and soil resources. To mention a few:

a. *Water Conservation Programme*

As part of a National Water Conservation Research Project, the DWAF has initiated an investigation into the retrofitting of households with water conservation devices. Umgeni Water is contributing to this initiative in partnership with the local municipality by financing and managing a project in the Pietermaritzburg area which involves fitting 230 houses with water-saving devices and conducting associated internal plumbing leakage investigations.

b. *Afforestation Review Panel*

Umgeni Water sits on the Afforestation Review Panel to consider and advise on all regional applications for afforestation permits. All permit applications have to be screened by the panel to assess the implications for catchment yield, particularly in catchments where runoff has already been substantially reduced through farming and other land use practices.

Umgeni Water is also starting a high level screening investigation of catchments within Umgeni Water's operating area to assess their present yield and anticipated future water demand as a basis for evaluating their afforestation potential. A rigorous in-house evaluation procedure for permit applications will be subsequently developed.

c. *'Working for Water' campaign*

Umgeni Water has allocated a total of R10 million to the restoration of river courses which have been impacted upon by alien invasive plant species and erosion. In addition to the primary objective of improving the water yield of affected catchments, the programme will contribute to improved water quality and will employ a substantial number of local people, resulting in positive impacts on local economies.

d. *Hazardous Waste Management*

KwaZulu-Natal does not have a hazardous waste disposal site. Inappropriate transport and disposal of such wastes presents a serious threat to surface and ground water resources.

During 1995/96 Umgeni Water led a partnership between the public and private sectors to initiate the process of establishing a licensed hazardous waste disposal site. The Umgeni Water approach is supported by the Minister of Water Affairs and Forestry and the provincial officials.

e Conservation, Recreation and Eco-tourism

Umgeni Water's responsibility extends to the environment surrounding the dams which it owns or manages. In 1993, when Shongweni Dam was decommissioned as a source of water for domestic use an agreement was struck with the Msinsi Holdings to manage the dam's environs on behalf of Umgeni. The Shongweni Resources Reserve was developed along eco-tourism lines drawing on the local community for labour and providing the community with an infrastructure which enables them to run a nature reserve commercially. Msinsi has also been contracted to manage the Nagle Reserve at Nagle Dam and certain areas at Darvill Wastewater Works and environs of Inanda dam.

f Soil Erosion Studies

The Water Quality Department within Umgeni Water is conducting a research on soil erosion and the related land uses that enhance the rate of soil loss. Three case studies are considered one of which is located in the close vicinity of the Mgeni catchment. The studies will help in quantifying the soil loss, its causes and its control. Though the studies fall outside the boundaries of the Mgeni catchment, yet the research is generic and findings can be transported to other locations of similar land use and topography.

3.1.3.11 Percentage increase in degraded land

From all the above investigation carried out for the Mgeni Catchment, it is clear that there is an overall degradation of the land resources reflected mainly in the deterioration of the water quality, reduction in the quantity of the water resource, increase in flood events and increase in the amount of runoff. These indicators show that there is an increase in the percentage of degraded land. It is very difficult in the short time span allocated for completion of this study

to quantify the percentage increase in land degradation without identifying land indicators that would need to be evaluated over at least five years. As far as the availability of data is concerned, a large proportion of the required data should be available in a crude format that need to be standardized to run temporal comparisons.

3.1.3.12 Percentage increase in irrigation licenses/ irrigated area

No new irrigation licenses have been issued in the last 5 years within the Mgeni catchment. This has been as a result of the realisation of the importance of the Mgeni River and the high demand on the system. (Perkins, pers. comm).

3.1.3.13 Population growth in the catchment

The projected population percentage growth in the Mgeni Catchment is 34% (MCMP).
DBSA predicted

Table 2: Percentage Population Growth and GGP in Representative sub-catchments of the Mgeni Catchment:

	Midmar	Albertfalls	Nagle	Henley /PMB	Thousand Hills	Durban	Total
Population % Growth	15	30	40	33	20	25	34
GGP % increase	7	30	30	40	50	45	40

3.1.4 Lessons Learnt

- The importance of water resource management and catchment protection have been identified as a priority in many areas in South Africa. However, few protection measures have actually been implemented as yet. The lack of structured approach to identify needs and develop action plans is still in its early stages.

- Institutional responsibilities are still fuzzy and undefined. However, there are a number of attempts to address this problem in the form of Integrated Catchment Initiatives viz. Midmar Catchment, Pietermaritzburg/Msundusi Catchment and the Albertfalls Catchment. All of these attempts have not reached the implementation stage but have all followed a bottom-up approach to ensure community involvement and sustainability of protective measures.
- Land uses and their impact on the water quality for the last ten years, does not show a considerable improvement, probably, due to the infancy of Integrated Catchment Management approach.
- Decisions are still economically-driven in the sense that where there is a project of high economic returns, environmental considerations could be relaxed to some extent.
- Assigning quantitative parameters to temporal variations in livestock density and irrigation licenses were not readily available hence were not feasible to include in the report.

3.1.4.1 Successes, Mistakes/Failures

Successes/ Mistakes/Failures

- Physical and environmental data on the Mgeni catchment are well documented.
- More time was required before the evaluation of the Mgeni catchment management approach was conducted. Most catchment initiatives have not been finalised yet.
- No new permits will be issued in the Mgeni catchment for afforestation, farm dams or irrigation.
- The classical conflicts between development and the environment are still healthy and well in South Africa.
- Pollution sources have been identified in most cases and where the source is diffuse, measures have been taken to narrow down possibilities of causative landuse.
- The involvement of Water Boards in catchment management is not clear in the new Water Law in South Africa.
- The Mgeni catchment is further divided into smaller sub-catchments for detailed studies for water source protection and pollution prevention. So far, there is the Midmar Integrated Catchment Initiative and that of the Pietermaritzburg Catchment. The former was initiated by the Provincial Government whereas the latter was by the Institute of Natural Resources and Umgeni Water.

Principle 2

ADEQUATE WATER ALLOCATION NEEDS TO BE AGREED UPON BETWEEN STAKEHOLDERS WITHIN A NATIONAL FRAMEWORK.

3.2.1 BACKGROUND

Historically in South Africa, the use of water resources has been very closely correlated with ownership of land adjoining natural surface water features. For many decades, land owners of property with river frontage could use their share of the dry weather flow in that river for their own purposes. The decision as to what constituted a fair volume to take was based largely on land area.

The principle of more detailed stakeholder involvement is a new one in South Africa, but it is one to which the authorities responsible for water resource allocation decisions are highly committed. At present, the majority of technical expertise relating to water resource measurement and allocation is concentrated within government, or government appointed agencies. Thus, the consultative process through which a resource allocation decision passes is heavily reliant on such agencies for data and interpretation.

Despite the difficulties involved in insisting on a consultative process, there is a very strong commitment to it from policy makers in South Africa. Technical experts generally agree on the desirability for such a process, but often point out how protracted consultation delays the implementation of new developments.

3.2.2 Methodology

This principle required interviewing a number of officials and consulting a variety of reports.

3.2.3 Results

3.2.3.1 Water sufficiency

The Water Resource Management document which this investigation is attempting to analyse is the Mgeni Catchment Management Plan, a water resource management study applicable to the Umgeni River catchment in KwaZulu Natal, South Africa.

The authors of the Management Plan report investigated the distribution of water resources within the catchment, and reported that the average flow from the Umgeni River to the sea was about $730 \times 10^6 \text{ m}^3$ per annum. The author's investigations found annual abstraction from the Umgeni River to be approximately $340 \times 10^6 \text{ m}^3$, broken down as follows:-

- 62% Bulk domestic water supply
- 19% Industry
- 18% Irrigation
- 1% local use and livestock watering.

Allocation of water to these various sectors is very strictly controlled by the DWAF. Any user wishing to abstract more than 5 l s^{-1} must obtain a permit from this government department, and permits are generally only issued to those with riparian rights, as defined under the Water Act (Act 54 of 1956). Strict limitations are also placed on the size of farm dams which are allowed to be built in the catchment. Land owners with riparian rights are those whose properties are in contact with a public stream.

Development of the water resources in the Umgeni Catchment in terms of large dams has been at the expense of the central government, and was carried out with the objective of assuring the supply of drinking water in the area. For this reason, abstraction from the system for users other than bulk domestic supply have their quotas calculated based on normal dry season flow figures without any attenuation allowed for dam storage. Thus the only benefits irrigation farmers and industries accrue from the presence of the large dams in their catchment is that the flow is more regulated than it would have been had the dams not been built.

The various stakeholders in the catchment express a variety of opinions regarding this highly regulated system. Application for bulk water usage are made to the DWAF, who investigate the enquiry internally and then issue permission or refuse it, depending on the results of their enquiries. Such decisions are not normally negotiable.

According to the DWAF, the larger authorities whose water resources they control are generally satisfied with the situation, but that industrialists and agriculture frequently express dissatisfaction. Industrialists typically call for a system with less regulation, and farmers are unhappy with the amount of water allocated to their sector. Forestry farmers in particular would like to develop their industry more in the catchment, but are unable to do so because DWAF is the department which issues permits to plant commercial forests. No formal record is kept of numbers of complaints, but informal records of meetings are kept and are not usually publicly available. The offices of the DWAF responsible for decisions of this nature are of the opinion that stakeholder satisfaction is an important issue, but that individual demands must only be met in the light of regional and national interests. The department views all water resources as a national resource, and reserves the right to use all water resources in the nation's interest as a whole.

3.2.3.2 Allocation mechanisms

As already stated, the allocation of water resources in the Umgeni Catchment is highly regulated by the controlling central government department, the DWAF.

Decisions regarding the allocation of water resources within the catchment are always routed through this department. Decisions regarding resource allocation are presently still made according to the riparian rights system, basing calculations on normal dry weather flow volumes. Factors such as the commercial benefit to which the water would be put under envisaged systems would typically also be included in considering any new application.

Stakeholder involvement in the decision making process varies widely between the various user groups in the catchment. The most formalised system of stakeholder consultation across

all levels takes place in the forestry sector, in which a group called the Forestry Review Panel is the forum for discussion pertaining to any commercial forestry issue in the catchment. Serious mistakes have been made in the past relating to the areas allowed to be planted to commercial forests, and the industry is widely perceived as being the one with the most impact on volumes of water delivered by a catchment to its surface water bodies. For this reason, the DWAF have been especially careful to ensure all interested and affected groups have representation on this advisory panel. The final decision still rests with the DWAF however, and decisions are generally irreversible.

With regard to any interest groups other than forestry, stakeholder consultation is less formalised. The DWAF are strongly committed to making decisions related to competitive resource demand with due care. Such care is typically brought about by negotiation with all groups expressing an interest in any particular allocation issue. Those concerned are invited to submit their assessment of a particular resource allocation issue, and the Department decides the outcome based on the merits of the arguments placed before them.

Water resource data for the Umgeni Catchment is largely held either by the DWAF or by Umgeni Water, the local bulk drinking water supplier. Some overlap in the information does exist, and in many cases, Umgeni Water act as an agent of the DWAF, particularly in connection with water quality issues in the inland regions of the catchment. All data and information held by the DWAF or Umgeni Water are available to the public on request. Information is usually distributed with disclaimers relating to use for legal purposes, and requesting source acknowledgement.

3.2.3.3 Legal background to resource allocation

Under water law current in South Africa at the time of writing, allocation of water resources was based largely on the Roman-Dutch riparian rights system. In layman's terms, this meant the normal (dry season) flow of any river would be fairly divided amongst those people living on the land bordering the rivers so as to utilise the entire base flow.

Under a new Water Act undergoing consideration by the South African Parliament in 1997, several fundamental differences are likely to be introduced into the decisions relating to water resource allocation, the major differences being that under the new act it is likely that there will be no ownership of water, only rights for the use of the resource for basic human and environmental needs. Authorization to use water in perpetuity is not likely to be allowed, and the location of a water resource in relation to land shall not confer preferential rights to usage. Environmental requirements are also likely to be a new facet in the new water law, although environmental considerations have for a number of years been given attention in resource allocation debates. Such considerations have not previously had legal backing, however.

In the Umgeni catchment, the old water act was effectively implemented, and a great degree of control was exercised over water usage in the catchment ever since population pressure became sufficiently high to require regulation of water resources. Currently, there is much debate as to whether the law was equally fair to all people living in the area, and the national issue is one viewed with sufficient importance by the government as to require the drafting of a new legal act.

3.2.3.4 Equity in distribution

The issue of equity in water resource distribution is a national debating point in South Africa, and the Umgeni Catchment is not excluded from this. Perhaps the most important question is in relation to access to safe drinking water. Rural people in the catchment typically make use of springs and untreated river water, with obvious health implications. In recent years, growing demand due to population growth, and severe drought conditions have resulted in central government, water authorities and local councils providing communal bore-holes for the supply of drinking water. There currently remains a great disparity in safe drinking water

provision between urban and rural areas, but a great deal of work is being expended to remedy this.

With regard to overall water resource allocation, the fairness of allocation is viewed differently in various sectors. With the DWAF at the highest (policy) level, the perception is that resource allocation has been unfair. However, technical staff with the DWAF whose work function it is to perform the calculations upon which allocation decisions are made affirm that all stakeholders are taken into consideration in their data analysis. Where authenticated inequalities have occurred in the past, the figures at the DWAF's disposal have shown these to be as a result of certain riparian users not exercising their rights, leading to an imbalance. Typically, more wealthy users take more than they should, and poor rural communities without the infrastructure or funding to fully utilise what should be their quota fail to take advantage of their rights under the old law. With community upliftment, groups who in the past did not make use of their legal entitlement are now demanding their rights, resulting in established users feeling they have less water available.

The equity issue is the basis for the current review of the Water Law in South Africa, and many complex issues remain to be resolved in relation to this before a legal system readily acceptable to all the catchment's inhabitants can be found.

3.2.4 Lessons Learnt

The involvement of stakeholders in debates concerning water resource allocation is a policy requirement in South Africa, and implementation of this policy is currently being brought about. With particular reference to the Umgeni Catchment, water resources are heavily utilised, and decisions regarding equitable distribution of the existing resources have to be made with due consideration for the benefit of the region as a whole. Decisions regarding allowable use are made by the central government agency responsible, and although as much consultation as is possible is carried out, decisions have to be made in the context of a resource too scarce to satisfy the desires of all users. Compromises have to be made which result in dissatisfaction among groups who perceive themselves to have been discriminated

against, but as a principle, stakeholder agreement is sought in decisions regarding water resource allocation.

Successes, Mistakes and weaknesses

Successes /Mistakes /Failures.

- The identification of mistakes in the resource allocation process has led to the formulation of active consultative fora to address these issues.
- Allocation of land to long term resource consuming activities (such as commercial forestry) needs extremely careful consideration. Insufficient attention to detail, or lack of data had lead to serious errors in the past.
- The primary principle of full stakeholder involvement has been identified as a priority among major resource allocation agencies.
- Duplication of catchment management activities, particularly data measurement, storage and management weakens the effectiveness of the available (but limited) catchment management resources.

3.2.4.1 Open Issues

- The consultative phase of water resource management in South Africa needs more time to be fully tested. Additional weaknesses and strengths may still emerge in the future.
- Provision of safe drinking water in rural areas and the understanding of what constitute 'safe' water requires continued implementation and development.

PRINCIPLE 3

3.3 EFFICIENT WATER USE IS ESSENTIAL AND OFTEN AN IMPORTANT RESOURCE.

3.3.1 Background

At a national level in South Africa, efficiency of water use is viewed by the government department responsible for Water Affairs and Forestry with a great deal of concern. In many regions in the country, rainfall is often insufficient, or too irregular to render surface water a dependable resource without intervention. As a result, many large dams were built in the past. With increasing costs of development in progressively more difficult sites, and growing environmental awareness, this policy is becoming viewed with less confidence to provide answers in the future. Inter-basin transfers continue to be utilised where strategic demands dictate the need for assured water supplies; but such schemes frequently are becoming prohibitively expensive.

3.3.2 Methodology

This principle required interviewing a number of officials and consulting a variety of reports.

3.3.3 Results

3.3.3.1 Efficiency of water use

Nationally, a programme is under way to maximise the yield of water from catchment areas. Frequently, run-off from South African catchments is adversely affected by the planting of alien forest vegetation. The current government campaign is aimed at clearing alien vegetation from a buffer zone 30-50m on either side of all water courses. Preliminary results from this exercise are encouraging, but it will of necessity be an extremely long term project.

In the Mgeni catchment, the high rainfall, and developed infrastructure of storage dams have meant that efficiency of water use is not frequently considered to be a factor of critical urgency.

However Umgeni Water as the regional bulk water supplier in the area, does realise that efficiency of water use is an important aspect of responsible resource utilisation. This realisation is acted upon by Umgeni Water in terms of ensuring losses in the bulk water reticulation system are minimised by maintenance of the system under its control. In general though, efficiency of water use does not appear to be viewed as a resource in the Mgeni River Catchment.

Since volumes of purified water sold by Umgeni Water convert directly to revenue earned, the organisation focuses its attention on leak reduction to the part of the network on the bulk supplier side of metering systems. The company does not, as a rule attempt to influence the water usage patterns of its customers or undertake repair of end-user infrastructure.

The majority of water abstracted from the Mgeni Catchment is taken for the purpose of purification for potable water supply to the Pietermaritzburg, Pinetown and Durban areas. Strict control is thus exercised by the DWAF over abstraction for other purposes. This control effectively limits the ability of farmers, industrialists or others to waste significantly large volumes of water.

3.3.3.2 Measures of inefficiency.

Very little actual measurement of losses from reticulation systems in the Umgeni Catchment appears to be undertaken. Umgeni Water and its client municipal groups have the expertise and ability to deal with leakages, and do so on a reactionary basis. Umgeni Water in particular are of the opinion that loss reduction will become a more frequent aspect of their operational activities as the emphasis of the company's business shifts from the original position of bulk supplier to a company increasingly involved with direct supply of water to the end user.

With this realisation in mind, Umgeni Water have formulated a plan for detailed investigation of losses due to leakage from small diameter lines. A pilot study into this matter is scheduled to begin in 1998.

3.3.3.3 Effective use of water

With increasing development, the provision of purified water to individual households in the Mgeni Catchment generally takes place with the understanding that consumers must pay for the water they use. Foreign aid, national and local development funds and other such financial resources are often utilised to provide funding for the infrastructure required to supply purified water, but factors such as maintenance and repair costs are usually given consideration in the calculation of appropriate water tariffs. The extremely high costs of providing purified water in remote rural areas are not borne entirely by the consumers in those areas. Cross subsidisation from the urban areas is often the only way safe drinking water can be supplied to outlying areas at a price affordable to the people living there.

The cost of purified water to rural consumers appears to act as an effective self-regulating technique which ensures individuals are conscious of the volumes of water they consume. Watering of home gardens and domestic animals seldom appears to be done using purified water; individual householders seem to most often rely on traditional unpurified sources for such purposes.

The current more extensive purified water reticulation systems in the Umgeni Catchment are yet to be tested under severe drought conditions. In the past, when lack of rain threatened the ability of the catchment to provide sufficient water to meet normal consumption patterns, public campaigns and voluntary restrictions were the methods employed to deal with the supply shortage. The increased number of consumers in the Mgeni Catchment could lead to the need for more rigorous restrictions under future drought conditions; but the difficulties experienced in the previous drought years of the 1980s resulted in the provision of infrastructure to allow for inter-basin transfers of river water to augment the naturally available volumes in the Mgeni Catchment.

3.3.3.4 Non-implemented efficiency plans.

At the height of serious drought conditions in the Mgeni Catchment, a number of contingency plans were developed to manage the situation under prolonged dry periods. These proposals included the re-cycling of wastewater, but were not implemented due to the arrival of sufficient rains.

Under such drought conditions, individual municipalities enforced their own water saving measures. The use of hose pipes was banned and households were limited to a daily allocation of water. If the daily consumption figure was exceeded, the authorities threatened to impose punitive cost penalties for volumes consumed above the regulated limit, or restriction in the rate of flow delivered to consumers frequently exceeding their allocations. These extensive measures were not frequently enforced due to heightened public awareness of the severity of the situation making such measures unnecessary. It must be stressed that far fewer consumers were connected to such supplies when last such measures were necessary, so making such campaigns much easier to enforce in the past.

Under the present conditions of sufficient good quality water for the supplied consumers living in the Mgeni Catchment, efficiency of water use is not often seen as a factor of vital importance. More emphasis is placed locally on developing new infrastructure to supply the considerable numbers of people living in the area who currently do not have access to safe drinking water.

3.3.4 Lessons Learnt

- More efficient use of water appears to be recognised as the answer to ever increasing demands placed on a (sometimes scarce) resource.
- Considerable expenditure to maximise the sustainable yield of catchment areas appears to be money well spent.

3.3.4.1 Successes/failures

Successes	Mistakes/Failures
Umgeni Water put considerable resources into leak detection and prevention, as do the organisations client municipalities.	Efficiency of water use is not a great priority in the study area. Good rains of the past few years seem to have dimmed the memory of severe shortages of 10 to 15 years ago.
In times of severe drought, consumers in the study area have responded favourably to campaigns to save water. Awareness of the importance of the shared resource seems to be easily raised if necessary.	Effective means of measuring the efficiency of water use do not appear to be in place at the time of this survey.

3.3.5 Open Issues

- No open issues were identified.

PRINCIPLE 4

3.4. MANAGEMENT NEEDS TO BE TAKEN CARE OF AT THE LOWEST APPROPRIATE LEVELS

3.4.1 BACKGROUND

The purpose of this principle is to bring together and discuss the several components included under the overall concept of decentralisation. There is now a strong consensus that institutional weaknesses and malfunctions are the main forces behind the slow delivery of national water and sanitation services to communities who need them most. There is an urgent requirement, in many communities, for attention to be given to creating an enabling environment for decisions to be taken at lowest appropriate levels. This environment has to be created in order to address the needs relevant to all water sector activities, including water resources assessment, planning and management.

In creating the enabling environment for lowest appropriate level management, the role of the central government includes mobilisation of financial and human resources, legislation, setting of standards and other regulatory or policy functions, monitoring and assessment of the use of water and related resources, and creating opportunities for public participation.

The linkage from the national through the provincial to the local levels of government is also, however, particularly important within the water and sanitation sector as many important practical day-to-day decisions regarding the resource must be made at very local levels.

To ensure that the initiation, promotion and development of integrated water resources takes place at an appropriate level, legislation must be enacted to define the responsibilities and obligations of the various sectors of government and to define the basis of devolution of responsibility from the central to the lower levels of government. Existing administrative structures will often be quite capable of achieving effective local water resources management, but the need may arise for new institutions based upon the perspective, for example, of river catchment areas, regional councils and local community committees. Although water is managed at various levels in the socio-economic system, demand-driven

management requires the development of water related institutions at appropriate levels, taking into account the need for integration with land-use management.

The central government and private sector have an important role to play in providing support to lower levels of government and local communities in creating the required enabling environment for integrated water resources management. This should include, as appropriate, technical and financial support to local levels, including community-based institutions, non-governmental organisations and women's groups.

3.4.2 METHODOLOGY

The research focused on the compilation and interpretation of information produced by local agencies, individual researchers and consultants. It was considered appropriate to concentrate on strengths and weaknesses that have been experienced, and wherever practical, to identify and isolate the main driving forces behind those strengths and weaknesses. To this end, the following methodology was followed:

- Visits were undertaken to selected institutions within the Mgeni catchment, with the aim of meeting with those individuals responsible for water resource management and development issues as well as those involved in the initiation and implementation of integrated catchment management plans and actions at national level as well as within the Mgeni catchment.
- Personal and telephonic interviews were conducted with water resource managers and practitioners, including key staff within the DWAF and Umgeni Water, as well as research institutions engaged in the planning and implementation of integrated catchment management plans and actions. These interviews and interactive discussions were supplemented in meetings.
- Numerous study reports and policy documents were obtained from several government and private institutions and agencies. These documents were thoroughly scrutinised to determine their usefulness in addressing the requirements of the project as a whole.

- Personal interviews were conducted with water resource managers and strategic planners within the DWAF and Umgeni Water.
- Telephonic interviews were conducted with several stakeholders, including well established environmental/conservation groups or agencies, agricultural/farming associations and industrial / commercial associations.

3.4.3 RESULTS

3.4.3.1 Management Responsibilities in Water Supply Systems:

South Africa has experienced sweeping socio-economic and political changes since 1994. Previous 'command and control' approaches to water resources management imposed unilaterally from the central government, are no longer widely accepted by the general public. Communities now feel that there is a growing need for them to participate in, and contribute to, decision-making processes, partly due to their lack of trust in previous delivery systems. Water resources management processes are becoming more people-oriented, rather than being dominated by technical considerations as it was the case in past. The current situation is being described below.

In South Africa water resources are regarded as very important national asset. The central governments is recognised as the custodian of these resources. The DWAF is tasked with the responsibility of water resources management on behalf of the government. The central government has two main responsibilities with regard to water resources. Firstly, to ensure that all citizens of the country have access to adequate safe water. The government bears the overall responsibility for this. The second responsibility relates to the management of the national water resources. In short, the DWAF has a responsibility to ensure that both the basic needs of the people are met, together with those additional needs for water required to sustain the current needs of users and the anticipated growth in the national economy.

The national department plays a minor, more indirect role in terms of direct water supply. This responsibility is largely delegated to regional or local agencies. The DWAF establishes national policy guidelines and a national water development strategy. It also sets the minimum service standards and monitors and regulates the actual service provision. The department is involved with the building of some of the dams, bore-hole complexes and inter-basin transfer schemes. It is rather difficult to state categorically how long the department has been monitoring these supply systems. However it might suffice to mention that the mandate of the department as discussed here had its foundations in the Water Act of 1956. This was firmed upon in 1970 when fundamental amendments were made to the Act (DWAF, 1986).

The management and development of water resources is not included within the new constitution's list of schedules 4 and 5 functions which outline provincial governments functional responsibilities. Provincial governments share the general responsibility for assuring the supply of water services. This is done via the promotion of effective local government.

In addition, recently Provincial Water Committees have been established to facilitate liaison and co-ordinated development planning between the regional offices and other provincial government departments. The need for these water committees was identified in the Water and Sanitation Policy of 1995 (DWAF, 1995a). The Provincial Water Committees are also responsible for taking care of common interests among various institutions; informing the central government; identifying priorities and critical areas; and advising on the implementation of RDP based water and sanitation services. The lack of capacity in the sphere of water resources management has delayed their establishment in some provinces. Furthermore, the capacity of Umgeni Water to deliver water services means that no such committee will be required in the area operated by this agency in the near future.

Water Boards were established in terms of Section 108 of the Water Act of 1956. The management board of a water board is composed of representatives of the communities the water board supplies to and one representative from DWAF. Umgeni Water, the only water board in the Mgeni catchment, was established in 1974. It is responsible for bulk water supplies for urban, industrial and agricultural use to local authorities within its area of

jurisdiction and large individual consumers. Umgeni Water's primary role involves primary storage facilities and bulk transmission pipeline infrastructure which supply water to a number of urban local authorities and rural settlements.

The rural settlements have only recently been (about five years ago) supplied by these bodies. Bulk water supplies refers to primary storage dams, bore-hole complexes, water and sewerage treatment works, reticulation and pumping to treatment works and secondary storage reservoirs. To achieve its mandate, Umgeni Water determines the existing and future water demands of user groups and to provide infrastructure which is needed to supply the required water (in terms of quantity and quality). It receives untreated water in bulk from the state owned schemes such as dams or the organisation itself exploits ground water sources. It is further responsible for water purification and for bulk distribution to the different water user groups within its operational area. Normally Umgeni Water will not undertake the distribution of water to individual users within the boundaries of a local authority. Umgeni Water also owns and operates wastewater works over and above large pump-stations, aqueducts, water works and some dams.

Irrigation Boards, like water boards, are statutory bodies which serve the interests of groups of irrigation farmers. They operate and maintain water supply systems for agricultural use. No irrigation boards are operational in the Mgeni catchment.

In urban areas, the responsibility of actual water service delivery lies with the local government i.e. metropolitan and local authorities. As providers of these utility services, local authorities can be major water developers or generators of wastewater. In terms of the Constitution, local government has the responsibility to make provision for access by all persons residing within its area of jurisdiction to water and sanitation providing that such services and amenities are rendered in an environmentally sustainable manner and are financially and physically practicable. The water and sanitation departments within these authorities manage secondary storage and transmission facilities serving a defined urban area or rural settlement. In particular this refers to secondary storage reservoirs, secondary reticulation which serve a number of townships, suburbs or rural areas. In terms of sanitation, this includes sewer reticulation from urban communities to wastewater treatment works.

In rural areas, the provision of water and sanitation to the end user currently lies with the Water Boards (where they exist). In fact, sanitation is largely not provided in rural areas despite this arrangement. In these areas, new regional councils have been established. It is hoped that they will become fully-fledged local authorities, onto which this responsibility may be passed once capacity to operate and maintain the projects has been established. It is envisaged that water board capacity might be seconded to the regional councils (DWAF, 1995a).

The maintenance of off-site water and sewer reticulation is the responsibility of urban local authorities. In rural areas, this responsibility lies with Water Boards and Regional Councils (formerly Joint Services Boards). Regional councils usually focus on a single activity such as drinking water supply, sewerage or drainage. The inherent problem with this approach is that these structures lack management capabilities and do not link well with local governments (J Perkins, pers. comm.).

Recently in rural areas, responsibilities for maintenance and operations of reticulated infrastructure have been shared with or are being passed over to local Water Committees. The establishment of local water committees is a pre-requisite of government funding of basic needs, as required in terms of the government's Reconstruction Development Programme (RDP, 1994). Umgeni Water has developed and is already implementing its Rural Areas Water and Sanitation Plan (RAWSP). The principles and objectives on which RAWSP is based are matching those laid down in the RDP policy. From the start, Umgeni Water recognised the importance of stakeholder/community involvement in the delivery and maintenance of water supplies. The organisation's Rural Planning Officers are tasked with visiting rural areas with the aim of first gaining commitment from the people. They guide the community in the establishment of Local Water Committees. The latter liaise with the Rural Planning Officers and eventually become responsible for the management of the water and sanitation infrastructure once the schemes are commissioned. The RAWSP principles and programmes are enthusiastically endorsed by the various levels of management.

The responsibility and roles of different aspects of water resource management are given in Figure 5.

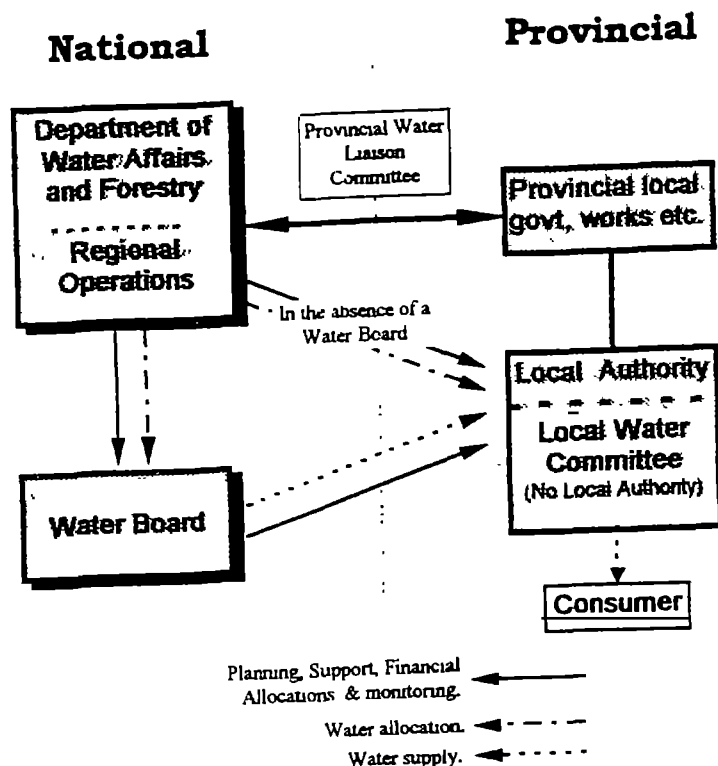


Figure 5: Responsibilities and roles for water resources management (DWAf, 1995a)

3.4.3.2 Bulk water supply infrastructure:

Umgeni Water manages bulk storage and distribution infrastructure to provide bulk supplies to domestic and industrial consumers. The bulk water supply infrastructure includes pump stations, aqueducts, pipelines and water works. The bulk water supply system covering the entire Mgeni catchment is set out in Table 3. The system is divided into the inland and coastal systems.

Table 3: Bulk water supply systems in the Mgeni catchment (DWAF & UMGANI WATER, 1995)

System	Source	Pipe capacity MI/d	Waterworks	WW capacity MI/d	Area serviced
<u>Inland</u>					
Midmar Dam					Mpophomeni, Howick-West, Western Pmb
- Pipeline 51	Midmar	187	Mill Falls*	10	
- Pipeline 251	Midmar	394	DV Harris	81	Pmb, Edendale, Ashburton, Thornville
- Pipeline 61	DV Harris	80	HD Hill & Umlaas Rd		
- Pipeline 53	DV Harris	55	Umlaas Road	55	Cato Ridge, Hammarisdale, Pinetown, Inchanga, Elangeni, Georgedale, Mpumalanga
- Pipeline 57	Umlaas Road	65	Distribution		
-	Midmar	-	Howick	4	Howick, SARMCOL
Henley	Henley Dam	38	HD Hill	38	Edendale, southern Pmb
<u>Coastal</u>					
Nagle Dam					
- Aqueduct 1	Nagle Dam	110	Durban Heights & Wiggins	610	70% greater Durban
- Aqueduct 2	Nagle Dam	159			
- Aqueduct 3 & 4	Nagle tower	220 & 223	Durban Heights Durban Heights		
Clermont pumps					
- Pumps 1-3		105	Wiggins	175	25% greater Durban
- Pumps 4-6	Mgeni River Mgeni	345	Wiggins		

	River				
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*Mill Falls was decommissioned at end of 1996.

The waterworks are monitored daily for water quality for a number of variables. The inflow and outflow are also monitored on a daily basis.

3.4.3.3 Wastewater Works

There are more than 28 wastewater works situated in the Mgeni catchment, of which Darvill WWW near Pietermaritzburg and the Northern, Central and Southern WWW near Durban have the highest inflow and outflow returns. The main WWWs that discharge into the Mgeni river and its tributaries are given in Table 4.

Table 4: Main wastewater works in the Mgeni Catchment (DWAF & Umgeni Water, 1995)

Wastewater Works	Discharge point	Volume of effluent (MI/d)	Works capacity (MI/d)
Mpophomeni	Umthinzima	08	0.7
Howick	Mgeni	1.0	6.5
Darvill	Msunduzi	60.0	54.0
Cato Ridge	Mngeweni	5.0	unknown
KwaDabeka	Mgeni	2.0	9.0
KwaMashu	Sea Cow Lake	30.0	70.0
Durban Northern	Mgeni	36.0	70.0
New Germany	Aller	2.2	6.7

Most of these wastewater works have been upgraded since 1991. All wastewater works are monitored for the following variables:

- amount of effluent entering the works.
- quality of treated effluent before it is discharged into a river
- rainfall.

The monitoring for water quality is mandatory in terms of Section 21 of the Water Act of 1956.

3.4.3.4 Dams

There are five major dams located in the Mgeni catchment, of which Midmar Dam is found higher up the catchment and Inanda Dam is the lowest down the catchment. Henley Dam near Pietermaritzburg is the only major dam outside the Mgeni river. Tables 5 and 6 list the major dams and provide information about their physical characteristics respectively.

As discussed earlier, most dams are built by the national department of water affairs. In the Mgeni catchment, these dams are managed and operated by Umgeni Water.

Table 5: Major dams in the Mgeni catchment

Name (River)	Date of Commissioning	Purpose	Owner (Operator)
Midmar (Mgeni)	1965	Supply Pietermaritzburg and inland water supply system; irrigation downstream.	DWAF (UMGENI WATER)
Albert Falls (Mgeni)	1975	Augment storage of Nagle Dam.	DWAF (UMGENI WATER)
Nagle (Mgeni)	1950	Supply greater Durban area.	UMGENI WATER (UMGENI WATER)
Henley (Msunduzi)	1942	Supply Pietermaritzburg and inland water supply system; recreation.	UMGENI WATER (UMGENI WATER)
Inanda (Mgeni)	1989	Supply Clermont pumpstations, downstream users and estuary	DWAF (UMGENI WATER)

Table 6: Physical characteristics of major dams in the Mgeni catchment (DWAF & Umgeni Water, 1995)

Name	Altitude (m)	Catchment area (km ²)	Volume at FSL (Mm ³)	Surface area at FSL (km ²)	Maximum depth (m)	Mean depth (m)
Midmar	1046	928	177.3	15.64	19.8	11.4
Albert Falls	656	1644	289.1	23.54	24.6	12.2
Nagle	404	2535	23 2	1 56	24 4	15 2
Henley	931	238	5 9	0 66	20	8.7
Inanda	146	4028	258.6	14 63	?	?

The following monitoring is undertaken on a daily basis at the dams:

- water levels
- evaporation
- rainfall
- dam inflow
- dam abstraction to the water works

3.4.3.5 Farm Dams

Farm dams are owned by individuals for agricultural use. The number of farm dams in each of the major dam catchments is shown in Table 7.

Table 7: Farm dams by dam catchment (DWAF & Umgeni Water, 1995)

Catchment	Number of farm dams	Area (km ²)	Capacity (x 1000 m ³)
Midmar Dam	460	8.42	19 732
Albert Falls Dam	248	3.72	7 439
Nagle Dam	199	2.97	5 974
Inanda Dam	197	1.18	1 695
Total	1 104	16.29	34 840

No information is available regarding the monitoring systems of the farm dams. However, the DWAF monitors the number of dams built in the catchment as it is required in terms of the Water Act that any individual constructing a dam with a capacity of 150 m³ needs a permit.

3.4.3.6 Groundwater Sources

It is generally believed that South Africa is not richly endowed with groundwater resources which can be exploited cost-effectively. Nevertheless, there are some areas with proven ground water sources that can be exploited for use. However, for a number of reasons ground water exploitation is not seriously considered. The most important of these relates to uncertainty about bore-hole yields, which is due mainly to lack of knowledge about hydro-geological characteristics of groundwater sources such as natural recharge rates, the utilizable storage capacity and the abstraction potential from aquifers (DWAF, 1986).

Another important issue is that in South Africa ground water is generally regarded as private water that is exclusively available to the owner of the ground on which it is found. This means that current legislation does not facilitate the development of groundwater sources in the public interest, but at the protection of the interests of relatively small group of landowners situated within an underground water control area.

Regarding the availability of bore-hole information in the Mgeni catchment, estimates put the current number of bore-holes at over 180. The only information documented in respect of number of bore-holes comes from those that are drilled either by the state or its agency like Umgeni Water. Privately drilled bore-holes are not recorded. This is despite the fact the Water Act of 1956 (Section 32) provides for drilling contractors to submit returns of bore-holes to the Department.

In short, quantities of ground water abstracted and fluctuations in the groundwater level are not known. An insignificant number of bore-holes are randomly monitored for water quality by Umgeni Water. However, this is only done after a complaint has been lodged by a landowner or member of the public (if bore-hole is used in a community).

Although groundwater plays a limited role in respect of water supply than it does in other countries of the world, where groundwater is the main source of water, it is often the only source available to isolated communities and is the most cost-effective alternative in such circumstances (DWAF, 1995a). The importance of ground water is therefore rapidly growing throughout the country as a result of the dwindling surface water resources and the need to develop local resources optimally.

Detailed water quality monitoring is conducted for those bore-holes that provide the main supply to a community water supply scheme.

3.4.3.7 Storm Water and Sewerage systems

The management of these systems is a competency of metropolitan and local authorities. In areas with no local authorities but which have storm water or sewerage systems, regional councils manage and operate them. A survey of local authorities found within the Mgeni catchment indicated that great variation exists in the manner the storm water and sewerage reticulation systems were monitored. Some undertook monitoring and recorded all monitoring results on computer whereas some kept no monitoring programmes. The information on the availability of storm water and sewerage records is provided in Table 8.

Table 8: Storm water and sewerage in the Mgeni Catchment (DWAF & UMGANI WATER, 1995)

Municipality	Records	Storm water	Sewerage
Durban	InfoMap/ArcInfo	Yes	Yes
Westville	UNIGAS	Yes	Yes
New Germany	None	No	No
Pinetown	Drawing	Yes	No
Clermont	Drawing	Yes	No
KwaDabeka	None	Yes	Yes
Inanda	Drawing	Yes	
Ohlanga Amatikwe	Drawing	Yes	
Kloof Forest Hills	Drawings	Yes	No (septic tanks)
Gillitts Everton Hillcrest Botha's Hill Drummond Waterfall	None	Yes	No (septic tanks)
Cato Ridge Camperdown Ashburton	None	No	Yes
Pietermaritzburg	GIS	Yes	Yes
Edendale	New areas (Drawing)	Yes	Yes
Imbali Ashdown Georgetown Caluza Snathingi Sobantu	None	No	
Plessislaer Inchanga	Drawing	Yes	
Smero Esigodini	Drawing	Yes	
Mpophomeni	Drawing	Yes	Yes
Inchanga West Langefontein	None	No	No (septic tanks)

Harrison			
Hilton			
Howick			
Wartburg			
Dalton			
Impendle			

3.4.3.8 Summary of Monitoring Programmes

Types

The major types of monitoring undertaken in the Mgeni catchment include the following:

- riverine
- impoundment
- estuarine
- abstraction
- groundwater
- bulk supplies
- effluent treatment
- effluent discharge

Objectives

The objectives for monitoring programmes include

- River :
- baseline data
 - problem identification
 - fitness-for-use
 - load estimation
 - water quality modelling

Estuary:

- baseline data
- problem identification
- fitness-for-use
- load estimation
- water quality modelling

Impoundment:

- baseline data
- problem identification
- fitness-for-use
- load estimation
- water quality modelling
- operational management

Abstraction points: - waterworks operational management

Wastewater works:

- compliance monitoring in terms of DWAF permits
- wastewater works process performance monitoring
- load estimation to the receiving water bodies

Gauging stations

Details of main gauging stations at impoundments and rivers are given in Table 9.

Table 9: Gauging stations in the Mgeni catchment

CATCHMENT	DWAF STATION No.	UMGENI WATER NO.	LATITUDE	LONGITUDE	NAME
Midmar	U2H007	1	29°26'23''	30°09'00''	Lions River
	U2H013	2.1	29°30'39''	30°07'47''	Petrus Stroom
	U2H048	3	29°29'42''	30°12'16''	Umgeni Midmar Outflow
	U2H049		29°29'42''	30°12'42''	Pipeline from Midmar dam
	U2R001	36.1			Midmar dam
Albert Falls					
	U2R003	41.1			Albert Falls dam
	U2H006	5 1	29°22'50''	30°16'39''	Karkloof at Shafton
	U2H012	11 1	29°26'13''	30°29'11''	Sterk at Ghoeck
	U2H021	9	29°25'18''	30°38'13''	Crammond
	U2H014	8	29°25'58''	30°25'56''	Umgeni Albert Falls Outflow
Msunduzi					
	U2H022	70	29°39'39''	30°38'13''	Duzi at Eddy Hagan drive
	U2H011	57	29°38'44''	30°15'34''	Duzi Henley Inflow
	U2R005	74 1			Henley dam
	U2H060	58	29°38'21''	30°15'35''	Henley diversion
	U2H057	61			Slangspruit
	U2H058	62	29°37'51''	30°21'12''	Duzi at Masons Mill
	U2H041	67	29°36'27''	30°27'00''	Duzi at Motor X
	U2H042	21	29°39'31''	30°41'02''	Mngweni
		71.9			Darvill WW outfall

CATCHMENT	DWAF STATION No.	UMGENI WATER NO.	LATITUDE	LONGITUDE	NAME
Nagle					
	U2H005	14	29°35'05''	30°35'15''	Umgeni Nagle Inflow
	U2H052		29°35'31''	30°37'41''	Nagle Diversion
	U2H053		29°35'31''	30°37'41''	Pipeline from Nagle dam
	U2R002	43.1			Nagle dam
	U2H059	15	29°35'09''	30°37'17''	Nagle diversion channel
Inanda					
	U2H055	20	29°38'31''	30°41'15''	Nagle/Inanda weir
	U2R004	51.1			Inanda dam
	U2HO54	26.2	29°42'29''	30°52'04''	Umgeni Inanda Outflow

3.4.3.9 Water Resources Management

Department of Water Affairs and Forestry

In a semi-arid country like South Africa, it is pertinent that the country's water resources should be developed and managed to the benefit of the country as whole. For this reason, water resources (both surface and ground water) in South Africa are under the full control of the national department of water affairs. The need to put the management and control of the country's water resources by the state was identified in the 1970s with the amendment of certain provisions of the Water Act 54 of 1956.

Prior to 1970, the department responsible for water resources management and development concentrated mainly on the supply of water for irrigation, and regularly consulted the departments responsible for agriculture and land matters. This created some shortcomings in the department's planning of the country's water resources development.

To realise the shift of emphasis and approach, fundamental amendments to the Water Act of 1956 were made. This ensured that full control over the allocation and use of water in public streams was vested in the national department. Since these amendments to the legislation, the department was provided with the mandate to apportion the available water resources among various sectors of the economy. The development, management and administration of water resources are now strongly centralised. Strategic water resources infrastructure such as dams and inter-basin transfer schemes are developed and managed with a direct involvement of the national department. The local and regional authorities and agencies play an important, amid subsidiary, role by providing for urban and rural needs and the distribution of water.

Surface water is the most readily available source of water and the national department concentrates mainly on the development of these water resources. The water legislation contains comprehensive provisions regarding the rights to the use (not ownership) of surface water for various purposes. There is distinction made between private and public water. Where water rises or falls on a particular property, the exclusive right to the use of private water for any purpose rests with the owner of that property. The rest of surface water is public water. There is no right of ownership of this water but a right to use. The use of public water is subject to a number of restrictions in terms of quantity, storage, etc.

Groundwater sources are limited in South Africa. Except in few places, where the resources have a potential for public use and therefore do not warrant management and control by the state, the use of groundwater rests with the owner of property on which it is found. Where there is a potential for the resource to be used communally, the state guards against over-utilisation by empowering the national Minister to issue directives to regulate the exploitation of groundwater within a defined subterranean water control area. The limited involvement of the state in groundwater resources development can be attributed to the following factors:

- uncertainty about groundwater yields which in turn is due to a lack of knowledge about hydro-geological character of groundwater sources
- shortage of expertise and technology in the field of borehole drilling

- groundwater is generally regarded as private water that is exclusively available to the owner of the ground on which it is found.

Statutory Bodies

The national department recognised in the Water Act of 1956 that local water sources could be controlled and managed by local agencies. To this end, the Water Boards and Irrigation Boards were established as statutory bodies. They are empowered to control water resources on behalf of the national government. In the Mgeni Catchment three out of five dams are owned by the national government but they are all operated on day to day basis by Umgeni Water. In their area of jurisdiction, irrigation boards operate water resources schemes on behalf of the state.

These bodies are empowered to devise policy and undertake strategic planning with regard to water resources management. However, these activities should be endorsed by the national government.

Other

The local levels of government generally are not considered major participants in water resources management, but certain significant activities are delegated to these levels. This is primarily attributed to the restricted perspective associated with the small geographic scope of the typical local government. Management decisions based on such a perspective are likely to give inadequate attention to effects of the decision, external to the decision-maker and therefore give inadequate attention to general social upliftment.

3.4.3.10 Level of water resources management

The DWAF as custodians of water resources in South Africa, have recognised the importance of promoting local autonomy by encouraging local institutions to assume the responsibility for those services that are of a more local than national interest. Such bodies include Water

Boards and Irrigation Boards (largely based on catchments) and some regional authorities. Since the change of government in 1994, local water committees have been made mandatory for issues relating to water and sanitation services provision. These committees are responsible for the implementation, operation and maintenance of local water supply and sanitation schemes.

For a number of reasons, including socio-political history of South Africa, local structures are generally weak. They lack capacity in technical, financial and management attributes. For this reason, there is a danger of taking uninformed decisions which in turn lead to collapse of the delivery systems. To this end, the lead agencies such as Water Boards provide a very strong extension services to local committees by extending their technical guidance and support to the communities. They also provide funding or assist local organisations to motivate for funding for initial scientific/technical investigations, and for the running costs incurred by the committees. In short, there is no doubt that community structures at local level lack sufficient expertise and skill which can be utilised in managing local water supply schemes.

Within Mgeni catchment there are approximately seventy local water committees. Of these, approximately 60 are functioning well with clear roles and responsibilities. Their main functions include selection of areas in the community that should be provided with water first; select the type of the project to be implemented; determine the training requirements in the community; and selection of people within the community who will actually implement the project. As already mentioned, the capacity of these committees is not adequate and for this reason a number of issues have to be resolved with the assistance of the lead agency. Issues which usually require the intervention of Umgeni Water include:

- labour disputes
- individual water connections
- Meter reading
- accounts management

The policies provide that the local committee should be mentored over a certain period (approximately 2 years) to learn how to resolve these matters. Once the committees have been given this capacity, schemes are handed to the community.

In a recent study conducted within Umgeni Water, it was shown that over 90% of stakeholders (Principle 5) are satisfied with the management of water supplies by the organisation (Nyasulu & Associates, 1997).

3.4.3.11 Role of existing legislation

While the Water Act of 1956 recognises the importance of subsidiarity in water resources by facilitating the establishment of regional offices, water and irrigation boards, this is perhaps not sufficient. In urban areas, local authorities are the lowest administrative bodies entrusted with the task of water resources provision and management. In rural areas where local authorities did not exist (until June 1996) to undertake the responsibility of water resource management, it can be argued that the existing water law does not adequately facilitate this principle.

The water law is being reviewed. This process seems to address the weaknesses of the previous and existing legislation.

3.4.3.12 Changes in the level of water resources management

The sweeping socio-political changes in South Africa have led to the introduction of a new Constitution and with it fundamental changes to policies and legislation including the water law. In terms of the constitution, water is a function of the central government. The basis for this is that water is a scarce national resource which requires state management and planning.

Despite this bias towards a centralised management of water resources, this does not preclude the interests of other levels of government in this important functional area. In terms of schedules 4 and 5 of the constitution (which sets out the legislative competencies of provinces), there are several functions of provincial government which interface with water

resource management and which undoubtedly call for close liaison between the central government and the various provincial governments.

At the beginning of 1995, a Water and Sanitation Policy was produced by the DWAF to provide a new framework for the management of water resources. In terms of the policy, Provincial Water Committees should be established to undertake the task of local water and sanitation provision until effective local government structures have been established. Where capacity of communities is not satisfactory, a water board should provide this capacity or second its capacity to areas where it is needed most - the rural areas.

The water law review process on which the government is currently embarking does not include consideration of which level of government should be responsible for managing water resources as this question has already been settled by the constitution. Nevertheless, the Water Law Principles, which were approved by Cabinet at end of 1996 provide a framework for delegating responsibility of water resources management to regional level. For example, Principle 23 requires "the responsibility for the development, apportionment and management of available water resources to be delegated to a catchment or regional level in such a manner as to enable interested parties to participate" (DWAF, 1996a).

Furthermore, the government's Reconstruction and Development Programme policy requires involvement of local communities in water resources management and development. The establishment of local water committees by the developing agency is the prerequisite for accessing government funding for a community water supply scheme.

However, these changes regarding levels at which water resources are being managed, are faced with a number of problems. One of the key problems is the lack of capacity of these community structures to undertake tasks that are expected of them. For this reason, most desperately required services such as water and sanitation provision are being delayed when the committees are receiving training.

3.4.4 LESSONS LEARNT

The general approach to water resources management and development as advanced by the Mgeni Catchment Management Plan rests heavily on the acceptance of individual or group responsibility by communities, with as little interference by the central government as possible. This is difficult in the Mgeni catchment situation, because many inter-agency and inter-departmental boundaries exist at all levels of government. In addition, there is considerable fragmentation of responsibility for water resources management. The lack of consistent national, regional and local policy also adds to the problem.

The hostility amongst various political groupings within the communities complicates the issue further as no 'agreement' situation exists. In view of the above, it is perhaps justified to retain the status quo until the fragmentation of legislation and enforcing agencies and political hostilities have been addressed.

Where this principle is likely to be successful is in the area of water quality management. Here, there is wide agreement that water quality should be improved and all main stakeholders want to participate (Nyasulu & Associates, 1997). The spirit of the principle may be defeated when there is a need to resolve matters of water apportionment, whether these are directly linked to water quality or not.

Water allocation is currently a politically sensitive matter at various levels and it is unlikely to be resolved in the immediate foreseeable future. In short, water resources management based on the "bottom-up" approach is unlikely to be achieved for water allocation decisions in the Mgeni catchment (and indeed the whole of the republic) at this time. In addition, the unequal distribution of water availability in the country means that intervention of the state will be required to ensure equity of supply to water-scarce regions.

In view of the above, statutory and regulatory powers in terms of water resources management can best be served if they remain primarily in the hands of the central government department or its agency to help to prevent misuse of those powers in order to promote local interests.

Extension and supporting services supplied by government agencies should be maintained, at least in so far as rural environments (in which capacity is lacking) are concerned.

3.4.5 SUCCESSES AND MISTAKES/FAILURES

Successes
Mistake/Failures
<ul style="list-style-type: none">• Regional councils, Water Boards, metropolitan councils play an important role in water resources management at regional and/or local level.• Monitoring for water quality and quantity undertaken for impoundments and rivers. High water quality standards are use for potable water and effluent.• The new constitution and policy have pave the way for delegating of water resource management responsibility to lower level of government.• The Reconstruction and Development Programme requires community level of management of resources.• Delegation of responsibility to lower levels going hand in hand with capacity building and support from well established institutions such as water boards.• Past legislation ignored ground water sources leading to inefficient management and utilisation of this resource.• Water legislation biased against poor rural communities.• There is a lack of capacity to manage water resources in areas previously excluded from the main political and economic stream.• Some authorities do not keep records of stormwater and sewerage infrastructure leading to inefficient management.

PRINCIPLE 5

3.5 INVOLVEMENT OF ALL STAKEHOLDERS IS REQUIRED

3.5.1 BACKGROUND

In the past stakeholder participation was very limited. This can be attributed to the absence of suitable institutional structures and the presence of an inappropriate legal framework. The public used to be informed in an unstructured way of impending management actions rather than being involved in a participatory management system based on shared responsibility and joint decision-making. This situation was made worse in those situations where the general public either did not understand the issues at stake or were unable to participate properly, either because they were uncertain as to their roles and responsibilities or because they lacked appropriate information. Furthermore, tribal authorities who enforce traditional laws relating to water resources use and allocation in certain designated areas were largely excluded from decision-making processes.

Unlike in the past, it is now widely accepted by the major water resources developers and managers in South Africa that water resources should be developed and managed by all stakeholders. The Mgeni Catchment Management Plan is one of those few situations in South Africa where water resources managers, namely the DWAF and Umgeni Water have been able to demonstrate that most, if not all, the parties concerned have largely participated in the planning and decision-making process.

The successful implementation of the Mgeni Catchment management Plan strategies ultimately depends on the belief in, and commitment to, the notion of stakeholder participation. Such stakeholders attempt to meet their own needs as far as possible, with little dependence on central government. To attain this goal of adequate and meaningful involvement, stakeholders should be empowered to organise themselves and manage local situations for their own benefit. At the heart of this principle is the notion that for any water resources management and development actions to be successful, they must involve stakeholders at all levels of decision-making, from conceptual idea right through planning,

implementation, monitoring and auditing. All stakeholders must have a right to participate in actions that affect resources close to them, they must be equipped with the capacity to make sound judgements, and they must have access to all relevant information.

As various stakeholders pursue diverse actions and attempt to meet their own needs as far as possible, there is always scope for conflict of varying degrees within such fora.

With regard to the Mgeni Catchment Management Plan and Rural Areas Water and Sanitation Plan, there has been a clear recognition that there should be enhanced participation of all stakeholders in water resources development and management, with local authorities and community groups acting as full partners.

3.5.2 METHODOLOGY

The research focused on the compilation and interpretation of information produced by local agencies, individual researchers and consultants. It was considered appropriate to concentrate on strengths and weaknesses that have been experienced, and wherever practical, to identify and isolate the main driving forces behind those strengths and weaknesses. To this end, the following methodology was followed:

- Visits were undertaken to selected institutions within the Mgeni catchment, with the aim of meeting with those individuals responsible for water resource management and development issues as well as those involved in the initiation and implementation of integrated catchment management plans and actions at regional level as well as within the Mgeni catchment.
- Personal and telephonic interviews were conducted with water resource managers and practitioners, including key staff within the DWAF and Umgeni Water, as well as research institutions engaged in the planning and implementation of integrated catchment management plans and actions. These interviews and interactive discussions were supplemented in meetings.

- Numerous study reports and policy documents were obtained from several government and private institutions and agencies. These documents were thoroughly scrutinised to determine their usefulness in addressing the requirements of the project.
- Personal interviews were conducted with water resource managers within the DWAF and Umgeni Water.
- Telephonic interviews were conducted with several stakeholders, including well established environmental/conservation groups or agencies, agricultural/farming associations and industrial / commercial associations.
- Reports detailing customer satisfaction from Umgeni Water's activities were reviewed.

3.5.3 RESULTS

3.5.3.1 Main stakeholders

As the number of concerns in respect of water resources management has increased significantly over the last few decades, so have the number of parties with an interest in water resources management grown. The perspectives of each of these parties has evolved from their particular interests. It is important to define the present actual and perceived roles and mandates of the main role players. The present roles of various stakeholders dictate what they can and cannot do.

The main stakeholders in water resources management are:

- the water resources developers and managers - those stakeholders whose focus is on optimisation of the availability (quantity and quality) of the water resources e.g. DWAF, Umgeni Water and metropolitan councils
- the water resources protectors - those stakeholders whose focus is the protection and conservation of the resource e.g. Natal Parks Board, DWAF, Umgeni Water.

- the water users - those stakeholders whose focus is the optimisation of usage e.g. industry, farmers, and domestic user groups.

The main stakeholders in water resources management in the Mgeni catchment are given in table 10.

Table 10: Main stakeholders in water resources management in the Mgeni catchment

ORGANISATION/INSTITUTION	STATUS
DWAF - National	The department is mandated by the Water Act to manage water resources on a national basis.
DWAF - Regional	Implement national policy in the regions in terms of the law.
Water Boards - Umgeni Water	Established by Water Act to provide bulk water supply in their area of jurisdiction Agents of the national department. The reason Water Boards are under the management of the central government is because their areas of operation cover more than one province and because they undertake important resource management functions on behalf of the DWAF
Metropolitan Council - City of Durban	Required by law to provide a water and sanitation service within its boundaries
Local Council - City of Pietermaritzburg	Required by law to provide a water and sanitation service within its boundaries
Provincial Government - KwaZulu-Natal <ul style="list-style-type: none"> • Local Government and Housing • Environmental and Traditional Affairs • Agriculture • Parks Board • Health 	Required by law to perform certain tasks related to water and service provision These departments have a mandate to undertake tasks that have a bearing to water resources issues
Other Government Departments - National <ul style="list-style-type: none"> • Department of Mineral and Energy Affairs • Department of Environmental Affairs & Tourism • Department of Trade and Industry • Department of Agriculture 	All have responsibilities relating to water resources management. Although the mandates of these departments are given, they should not be treated as such but rather that they should be clearly understood so as to appreciate their perspectives.

<ul style="list-style-type: none"> • Department of Health 	
Non-governmental organisations <ul style="list-style-type: none"> • Wildlife Society • etc. 	By nature of their work, conservation organisations play a major role in water resources management and development. They perceive themselves as actively involved because they are consulted when water-related projects are planned. They are usually represented on decision-making panels for those projects
Other Organisations <ul style="list-style-type: none"> • Joint Services Boards • Development Services Board 	They are empowered (financed by local government) to be involved in provision of various services including water and sanitation.
Industry, Commerce and Agriculture Durban Regional Chamber of Commerce PMB Chamber of Commerce and Industry Natal Agricultural Union SA Timber Growers Association Farmers Associations	They are consulted by water resources managers and developers in their area of jurisdiction.
Domestic User Groups Ratepayers/ Resident Associations	They do not see themselves as involved in terms of the existing legal arrangement. This situation is being addressed at policy level by the central government

All these stakeholders have a mandatory and / or *de facto* role and responsibilities in water resources management. Although each of the main stakeholders usually acknowledges and even furthers the causes of others, the bias given by their individual perspectives cannot be overemphasised. All but one group of stakeholders perceive themselves as being involved. The individual domestic users (particularly in black residential areas) feel that they have largely been ignored in decisions relating to water resources management.

Stakeholders interviewed for this exercise and other studies (Nyasulu and Associates, 1997) wish to be actively involved in water resources management (Annexure 8) . Records of information required by stakeholders are maintained on an *ad hoc* bases The main issues that various stakeholders want to have access to information on is given in Table 11.

Table 11: Information required by various stakeholders (adapted from Nyasulu & Associates, 1997)*

Domestic User groups**	Authorities; Conservation groups; industry/agriculture user groups
<ul style="list-style-type: none"> • infrastructure development (60%) • rural water supply projects and other social upliftment schemes (61%) • tariff increases (80%) • water quality issues (70%) • water saving devices and other conservation matters (70%) 	<ul style="list-style-type: none"> • infrastructure development (90%) • rural water supply initiatives (80%) • water quality issues (80%) • environmental/conservation policies (80%) • water saving initiatives (80%)

* This relates only to information required from Umgeni Water

**The average percentages do not reflect the differences in information requirements by various racial groups. Most communities which have received a good supply of water do not actively want to have access to information. Communities who live in rural areas (most of them black) feel that they have largely been neglected and would like to be involved in decisions pertaining to water allocation, water pricing, prevention of pollution and flood management. Most respondents from these communities want to have access to information relating to infrastructure development and water supply schemes. Conservation organisations bargain for less wish to be involved in matters relating to environmental policies and water quality/pollution prevention initiatives. Local authorities also want to have access to information pertaining to financial stability of bulk water supply agents as well as tariffs increases.

3.5.3.2 Ownership of water resources

The powers or right to control over the use of water are provided in the Water Act of 1956.

Atmospheric water: The Act prohibits the manipulation of atmospheric precipitation or harmful interference with it without the approval of the minister of water affairs. Precipitation water can be used on the property on which it falls as private water.

Surface water: A distinction is drawn between public and private water. Public water is a source of water that has a potential for communal use while private water is too limited for use by a large community. With regard to public water, the right to the use of water rests in the hands of the state and that right can be exercised by any other person only on the authority of the department. Most of these provisions remained in force despite the introduction of the principle of riparian rights in the earlier versions of the water law of the country. The riparian rights accorded the owners of property adjoining a watercourse the exclusive right to the use of the water of that watercourse. The Water Act provides for the right of use only, not the right of ownership. These rights are restricted in respect of quantity, preservation of quality, size of diversion and storage works and utilisation. While the DWAF issues and controls permits in respect of abstraction of public water, this control is not adequate due to lack of monitoring and resources.

With regard to private water, the owner has the exclusive right to use private water on his/her property for any purpose, subject to the rights of others acquired through prolonged use. A permit is required for private water to be used on other properties.

Groundwater: It is treated as private water.

Although not legally sanctioned, the tribal authorities in rural areas had powers over water sources (such as springs and wells) within their area of jurisdiction. They allocated water use to their subjects and ensure that water sources are protected. In some areas, these authorities punished offenders i.e. those not adhering to the authorities directives.

In the order of 70 community water supply schemes are under construction or have been completed all over the Mgeni catchment (Annexure 7). These schemes are in areas previously neglected. In terms of Umgeni Water's Rural Areas Water and Sanitation Programme, the

communities should receive training in management of these schemes. Once this capacity has been created, schemes are supposed to be handed over to the community. The gap in the capacity of these communities is so wide that none of the communities have taken over a water supply scheme. Instead partial handover has taken place with Umgeni Water still responsible for most requirements.

The powers or right to control over the use of water are being reviewed (DWAF, 1995b).

3.5.3.3 Platforms for decision-making

For all major projects - mainly bulk storage and distribution developments, a Steering Committee (under the Chairmanship of Umgeni Water's representative) is established. Representatives of key stakeholders are convened on this committee which serves as a liaison forum which the developer will interface with to get guidance with regard to any matters of the project. As these committees continue to operate throughout the planning and construction phases of the project, the decisions are taken via consensus. In view of the fact that all deadlocks in the Steering Committees are resolved by consensus, records of problems and decisions acted upon are kept in the minutes of all meetings. Given the diversity of nature conservation, all Steering Committees have representation from conservation groups.

For community water supply projects, a Water Committee serves as the forum for decision-making. The committees are formed democratically for each and every project. In addition, a Supra Executive Committee provides a forum for decision-making on broad issues. This Committee comprises of chairpersons of all existing Local Water Committees. These meetings are chaired by Umgeni Water representative. Proceedings of meetings of this committee are recorded in the minutes.

None of these forums has a functioning monitoring systems.

3.5.3.4 Conflict Resolution

In terms of the Water Act of 1956, the Water Court is empowered to resolve conflicts among water uses and water user groups/sectors, which involve water allocation. The approach

followed is that the court utilises provisions of the law, taking into account preferences among general water use categories. However, the water courts had a minor or ineffective role to play for the following reasons:

- they had no inherent powers
- they had no criminal jurisdiction nor power to deal with criminal offences or to review any administrative action
- they were not accessible to general public in particular rural people because they were based in major cities - thereby placing them far from spots where disputes occur
- their judgements not publicly available
- Precedents were accessed by specialists

Despite the availability of water courts to resolve disputes and claims, there seems to be no platform for conflict resolution in cases where the economic growth objective comes into conflict with another objective e.g. environmental conservation. This is due in part to inherent incompatibilities between development and conservation. Given the low development status of some of the areas in the catchment, development often takes precedence over conservation.

In 1995, the DWAF established an Afforestation Review Panel to address all applications, disputes and claims relating to afforestation. The panel consists of various stakeholders, including representatives from the department, environmental lobby groups, forest and timber companies, research institutions, non-governmental organisations and the general public organisations. Disputes and claims are resolved through consensus with majority vote used to reach decisions on most aspects. The court of law is usually used as the last resort in such matters.

At community or project level, no proper conflict resolution platforms are in place. Disputes and/or claims are discussed between steering or water committees until consensus is reached. Where a particular party is not satisfied with this process, the normal court of law is approached to resolve the dispute or claim.

Regarding water quality matters, normal courts of law are used. Again these structures are inefficient due to improper training and lack of information and resources.

3.5.4 LESSONS LEARNT

The deficiencies of most past water resource management activities can be attributed largely to the view that water management is primarily a technical activity. While this view is true in most respects, it does not consider the fact that management of whatever resource has fundamental social dimensions that should be fully incorporated into decision-making processes.

The incorporation of social considerations into water resources development is necessary to establish and achieve management and to avoid undesirable social impacts such conflict. Nevertheless, a precautionary approach is also required to prevent these undesirable consequences.

3.5.5 SUCCESSES AND MISTAKES/FAILURES

Successes
Mistakes/Failures
Stakeholder involvement encouraged via representation in project steering committees and local water committees
Water Court able to address disputes relating to water apportionment
Abstraction of water from public streams controlled
Records of minutes of stakeholders or committees kept
Afforestation Review panel exist to deal with applications for forestry
Lack of capacity hindering handover of schemes.
No proper recordkeeping system for stakeholder requesting information.
Water court had no criminal jurisdiction. Also no accessible to communities in remote areas.

PRINCIPLE 6

3.6 IS THERE A GENDER BALANCE IN WATER RESOURCE MANAGEMENT OF THE MGENI CATCHMENT

3.6.1 BACKGROUND

In a recent conference, the vice chairperson of the National Water Advisory Council, Dr Nozibele Mjoli reported that “Women should be making decisions because they are most affected by water problems and that the water-systems being implemented do not meet the needs of women and children”. Most women in rural areas consume 40 % of their calorie intake and a large portion of their time fetching /using water. They also have a good knowledge on quality and quantity of water in their areas.

One should thus make an argument for women’s involvement in planning a water project. It can be argued that it is even more difficult to plan community participation precisely than to plan the construction of a water scheme. Within most rural communities in South Africa, 95% of service providers in the water sector are men, and 95% of the beneficiaries are women (DWAF, Gender Policy document, 1997). There are instances within the Mgeni catchment, in Mpolweni, where water reticulation had been installed only to be discontinued several years later and is currently being reinstalled at great expense. This is both ecologically and economically detrimental to a community.

Community involvement in water projects are essential as communities always have the last word: if they don’t like the project they won’t use it!

The total population in the Mgeni catchment is just over 1.5 million. The most recent information available is that of this total 52% are women (Mgeni River Basin catchment study, SMB/SWK).

A brief look at the terminology helps provide clarification on the discussion about gender. Nontokozo Nabane (Centre for Applied Social Studies, Zimbabwe) describes gender as a

neutral term that could refer to either the masculine or the feminine. “ It does not refer to women alone but refers to the ideological and material relationship between them. While sexual differentiation is biologically defined, gender differentiation is socially defined. It describes roles, identity and power relations of men and women that are socially constructed.”

Gender roles change over time and do vary from culture to culture.

The principle of gender balance in water resource management has been identified as one of several good practices in water management. The purpose of this document is to identify how well this principle is being applied in the Mgeni catchment.

3.6.2 METHODOLOGY

Due to the time constraint no primary research has been conducted. Instead the following methods were used to source the required information

- A literature survey was carried out through the University of Natal and Umgeni Water resource centres.
- Telephonic research was conducted and where necessary personal meetings were arranged with Umgeni Water staff, Department of Water Affairs, Seneque Maughn-Brown /SWK, Durban Water and Waste and other consultants.
- Initial discussions with the Department of New Works at Umgeni Water helped identify two projects which could be studied more closely to see how well this principal was being applied. The projects recommended were the Vulindlela Water Supply Scheme and the Groenekloof Phase 1 Projects, both in the Mgeni catchment. Vulindlela Water Supply Scheme is a 2 billion rand project that aims to provide potable water to a community with a present population of 185,000 people. This is a rural water supply and sanitation project, however the impetus toward sanitation provision lags far behind the impetus to provide potable water. The second project, the Groenekloof Phase 1 project, is a bulk

water supply project that runs through an area of peri-urban squatter settlements as well as established rural communities.

- Interviews were arranged with the project managers on these projects and questionnaires were forwarded ahead of the meeting for consideration.
- Data on recruitment was obtained from Durban Water and Waste (Durban Metro), Umgeni Water and the DWAF to gain a snapshot of the demography with regard to gender roles in the two largest water provision authorities in the Mgeni catchment
- A brief look at the Mgeni Catchment Management Plan will examine whether gender issues have been identified.

This project will address the following questions:

1. How are gender differences, if any, perceived at the planning, decision making and user level?
2. What are the differences in the degree of participation and influence over decision making by men and women?
3. Do approaches promote equal participation and access to resources for both men and women?
4. Are there any gender sensitisation programmes at different levels?

3.6.3 RESULTS

3.6.3.1 Differences in the perceived needs and uses of water between men and women.

Water is essential for all life and within the urban context the water needs of men and women appear similar. Although this issue was not methodically researched using say the pocket chart process, the perception of the interviewer is that most participants found few words when asked this question in the urban context. This however changes quite considerably in the rural context where culture strongly dictates gender roles.

Rural Planning Officers for Rural Water Supply and Sanitation Schemes identified the following issues:

- Men are mainly concerned with the quantity of water they need to access for crop the cattle and crop watering.
- Women are more concerned with water quality and the distance of the source from their households.
- Men use water in ritual cleansing where large quantities of water are taken and then regurgitated in bullemeous fashion.
- Women on the other hand are most often involved in the cleaning and cooking routines and fetching water for washing and drinking.

3.6.3.2 Women and Water Rights

There are no restrictions legally on women obtaining water rights at present. However, the issue of riparian rights is currently being addressed by the National Water Law Review . The draft document outlines 28 fundamental principals and objectives which will be the pillars to the construct of a new national policy (DWAF, 1997) that will govern water resource management in South Africa in the near future. The only reference to affirmative gender action is outlined in Principal 13 which states that “As custodians of the nation’s water resources, the national Government shall ensure that the development, apportionment, management and use of those resources is carried out using the criteria of public interest”. One of these criteria stated is equity which could include gender equity. The remaining principals do not reflect any gender bias.

There are no legal restrictions on women being able to apply for water connections.

There is a difference due to land tenure between urban and rural areas on installing water connections.

In the urban area, the property owner simply fills in a form at the local municipality and no deposit is required (assuming that there is an existing water infrastructure). Should the house be in the husband's name and the wife applies for a connection in her name, a R 350.00 deposit is required. If the application is for a new house and the reticulation infrastructure needs to be installed, the property owner, male or female is charged R1311.00 for a 1/2 inch connection (Pietermaritzburg municipal authority).

The situation for women in rural areas differs in that environmental issues come to the fore such as the distance of the home from the nearest water-line, the elevation of that home relevant to the reservoir etc. It is also required that in the absence of land tenure papers, some proof must be furnished that she is a bona-fide occupant of that household (Pers Comm Maxwell Sirenya).

3.6.3.3 Gender differences perceived at the planning level

Several participants that were interviewed indicated a knowledge of water resource management plans and construction technologies which impact negatively on women. These include the following

- The turning handle on the water abstraction pump needs to be operated in such a manner that a woman's breasts are bumped with each turn. Besides being uncomfortable this could have a negative health impact for women.
- Meeting times for community water committee meetings are frequently set for a Sunday afternoon. This is to accommodate the presence of men in the decision making process as men are frequently working away from their rural residence during the week. Due to the submissive nature of women in the community, regardless of the number of women in the audience, it is the experience of rural planning officers that men in the audience make the decisions.

- Women are frequently used as rural planning officers as they tend to approach issues which may be of a controversial nature in a way that is not threatening to the community. Because men hold most of the power at decision making level and the perception by men that women are not involved in the decision making process, information is more freely provided.
- Department of Water Affairs and Umgeni Water have a policy not to provide a cash compensation to rural communities when homes need to be relocated and rebuilt because they lie within the high-water line of a planned dam construction. Instead their homes are rebuilt at an appropriate location. This is a policy that was developed after extensive consultation with communities. In the consultations it became apparent that a majority of women opted for the house rebuilding policy, while the elder men opted for the cash settlement option (Pers Comm Greg Huggins, SWK).
- The construction of a dam frequently impacts on vegetable gardens which are usually situated near the river course and thus within the high-water line. In this situation women insist on being directly involved in the discussions about the location of the new vegetable gardens and the provision of irrigation due to their loss of proximity to the river.
- When assessing the Instream Flow Requirement (IFR) , which is mandatory prior to the construction of any dam, women user groups are identified as they are most knowledgeable when it comes to water quality requirements and flow regime requirements by the community. Traditionally the IFR concentrated on the biophysical aspects of water quality. More recently the sociological aspects, the requirements for community events such as baptism, washing, drinking etc. are as important and it is here that community women are involved the planning phase of water resource management.
- Contractors interviewed mentioned that there was an effort to employ women where possible on contracts because they found that women were more efficient workers, were more reliable to be at work and were more likely invest their earning on household needs.

3.6.3.4 Differences perceived at the decision making level

- Women representatives on water committees tend to want to resolve disputes which hold up water delivery more readily than men as they realise that it is women who will directly benefit most by freeing up time and energy.
- Men, however, find camaraderie in spending many hours discussing issues of community management such as water resource management at the indaba, and as such, decisions which may otherwise be swiftly taken by a women, are drawn out.

3.6.3.5 Differences in the degree of participation and influence over decision making in Water Resource Management by men and women

The make-up of planners and decision makers in water resource management in the Mgeni catchment. The main organisation involved in water resource management in the Mgeni catchment include

a/ The DWAF

b/ Umgeni Water

c/ Durban Water and Waste (Durban Metro)

d/ Most rural water schemes have set up Local Water Committees and the gender differentiation on these water committees has briefly been examined.

e&f/ A brief look at the Vulindlela Project and the Groenekloof 1 project expresses how well the current gender policy is being applied at a project level where funding is considerable (2 billion rand)

a/ *DWAF*

i/ Policy

In current policy, the main strategies for recognising and addressing gender issues are as follows:

- Local committees responsible for planning and managing services are to comprise at least 30% women.
 - Within the Community Water Supply and Sanitation sector there should be 50% women amongst those employed in construction work.
 - The above strategies are based on the assumption that women's participation in planning and management will automatically serve to incorporate women's perceptions of problems and needs, so that supply systems will be adapted to take account of local gender issues.
- (from DWAF Gender Policy document)

A new policy, a National Gender Policy for Water Affairs and Forestry is currently in the final draft stages. Key objectives of the new policy include:

- The establishment of a Chief Directorate for Gender Equity
- Basing the design of all water supply and sanitation systems on needs assessments and feasibility studies which provide gender desegregated data, and which take account of the perceptions and needs of women.
- Designing and planning systems and technology which take account of gender differentials, in order to provide delivery systems which are appropriate for the beneficiaries.
- Making clear and different roles for women and men of the affected community in all formulation and implementation of plans to install new or improved systems for the supply of water, wood fuel and sanitation.
- Ensuring a minimum of 50 % female participation in planning, implementation and maintenance of service delivery systems at community level.
- Providing technical training to women of the community in order to enable their participation in programme planning and implementation.

ii/ Current Employment Situation (Durban Branch)

It is acknowledged in the draft Gender Policy document that the current department guidelines on women's participation have been largely ignored within the community and by contractors.

Table 12: Summary of DWAF (Durban) Recruitment Situation:

- There are 401 registered positions with the Kwa -Zulu Natal Department of Water Affairs.
- At present 14 positions are vacant. 387 positions are filled.
- Of the 387 positions, 349 positions are occupied by men.
- There are 38 women employed of which 26 positions are clerical or administrative.

The number of women involved in water resource management through DWAF in the Mgeni catchment is small. Where women are involved it is mostly in a clerical capacity. One interpretation is that women have limited (possibly negligible) impact on decision making in water related management of the Mgeni catchment. It may be agreed that most over-arching decision are made by Senior and Middle management and technical/specialist staff make day to day decisions which influence the agenda of water resource management. Table 2, below, identifies the gender influence in decision making processes at the DWAF (Durban).

Table 13: Indicator of decision making influence in the DWAF by gender. *

	<u>% FEMALE</u>	<u>% MALE</u>
Senior Management	0	100
Middle Management	29	71
Technical /Specialist	8	92
General Staff	62	38
Basic Skilled Staff	3	97
Total	10	90

* The data from the DWAF is provided in rank format which was interpreted to generate a format that could be compared with other water authorities in the catchment.

b/ Umgeni Water:

i/ Policy

The Umgeni Water affirmative action working document clearly recognises women as a group of our population that is under represented. Demographically reflective representation is important to Umgeni Water because

- 53.3% of the current and potential Umgeni Water customers are women (1996 South African Census).
- The percentage of women in Umgeni Water is an indicator of how effectively the New South African Constitution is being adhered to. Chapter 2 of the South African constitution, section 8.3 says that no person shall be unfairly discriminated against based on (amongst other things), gender.

Strategies to address this issue include affirmative decisions in:

- promotions
- recruitment
- individual development and training
- job evaluation and reward systems

The company also sees that there is a necessity to employ affirmative actions in redressing corporate culture and employee attitudes and to reach the community with affirmative ideologies through their outreach programs.

ii/ The Board of Umgeni Water:

Board members are appointed by the Minister of Water Affairs and Forestry. The total number of people on the board is 15 of which 4 are women and 11 are men. The term of this board expired at the end of April 1997 and a new board is to be appointed in the near future.

iii/ Current Employment Situation

<u>Table 14</u>			
<u>Indicator of Umgeni Water Recruitment by grade and gender</u>			
<u>Grade</u>	<u># of Males at level</u>	<u># of Females at level</u>	<u>% Female at each level</u>
02	1	0	0
03	6	0	0
04	6	0	0
05	29	1	3
06	31	5	14
07	40	6	13
08	68	17	20
09	86	12	12
10	101	46	31
11	142	27	16
12	55	37	40
13	45	20	44
<u>Total at all levels</u>			
2-13 inclusive	610	171	22

Although 22% of the of the total workforce in levels 2 to 13 are women, their influence at senior executive levels is limited.

Umgeni Water applies grades to different levels of authority and influence. In order to assess the influence in decision making, these grades were broken down as follows (direction provided by the Umgeni Water Human Resources department):

Senior Management : grades 02, 03, 04 and 05

Middle Management : grades 06 and 07,

Technical /specialist staff grades 08 ,09,10

General staff grades 11,12,13.

Basic staff as grades 14, 15, 16, 17, 18.

Table 15: Indicator of decision making influence in Umgeni Water by gender

LEVEL	<u>% FEMALE</u>	<u>% MALE</u>
Senior Management	<u>2</u>	98
Middle Management	13	87
Technical /Specialist	23	77
General Staff	26	74
Basic Skilled Staff	*	*
Total	22	78

* Umgeni Water was unable to provide a breakdown in the basic skilled category, grades 14 to 18.

[information provided by Frans Du Toit (Human Resources) in disaggregated form]

c/ Durban Metro (Water Section)

i/ Policy

The current policy was drawn up on 15 August 1994. It acknowledges the need to eliminate the gender (amongst other criteria) as a factor in recruitment. Section 5.2 of the policy document refers entirely to gender action:

- Equal pay to all employees doing equal or comparable work for the same period of time.
- The removal of barriers that prevent men or women from being appointed to posts traditionally reserved for persons of a specific gender.
- The elimination of any form of sexual harassment.
- Protection against discrimination in employment benefits on the grounds of pregnancy.

i/ Durban Metro (Water) current employee situation:

Durban Metro is the largest Urban Water authority in KwaZulu Natal and services the biggest city in the province.

Table 16: An indication of the recruitment situation in Durban Metro (Water Department)

- There are 506 registered positions with the Water Department of Durban Metro.
- At present 106 positions are vacant. 400 positions are filled.
- Of the 400 positions, 378 positions are occupied by men
- 22 positions are filled by women

The 22 positions that are identified above are broken down as follows:

- 2 women at middle management level
- 2 women at the technical/specialist level
- 16 women who are general staff
- 2 women at the basic skilled staff levels

From the above figure and the table below it is clear that the decision making capacity within this organisation is almost entirely male dominated.

Table 17: An indicator of decision making influence in Durban Metro (Water) by gender:

LEVEL	<u>% FEMALE</u>	<u>% MALE</u>
Senior Management	0	100
Middle Management	6	94
Technical /Specialist	5	95
General Staff	19	81
Basic Skilled Staff	1	99
Total	5	95

d/ Water committees in the Mgeni catchment

There are 4 large RAWSP projects currently underway in the Mgeni Catchment. These are

- The Vulindlela Water Supply Scheme
- Swayamane Water Scheme
- Mpolweni Water Scheme
- Nwabi Water Scheme.

Although RAWSP projects are supposed to be water and sanitation projects, the sanitation aspects of the projects are largely on hold. There is sanitation development going on at a few schools in the Vulindlela project.

There are approximately 55 water committees in the Vulindlela project but at present there are no documented statistics on the actual make-up of the committees. The Umgeni Water rural planning officer felt that the make-up of these committees could be as low as 25% female. The 1996 South African Census indicates that rural women make up 57.8% of the total rural population.

Initial meetings which are organised by proposed developers to introduce water projects to an area traditionally have a reasonable quorum of women present (60%), but unfortunately the original quorum does not necessarily translate into a representative water committee (Pers Comm Rob Burgess, Umgeni Water Rural Planning Co-ordinator).

e/ The Vulindlela Water Supply Scheme

i/ Policy

The Vulindlela project is an RDP project and is therefore bound by RDP guidelines which, in 1994 stipulated that “ In order to ensure successful and sustainable development and to give substance to the constitutional prerequisite that women should enjoy a full and proper role in society, all statutory bodies in the water sector, including Local Water Committees, shall be recommended to comprise a minimum of 30 % women. This should apply to all levels, particularly in management and should be instituted within 5 years.” (DWAF, 1994).

ii/ Current Employee situation

A quarterly report is issued by the project manager which includes some generic information such as the number of jobs created by the project and the gender breakdown. In the period up to March 1997 a total of 126,633 person days of work had been established of which 13, 569 were women workers. Thus 10.7% of the work days created by the project have benefited women. A further breakdown of these statistics indicates that on the Bulk Phase there was a 7.3% female involvement while on the Reticulation Work 16.6% of the working days are occupied by women.

f/ Groenekloof Phase 1

The project manager on the Groenekloof project was unable to supply a breakdown of employee records. The contractors and sub-contractors on each job are responsible for their work-crew. There is no gender quota policy governing this project.

Summary of “Women in Water Resource Management in the Mgeni Catchment”.

Organisation	% of Women involved in Water Resource Management in the Organisation.
DWAF	10
Umgeni Water	22
Durban Metro	5
Vulindlela Water Supply Scheme	11
Water Committees in the Mgeni Catchment	25

The information above indicates that the influence of women in the decision making process in water resource management in the Mgeni Catchment is extremely limited. On average only 14% of the decision makers are women.

* These data do not include women who may be working in water resource management through university research organisations and contract staff.

Percentage of persons indicating a need for differentiation between men and women:

No primary research has been carried out therefore the author is reliant on the responses of those interviewed, most of whom work in water resource management already. Of the 25 persons interviewed only three people, a rural planning officer, an outreach facilitator and a researcher in human resources felt that the current situation was inappropriate and is in need of attention.

3.6.3.6 Approaches to promote equal participation and access to resources for both men and women

Some of the indicators used to assess whether a balanced approach has been achieved include:

- **availability and level of information provided to men and women**

It is impossible to give a fair answer to this question without doing a lot of primary research. However, Steve Camp in the Umgeni Education Program and Sally Frost of the Umgeni Outreach Program both indicate that the information is available to whoever turns up at education sessions and that the information to men and women are the same.

There is however an issue of seniority within departments of water resource authorities regards who has access to conferences and workshops. The more senior personnel (who in the case of Umgeni Water, DWAF and Durban Water and Waste is male dominated) have greater access to conferences and workshops which are a very important avenue for new and innovative ideas.

At the water committee level the meetings are usually set for Sundays. In this case both women and men have equal opportunity of attending the meeting, should the home and cultural conditions allow her.

- **the division between the number of trained men and women for the same job.**

National education statistics for student enrolments in 1991, which gives an indication for graduates entering or available on the job market from 1992 to present have been used. (Umgeni Water, 1997).

Only the areas where training for water-resource management type subjects have been examined: Both Universities and technikons were looked at.

Table 19 : An Indicator of the # of Women in training in subject areas that relate to Water Resource Management.

Area of Specialization	Universiti es	Teknikon	% Males	% Females
Agriculture	83	17	74	26
Business, Commerce Management	68	32	56	44
Communication	31	69	27	73
Computer Science, Data Processing	72	28	62	38
Education	40	60	77	33
Engineering	92	8	96	4
Library Science	21	79	25	75
Life/Physical Science	58	42	53	47
Social Science	51	49	58	42

It is clear from the above statistics that with the exception of Communications, Education and Library Sciences, the availability of women in the job-seeking pool is limited. In the case of engineering there are no women engineers in the two largest water authorities at present. This will be difficult to redress considering the number of female graduates. Specific measures, such as those taken in England in 1984 when a program aimed at young females called "Women into Science and Engineering" was established, will need to be considered in the Mgeni catchment as well as the whole of South Africa.

There is still a male domination within Umgeni Water, however, even in areas where women are in the majority amongst graduates. The heads of the education program and public relations departments of Umgeni Water are male. It is therefore necessary for there not only to be a paradigm shift in student quota's but also in the application of corporate policies.

3.6.3.7 Gender sensitisation programs in the Mgeni catchment

Gender is a politically correct issue to include in any policy revision process and is generously addressed even in the current tumultuous political climate. There is however little understanding at a practical level on what exactly do we mean by gender differentiation in Water Resource Management. Several persons interviewed saw it as a woolly abstract concept easily ignored. The Chief Engineer in The DWAF (Durban) viewed Water Resource Management as a technical process and as such it makes no difference whether a women or a man carried out that process.

A further example is the lack of attention paid by to the 1994 White Paper from the National DWAF guidelines, which dictates that the Water Resource Sector shall comprise a minimum 30% women.

It can safely be said that there are gender sensitisation programs and guidelines in all bodies of Water Resource Management in the Mgeni catchment:

- The National Gender Policy for Water Affairs and Forestry (draft April 1997)
- RDP Guidelines for Presidential Lead Projects (such as Vulindlela) (1995)
- National labour Relations Forum for Local Government, Agreement on Employment Practices and Affirmative Action (August 1994)
- Umgeni Water, Affirmative Action Targets (March 1997)

Several stumbling blocks that lay in the way of applying these guidelines in the Mgeni catchment were identified

- lack of corporate will
- insufficient female graduates in nearly all fields
- lack of definition by women on the role that they feel they should play in improving the water resource sector
- lack of opportunities (e.g. conferences) around the subject area so that engineers etc. can pay attention to gender sensitive designs in water engineering.
- a cross cultural patriarchal society where women and men have clearly defined roles that rarely overlap.
- a cultural mindset where women are still intimidated by the force (emotional and physical) of men.
- a lack of facilities (such a affordable, acceptable local day-care, which facilitate a women's involvement)

Greater definition must be applied to gender differentiated benefits (changes in community life that were not formerly available: e.g.: education, meeting opportunities, some formal employment, access to other communities). A first step is to conceptualize a vision of both women and men playing equal roles in water resouse management.

Greek historian Herodotus wrote of encountering a tribe of female warriors which he dubbed the Amazons, in his travels north of the Black Sea around 450 BC (New Scientist Feb. '97). If women were the sole members of armies thousands of years agoperhaps it is not impossible for women play a much greater role in water resource management today.

3.6.4LessonsLearnt

There is a clear recognition that nearly all 'water related tasks at the rural level are being carried out by women who are well informed on issues around water quality and quantity.

In addition, several project managers as well as line staff have indicated that women are more efficient workers than men and they raise fewer stumbling blocks in certain situations. __

Studies have shown that both men and women place similar values on work, and that male-female differences in work are situational.(Davis, 1992).

Men currently dominate the decision making processes with regard to water resource management in the Mgeni catchment where the majority in that catchment is women.

Water Resource Management has historically been a rough dirty job which has had an emphasis on the mechanics of water manipulation and quantity provision.

The demand for water in the Mgeni Catchment is greater than the supply, which is the situation all over South Africa, a water poor country. One resolution to competing demand is a framework where all water uses (abuses) can be identified, such as that of Integrated Catchment Management.

Integrated Catchment Management can only be effected in a holistic manner with an approach that includes all of society. The decision making process must therefor reflect the demographics of the society living in the catchment.

The application of Principle 6, ensuring a gender balance in the management of water in the Mgeni catchment is in need of careful consideration and application.

Men have managed water for livelihoods whereas women have managed water for life.

3.6.4.1 Weaknesses

The Minister of Water Affairs and Forestry, Professor Kader Asmal, announced the new board of Umgeni Water on Thursday 1 May 1997. The new board is charged with the task of overseeing the affairs of Umgeni Water for the next 4 years. There are 14 board members of which 3 are women. Among the tasks of the board is the need to “strategies new ways in which problems in water resource management can be tackled”. Despite the appointment of a ‘gender secretariat’ to develop new policy in water resource management and the recommendation from this sect

PRINCIPLE 7

3.7 SKILLS DEVELOPMENT AND CAPACITY BUILDING ARE THE KEY TO SUSTAINABILITY.

3.7.1 BACKGROUND

A decreasing supply of clean water coupled with an increasing demand for water is the result of the lack of sound, sustainable water resource management world-wide, and South Africa is no exception.

One of the significant conclusions of the decade is that the solution to ensuring safe drinking water supplies lies not just with the application of technology but with better trained people able to manage water in all of its uses through an integrated approach to water management.

This report will examine the extent to which the current projects in the Mgeni catchment adhere to principle 7: “Skills Development and Capacity Building are the Key to Sustainability”. Strengths, weaknesses and problems associated with skills development and capacity building on each project will be identified.

3.7.2 METHODOLOGY

Due to time constraint no primary research among communities has been conducted. The following methodology was used to source the required information.

- Umgeni Water is a major partner in water supply and sanitation in the Mgeni catchment. Research was conducted to identify what Umgeni Water’s attitude to the need for capacity building is.

- There are three large water supply and sanitation projects currently underway in the Mgeni catchment: The Swayimana Scheme, the Mpolweni Reticulation Project and the Vulindlela Water Supply Scheme, which is a lead Presidential project. Questionnaires were forwarded to each project leader and included the following questions:
 1. What percentage of the budget is dedicated to capacity building on the project?
 2. Assuming that there is budget for capacity building, which area of capacity has been developed on each scheme?
 3. Are there any constraints (legal, cultural, institutional, lack of resources) to capacity building?
 4. Which philosophy/ techniques were used in capacity building?
 5. Do you feel training has made a difference to the project?
- Meetings were arranged with the project managers on these projects and further telephonic research was conducted where necessary.

3.7.3 RESULTS

3.7.3.1 Umgeni Water

Early in 1996 Umgeni Water carried out a restructuring exercise. It was recognized that the Corporate Service Division of Umgeni Water was playing a key role in the organisation with respect to community liaison and capacity building and that although this division of the organisation is mostly a planning division for water schemes, it has also to a certain extent become involved in design, maintenance, operation and finance with regards capacity building. Other divisions within Umgeni Water have also become involved in training and capacity building and as a result there is lack of continuity and responsibility. This is in spite of the current Umgeni Water policy which states it's intention to hand over community water supply schemes to communities to run. It was recognized that there is a need for a specified group of people to play an overall co-ordinating role in the area of training and capacity building. The following recommendations were made to the management body:

- The establishment of a community capacity building unit within the organisation.
- The establishment of a capacity building budget of 0,5% of the total cost of all capex community water supply projects.

One year down the road this has not been done and as yet no single water reticulation project has been successfully handed over to the community to run in the Mgeni catchment. In fact Umgeni Water has expanded it's workforce in the operations section to oversee maintenance on new projects.

Umgeni Water has an external education department which carries out general training and capacity building in water resource management mainly at schools which request the service. They do occasionally receive requests from communities who may be experiencing some ill health which the induna may perceive as being related to polluted water. The education unit will respond with training and some primary research upon which recommendations are made. There are however at least two problems associated with this procedure

- the external education department is not in a position to follow-up on their recommendations to the community and there is no logical institutional linkage within Umgeni Water for another department to do the follow-up.
- they are never able to evaluate, even in school training sessions, whether their training is indeed building capacity.

Internally Umgeni Water lends strong support to staff training and capacity building. Umgeni Water's ABE Program aims to raise staff to a level of functional literacy by the end of 1998. ABE students are producing an internal newsletter using their newly acquired skills. Likewise Zulu is being offered to employees who do not speak the language.

Many staff are allowed hours off work to attend training in computers, emergency medical response, business skills, communication skills, project management and other university or college courses.

3.7.3.2 Umgeni Water Rural Area Water and Sanitation (RAWSP) Philosophy.

The Philosophy behind Umgeni Water's approach to rural and peri-urban water and sanitation supply schemes include

- the introduction of labour intensive construction using local labour
- the provision of training in basic principals of business and construction management so as to encourage local labour to develop as sub-contractors
- the training of the community and the development of local water committees to maintain operate and administer the schemes as to be able to run it independently.

The application of the first two principals in the philosophy have in general been successful. The three projects examined below will demonstrate this even though in each project creative means have had to be found to ensure that the processes followed in hiring local labour were perceived to be fair.

There has been, however, less success in applying the third principal. Community participation and empowerment are seen as being critical in terms of the long term sustainability of the project. It is believed that to date no schemes have been successfully handed over to the community. The reasons described by the RAWSP coordinator indicate the complexity of the problem:

- The communities in rural areas do not see their counterparts in urban areas developing water committees, managing and financing water schemes. The provision of water and the maintenance of the process is part of a holistic National initiative with very limited local participation.
- The development of local water committees is threatening to the political balance in certain communities. Empowering some people who are not necessarily the political leaders or 'indunas' of the area with knowledge and control over a vital resource leaves

the leaders vulnerable and can cause community conflict. It must be emphasized that this is not the situation on all projects.

- Local water committees are being established at a time when the new political dispensation is encouraging the development of Transitional Local Councils. It is often the case that these TLC's regard the management of water and any other community resource as their responsibility and there is no need for a water committee.
- Umgeni Water is not, in reality, building capacity but rather providing a community liaison role through existing structures perceived to be building capacity. The net result is that several people in a community may be well informed regards the project but in no community thus far has the information dissemination process equipped people with the confidence and enthusiasm to want to run the project. At best 2% of a total budget is dedicated to capacity building. This figure may need to be reexamined.

3.7.3.3 Integrated Catchment Management/Primary Health Care Initiatives.

There are several other water management /health training programs being carried out in the Mgeni catchment with communities through special projects that are not initiated by Umgeni Water. These include projects through:

- The Parasite Control Program (an internationally funded project to address the epidemic infection rate in children by Helmenthic and Schistosome species).
- KwaZulu Natal Department of Health: Because so many health problems in the area are water related (such as bilhardzia) there is a reasonable emphasis on good water resource management.
- The National Government through line departments such as the DWAF, the Department of Health and a multi-departmental body (SANTAG) that deals with sanitation implementation.

There is clearly a host of initiatives in the training and capacity building arena. There are however several problems:

- seldom is any evaluation done on the effectiveness of a program. Most initiatives are driven by foreign aid where delivery of resources is tied to reports within a limited time-frame, not allowing for a period of evaluation.
- many programs opt for developing new educational materials (a concrete product for funders) with the result that there is a duplication of materials and a waste of resources that could be better used.

3.7.3.4 Vulindlela water supply scheme:

The Vulindlela Water Supply Scheme is designed to provide a sustainable potable water supply of 30 liters per capita per day within a 200 meter walking distance to a population of approximately 185,000 people. Besides the provision of water the primary objectives of the project include

- providing job opportunities for the community
- developing skills within the community
- assisting in developing capacity of the community
- uplifting people through training.

To ensure that these objectives could be met several conditions were required of contractors;

- local labour would be used having first been introduced to labour intensive construction.
- sub-contractors would be identified from the community and trained in the basic principals of business and construction management.
- the community would be trained to maintain, operate and administer the scheme so that it could be handed over to the community to run independently.

A budget of 2,7 % of the construction cost was allocated for education, training and capacity building. This is made up of 1% (R1,029,892) for education, external training and capacity building and 1,7% for job training mostly in technical (construction) skills. Key performance indicators would be examined on a quarterly basis and would include reports on training progress.

The 1997 Reporting Schedule was examined and the cumulative training / capacity building (in person days) that had occurred was as follows:

Table 20: Cumulative training/capcity building

Target Audience and Training Type.	Cumulative Person Days since start of project
Training (including literacy and numeracy training: construction labour force).	1 843
Training: Construction, Management and Administration. (Foreman, disadvantaged small contractor).	1 514
Community Capacity Building: Operation, maintenance and administration of scheme and meetings.	5 849
Future Operators Capacity Building: Operation, maintenance and administration of scheme and meetings.	834
Total Capacity Building and Training	10 040

14 Branch offices are in the process of being established to take over responsibility for the ongoing functioning of the scheme.

There are at least 55 water committees within the Vulindlela project area some of which receive training in literacy, numeracy, lifeskills, health, hygiene and general knowledge on water resources.

There was one main issue identified by the project manager that retarded a more efficient training, capacity building process:

- The current process allows for the election of an executive committee which is predominantly made up of representatives from the community where the water supply scheme is being built. All decisions regarding project process and spending then lies with this committee with recommendation from the Project Manager. It has been the experience of the Vulindlela Project that very little capacity building was done on the initial stages of the project as firstly the executive committee needed to engage capacity building themselves before they were able to identify the community needs in relationship to the project and ongoing maintenance of the scheme. Secondly there was a reluctance on the part of the executive committee to be too consultative amongst the community as that would be regarded as a devolution of power. Thirdly in order to maintain community respect there needed to be a degree of certainty of product delivery.

3.7.3.5 Community experiences:

- During the early stages of the project, rural planning officers put in place a process whereby community members can sign-up to receive water on site, paying a small deposit when signing up. One elderly lady, living close to a stream on the valley bottom declined to sign-up as she felt that they were building the reservoir too far from her house on the top of the hill. It would be too difficult for her to climb to the hill-top for clean water. Little did she understand that reticulation (a stage later in the project not visible on the ground yet) would bring the water to within a few meters of her house.
- At the completion of one section of phase 2 of the bulk structure emplacement it came time to lay off a section of the workforce as the line was moving into a new village and in accordance with the project requirements, new people from that area were to benefit from the training. A major dispute erupted with much threatened violence (using guns, slashing and burning tires and cars etc.) the entire project in that area was brought to a halt. It was only with considerable discussions and meetings that the work process was once again continued.

- A community member living near a recently completed section of reticulation in the Sweetwaters area, part of the Vulindlela project, reported that the newly installed communal tap had been vandalized and that water simply ran for 24 hours per day until someone shut it off completely. The community did not know what to do about it while it was running and are not sure of when they will be able to obtain water from the tap again.

3.7.3.6 Swayimana Water Reticulation Scheme:

The Greater Swayimana Reticulation Scheme is designed to serve a current population of 34,500 community members in five distinct wards over an area of 177 square kilometers. The Water reticulation scheme has a number of objectives:

- | |
|--|
| <ul style="list-style-type: none"> • Distribution of water to the consumers in consultation with the Water Committee. • Provision of individual meter connections • Creation of job opportunities • Labour intensive construction techniques • Skills training programs and development of entrepreneurs. |
|--|

To ensure the above objectives would be met the following requirements were made:

- A Water Committee is to be elected for each community and approved by the tribal chief in that area.
- All labour recruitment was done through the water committee.
- Employment procedures were established together with the elected water committees to ensure fairness.
- All workers were given an induction process to ensure complete knowledge about the project.
- Training in safe working practice was carried out at the start of the workers contract.

Most training appears to have been directed at the sub-contractor level in the following areas:

- Administration

- Basic Business Skills
- Registration for UIF, WCA and tax
- Purchasing of tools
- Technical skills in compaction of trenches etc.

Number of subcontractors trained : 10

Some training did occur with local labour in the following areas:

- Pipelaying skills
- Operator Training (wackers, water carts)
- Skills training for shutterhands, steelefixers and gangleaders.

Although no budget has been identified for capacity building or training the project manager has indicated that a considerable amount of time has been dedicated to training the water committee on this project in the following area:

- general committee operation
- how to conduct committee meeting
- administration
- finance
- general water knowledge

No data could be provided on

- the exact number of people trained
- the percentage of budget dedicated to training, although a rough estimate was R100,000

Most community related capacity building has been carried out through Community participation at community liaison meetings and forums. However there has been no general information given to the community on water resources or on the water scheme hardware now dotting the environment. Although the project has not yet been commissioned there is already considerable destruction due to vandalism on the scheme.

One major difference between this project and the Vulindlela project is that the Vulindlela project is an RDP Presidential Lead Project and as such is governed by RDP project criteria. Swayimana is a water project funded solely by Umgeni Water and not tied to any external criteria.

The project manager for the Swayimana project was also the project manager for the Mpolweni project:

3.7.3.7 Mpolweni water and sanitation scheme:

The Mpolweni project is designed to provide water to a small community of approximately 8000 people. It too is an Umgeni Water funded project not governed by any RDP capacity building criteria.

However, unlike the Swayimana project a considerable amount of community capacity building has been carried out by the pollution prevention department in Umgeni Water. This is due to research being carried out by this department into the impact of water reticulation, sanitation and education on the health of the community. It is hoped that the impact of the three interventions can be measured to see which has the most positive impact on community health.

The education drive includes the following:

- a play was commissioned that would present a message on health and sanitation issues that were felt to be a major cause of ill health in the community.
- the whole community was targeted by the organisation of a festival day at which the play, community concerts, political speeches, health officer talks and music was presented.
- simple story times using very simple puzzles were carried out at the pre-school level.
- primary and secondary school information dissemination was facilitated using videos, posters, water testing kits and talks.
- There is a plan to set up communication with women's groups who it is felt would have the most impact in habit change.

- smaller regional community meeting with general water information

However once again there are no data on the percentage of budget dedicated to training and capacity building and on the numbers of people who receive training.

The project Manager has reported several problems associated with training and capacity building, or the lack thereof:

- there is no organisational structure within Umgeni Water that takes responsibility for the coordination and evaluation of capacity building and training and many initiatives seem to overlap.
- There is no sense of ownership of the project upon completion. Vandalism in the form of stealing large lengths of pipeline that have been laid, tampering with the overflow controls on the reservoirs, attempts to tap into the bulk line etc. have occurred in the past few months.
- There is limited capacity to operate and repair the pipes or reservoirs if they break. The project manager, although theoretically has completed his contract, is still the person called when there is of an interruption in flow.

3.7.4 LESSONS LEARNT

- In order for capacity building to take place there needs to be a dedicated percentage of budget allocated to this task.
- In anticipation of handing over the management of a RAWSP scheme there must be some institutional capacity put in place that will coordinate the capacity building and training that is required to ensure that the scheme is sustainable in the long run and monitor the hand-over process providing additional training where necessary.

- A special effort needs to be made to ensure that the community develops a sense of ownership for the scheme and a sense of the importance of the scheme to the well being and enrichment of the community as a whole. This is so that the hardware on the scheme is not stolen.....rendering the scheme inoperable.
- There is a need to develop policy so that all projects, whether RDP financed or not, are governed by criteria similar to the RDP projects.

3.7.5 CONCLUSION

It is evident that there are different experiences at different projects and there is much lip-service paid to capacity building on all projects. Each project manager is responsible to a project and can implement lessons learnt from his past mistakes. However there is no manual to follow on best practice in the building and ensured implementation of the RAWSP scheme with lessons learnt from other projects.

There are constraints financially, politically, culturally and personnel wise:

- People in the rural areas of South Africa have not had access to information and even less access to schooling. Therefore there is a large amount of work around capacity building at any rural water project, potentially making schemes expensive.
- There are not many unemployed people in South Africa with the ability to provide training in water resource management, administration, health etc. in the local language.
- Political and cultural changes taking place in communities are happening at a rapid rate which affects the 'establishment' in all communities. There is a tendency to try and slow things down so as to remain in control of the dynamic process at the cultural level. Contractors who are in the business of installing water schemes as efficiently as possible often are not trained to deal with the cultural and political factors that inhibit this process.

One solution is to embark on a training program of multi-skilling existing staff so that perhaps the engineer or project manager could also fulfill, or at least oversee, the capacity building and training needs. This will certainly facilitate the development of capacity building at all levels.

Only the Vulindlela Project had a dedicated budget for capacity building and this clearly facilitated a more organised approach to the task. It is too soon however to evaluate whether this scheme will function any differently from the schemes without the dedicated budget.

None of the projects examined could be assessed for the percentage of trained people utilizing recently acquired skills as this information was not available, nor were any of the schemes discussed above yet in operation (with the exception of one small section of the Vulindlela Scheme where the broken tap problem was reported and is recorded above).

If the goal of developing a sustainable integrated catchment management is to be realized it is the opinion of the author that there is an opportunity to workshop with communities about water and the crucial role they will play in sustaining the quality and quantity of their water supply during construction of the water schemes. After all integrated catchment management is not about managing the water (it manages itself) but about managing peoples activities around the water resource.

PRINCIPLE 8

3.8 WATER IS TREATED AS HAVING AN ECONOMIC AND SOCIAL VALUE

3.8.1 BACKGROUND

According to the Water Law Review, principle 8 deals with the value of water. Recognition of the economic aspects of water is an essential part of the policy and management shift from a supply approach to water resources management to a demand approach. In other words, as long as it was practical and affordable to continue developing water supply infrastructure in order to meet unrestrained demand, then there was little need to consider the economic aspects of water. However, the moment that supply approaches become impractical or unaffordable and consideration is given to the management of the demand of water, then the economic aspects become all-important. The DWAF has recently embarked on the development of a demand approach to water management of which the revision of the current water tariff system forms a central part.

Fundamental principles with respect to the value of water:

Water is a social and economic good. There is a price attached to water and a cost associated with any process that changes its quantity, quality, locality, accessibility and its dependability. Being essential for life and a necessary condition for economic development, it also has economic value. These characteristics require an integrated approach to water resources management, which focuses on social equity and economic efficiency.

The adoption of this principle will allow water to become a more prominent factor in national and regional economic planning than it has in the past. This may well lead to decisions and initiatives which favour certain types investments with a lower need for water in relation to the economic and social benefits produced. An obvious example may be limitations on further irrigation expansion, particularly the irrigation of low value crops, in favour of higher value crops, produce beneficiation and manufacturing activities.

Pricing policy in the water sector should reflect the fact that water is a scarce national resource, and that there is an opportunity cost in using a particular application. The price of water should therefore be guided by economic efficiency criteria, balanced by social equity considerations and taking into account national economic interests and sectoral requirements.

The implementation of this principle will result in increased water prices for most users, and as such it will be necessary to determine the impact of this on a wide range of user sectors, particularly those that are currently subsidised such as agriculture. Water price increases and subsequent allocation changes should not lead to sudden high social costs such as increased unemployment and homelessness among farmworkers.

In order that water is allocated to its most economic use, it is necessary that it be transferable between users. Water Law should facilitate the transfer of water use rights, subject to certain central government imposed constraints.

Principle 3 advocates the marketing of water use rights as a means of improving the allocative efficiency of water. This proposal is supported by the experience of water rights trading in countries such as Chile. However, that experience also suggests that a precursor to successful water rights trading is the quantification and registration of all the water rights in a geographic area. As the previous section has indicated, this is an expensive task and one that still needs to be undertaken for many catchments in South Africa. A water right must be legally and hydrologically legitimate before it can be traded. Another potential impact of water rights trading is the delayed social costs which may occur when inter-sectoral trading occurs. Poor communities may be tempted (by attractive prices) to trade water which is surplus today only to find that it is required for basic human needs in the near future. It should also be noted that water rights trading may not be viable in all locations particularly if there is insufficient demand to constitute a functioning market where the prices approximate the economic value of the resource. The potential for water rights trading to compromise State responsibilities in respect of preventing over-exploitation of the resource, meeting basic needs and transferring water from one area to another, needs to be determined.

Where it is necessary to subsidise the provision of water services because of the inability of consumers to pay the full price of water, it is preferable, wherever possible, to use direct transfers to such consumers rather than subsidise the cost of water which may create distortions in the water sector.

The implication of the adoption of principle 4 will be a reduced financial burden on the State in the long term, and the greater sustainability of those schemes providing a basic water supply. Basic water supply schemes unfortunately are well known for failing when government support falters or when community-based cost recovery mechanisms prove ineffective. It is therefore, important to make the community participation in the planning and development of water supply schemes, and community ownership and control of the commissioned scheme. The other problem which bedevils cost-recovery on basic water supply schemes is differences in the levels of service from one community to another, but where tariffs are similar. This does not auger well for the acceptability of a subsidy system, the level of which might be determined by the economic status of a particular community.

3.8.2 METHODOLOGY

Most of the information included in this principle is from interviews, telephonic conversations and fax communication with individuals from within Umgeni Water as well as outside. Since Umgeni Water is a bulk water supplier and also reticulates to the rural community under its Rural Area Water Supply and Sanitation Programme, most of the information gathered refers to the water supply.

3.8.3 RESULTS

3.8.3.1 Water users that pay for the water used

It is stated in the fundamental principles for a new water law in South Africa, DWA (1997); principle 24 that: 'Beneficiaries of the water management system shall contribute to the cost of its establishment and maintenance on an equitable basis'. Farmers who have riparian rights do

not pay for the water directly. The water costs are inherent in the price of the land, the cost and operation of pumps to draw water from the river.

Urban dwellings in the old Pietermaritzburg TLC pay for their water whereas new areas joined to the TLC e.g. Great Edendale Area, have not paid since they started having water supply, five years ago. However, there is a new “Masakane” campaign that aims at raising awareness about the importance of paying for all services, water being one of these services (Scheffermann, pers. comm).

In the case of Rural Development Projects, communities, more often than not, do not pay for the water supply (Burgess, pers. comm). This is in contrast to the findings of a survey carried out in a wide spectrum of social setups in which 95% of respondents believed that people who live in rural areas should pay for their water. 70% believed that rural people should pay a subsidised rate (Nyasulu and Associates, 1997). The infra structure is paid for via a capital grant. Communities are requested to pay for the operational and maintenance costs. Otherwise, all water users pay for their water supply (Cyril Rudling, pers.com.).

Industries/businesses/ commercial also pay for their water with a R0.03 higher flat rate than for domestic users.

3.8.3.2 Percentage of water users that pay for water (water supply, irrigation, industry)

All water users pay for water except for the rural communities where payments are inconsistent. For irrigation, farmers that have riparian rights, do not pay for the water (J. Perkins, pers.com). Industries pay for their water supply but in many cases not for the environmental costs that would be imposed when discharging to a water body. This is mainly due to the inefficiency of implementing the law. Penalties inflicting payments imposed on the polluter could take years and would eventually not be relative to the amount of degradation imposed on the water resource.

At Umgeni Water, there is a new report being prepared to estimate the percentage of water users that pay for water which is called “Catch Analysis Report”. Until writing of these findings, the report was not ready and hence no figures were retrieved (Jane Laatz, pers.com).

3.8.3.3 Tariff system for different water users

Table 21: Tariffs for different Water Users

WATER USERS	TARIFF
Houses	R1,41/kL (for the first 5kL) R2,62/kL ((more than 5kL)
Flats	R2,44/kL (flat rate)
Industry/business	R2,73/kL (flat rate)depending on their total trade effluent and its content of Oxygen absorbed, they are charged R0.55/kL extra.
Informal Settlements	Zero, not supplied with water.

3.8.3.4 Tariff coverage of; Capital cost, Operations, Manintenance and Replacement cost

According to two officials from both Umgeni Water (Rudling, pers. comm) and the City Council, (Schefferman, pers. comm), tariffs meet all costs. The break down of figures was not availed and reference was made to the annual financial report at Umgeni Water (Annexure: 6).

3.8.3.5 Ratio incomes from tariffs and O&M cost.

According to the above, the ratio must be 1:1.

3.8.3.6 Cross subsidy system to enable poorer communities to receive water supply

At Umgeni Water, the water supply is subsidized from RDP for the Operational costs of rural supply schemes. Whereas the Operations and Maintenance costs are retrieved from the bulk water profits with the rural community paying a small fraction of that (Rudling, 1997).

Informal settlements are served by stand pipes which are paid for by the rate payers.

3.8.3.7 Financial system transparency

Financial statements are published annually at Umgeni Water (copy attached). The City Council's tariffs are decided upon annually and are published in an annual report. Payers receive bills with expenditure breakdown (Scheffermann, pers.com)

3.8.3.8 Water users that feel the price of water is 'fair'

"Elected councillors have representation in the borough that decides on setting the tariffs. Hence, it could be said that water users feel that the price of water is fair"(Scheffermann, pers.com).

According to the (RAWSP) staff and their experience, they believe that rural communities feel that the price of water is not fair "since the water comes from God". This is the response although prior to the construction of the reticulation infra structure, the the tariffs are calculated and are subject to the communities' approval.

The Nyasulu Report (1997) revealed the fact that 30% of the total interviewees believed that rural community payments for their water supply should be subsidised by the government. This clearly indicates that rural dwellers do not feel that the price of water is fair.

3.8.3.9 Percentage of users considering they pay a fair price

It was not possible to answer this question without a primary research which was not feasible either due to time and resources constraints.

3.8.4 Lessons Learnt

- Response to many points in this principle were subjective and could not be further verified because of the reluctance of officials to respond. Most water users have a complaint on the water tariff for some reason or the other.
- Domestic water users feel that their meters, if they exist, are not read regularly. Hence their water bill would be an estimation and does not rely on the consumption of the household.
- Information availability on this principle is very scarce. Contacts were initiated with the city council to comment on the tariff structure for irrigation, industries and water supply, there was a brief response answering questions on the telephone. No physical evidence was provided.
- In many aspects, the financial system is not thought to be transparent enough.
- It has been noted that the historic financial arrangements for water resource development in South Africa have not been adequate. An estimated twenty billion Rand worth of water resource infrastructure has been built by the state, for the benefit of users many of whom do not even pay the operational management costs incurred, let alone any contribution to capital (Dept of Water Affairs and Forestry, April, 1997).

CHAPTER FOUR: CONCLUSIONS

The development of the Mgeni Catchment Management Plan required a detailed understanding of the potential and observed water resource issues throughout the Mgeni River catchment including all factors that affect water quality and quantity. The complexity of the Mgeni River system implies that great diversity in the physical processes, basin characteristics and anthropogenic developments which may influence the water resource.

The eight principles that have been selected by the IRC/UNDP project have proven to be wide enough to encompass a wide and diverse multitude of issues that cover all the necessary water resource management practices in the Mgeni catchment and other related smaller schemes. However, there are a number of recommendations that could be made at this stage to emphasize some pitfalls in this assessment exercise.

The political conditions in South Africa are still in a transitional stage, at a situation where there are many ambitious promises by national government especially to rural dwellers. These promises have not been implemented yet and hence is more difficult to assess those that relate to water supply, sanitation and water resource protection. Within the Mgeni catchment, the attempt has been made to research an approach to catchment management. Resources have been pulled through from both provincial government and Umgeni Water Board. Now with the discussions on the new water law in South Africa, it seems that Water Boards have no defined role to play in catchment management. Such a situation could put a complete halt to the involvement of Umgeni Water in the process. However, it is hoped that the plan will still be fully implemented by the appropriate authorities.

The practicality of the principle that calls for management to be dealt with at the lowest appropriate level is questionable. The high percentage of illiteracy in rural areas encourages only the few that are educated to affect the opinions of the other majority. The language differences is another that does not allow for interactive discussions depending on the perception of the interpreters involved. The fragile political situation in KwaZulu/Natal does not allow for proper participatory approaches to be conducted in rural areas.

The hostility amongst various political groupings within the communities also complicates the issue of stakeholders involvement. Special considerations need to be sought to reduce any likely disputes that could be triggered by these discussions.

The key consideration in allocating responsibility for water resources management is determined largely by the degree of centralisation required. Where strong centralisation is favoured, the approach should ensure that all water resource management functions reside within a single ministry, with a number of directorates given different responsibilities. Where the approach favours delegation to lower levels, major emphasis must be put on co-ordination of responsibilities. The practicality of low level management of water resources can be shaped by the existing socio-economic development in a particular area. Where development is lacking i.e. social institutions are weak, low level management can facilitate organisation of these institutions. A different arrangement might be required for affluent areas

Men currently dominate the decision making processes with regard to water resource management in the Mgeni catchment where the majority in that catchment is women. Integrated catchment management can only be effected in a holistic manner with an approach that includes all in a society.

In order for capacity building to take place there needs to be resource allocation both in terms of money and institutional capacity.

The traditional belief that water comes from God should be rectified by awareness and education of those who do not consider water as having an economic value.

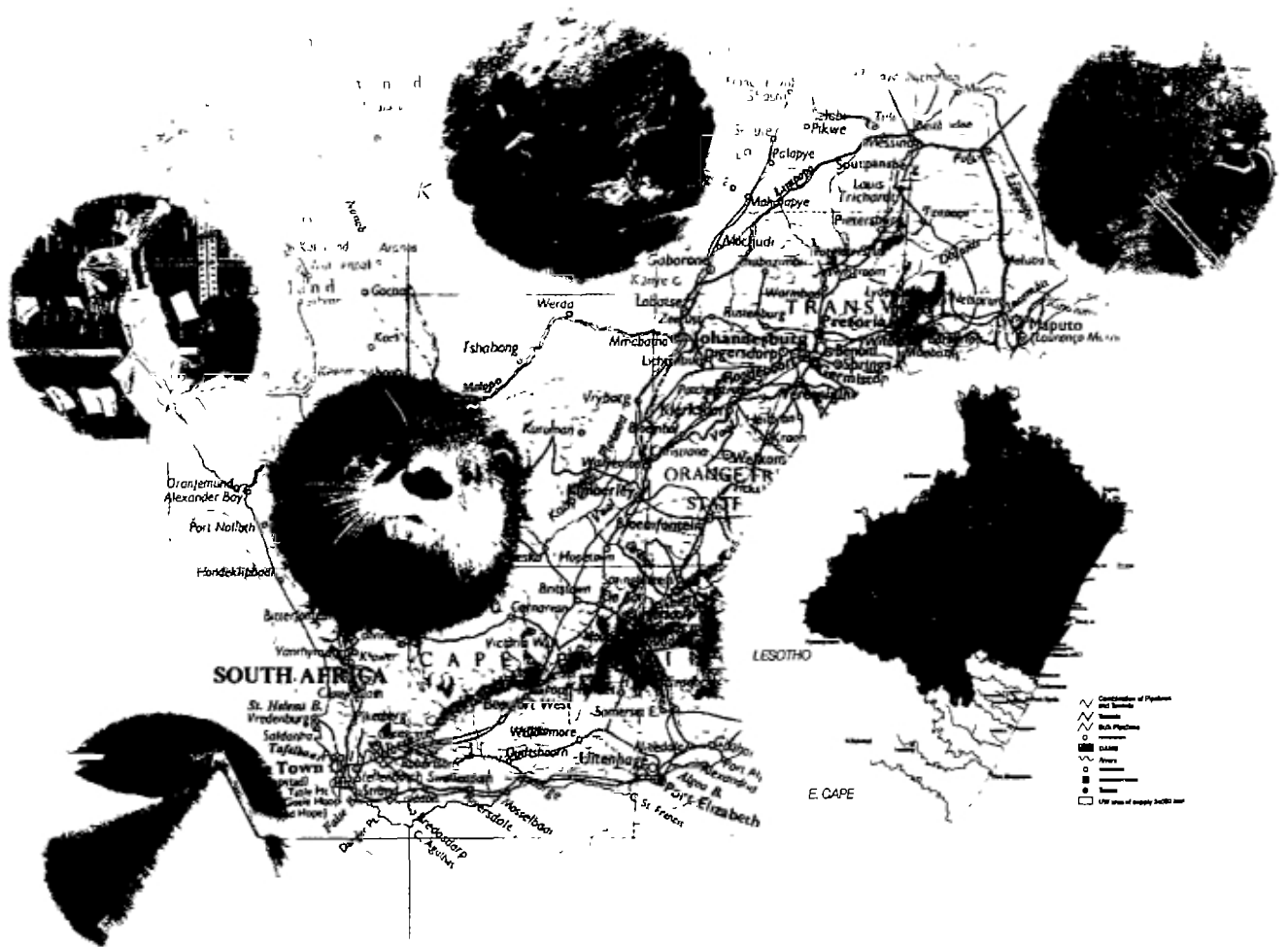
Most countries have initiated their water resource management in the near future. This project should continue to assess experiences, amending, editing and adding on the already identified principles. The exercise is very useful in providing a chance to devote some time to collate information that already exists. During the workshop its hoped that there will be a chance to learn from other experiences and to be able to transfere such information to every participants


home country. The following task would then be to spread the word and use every possible venue to do that.

ANNEXURE:

- 1 Umgeni Water's Environmental Report.

ENVIRONMENTAL *Report*



UMGENI

 WATER • AMANZI

FOREWORD

by Chief Executive



BRIAN WALFORD

As a service provider, Umgeni Water adds value to our most significant natural product – water. The storage, treatment and distribution of potable water to over 3,5 million people in our supply area represents a significant investment in KwaZulu-Natal's social, economic and environmental fabric.

Our commitment to the people within our area of supply extends to the provision of safe water supplies and sanitation to previously disadvantaged people in the rural areas. Ensuring the future health and economic well-being of our customers through the provision of water is reliant on Umgeni Water securing safe supplies of water now and in the future.

This, our third environmental report, is a reflection of our commitment to the goal of sustainability in the water sector. It reflects not only our ability to execute our core business of storage, treatment and distribution of potable water, but also the way in which we conduct our business. This is done in a climate of environmental, social and financial accountability.

ENSURING THE FUTURE HEALTH AND ECONOMIC WELL-BEING OF OUR CUSTOMERS THROUGH THE PROVISION OF WATER IS RELIANT ON UMGENI SECURING SAFE SUPPLIES OF WATER NOW AND IN THE FUTURE

Development and environment are inextricably linked in the water sector. Decisions to develop new infrastructure have to be carefully considered to achieve a balance

between benefit to society (including quality of life, health and related economic benefits) and the effects on the environment in which that society lives. Equally, the effect of human habitation on the environment impacts on water resources and influences the need for infrastructure such as dams and water treatment works.

This report reflects Umgeni Water's dual responsibility to environmental care. Firstly, in respect of the organisation's developmental activities, impacts on the environment are inevitable. The challenge is to minimise negative impacts, and to optimise positive benefits in the context of the provision of an essential service. Secondly, Umgeni has adopted a holistic, integrated approach to the management of water in its area of supply where we are addressing root problems of deteriorating water yield and quality within our catchments. By managing risk in this area, Umgeni Water recognises that catchment environmental health underlies our ability to supply sufficient water of appropriate quality to the current and future generations of people within our area of responsibility.

Within the organisation, our evolving environmental management system has provided a

THE CHALLENGE IS TO MINIMISE NEGATIVE IMPACTS, AND TO OPTIMISE POSITIVE BENEFITS IN THE CONTEXT OF THE PROVISION OF AN ESSENTIAL SERVICE

guiding framework for managing our impacts. In the past three years since the inception of the management system we have come a long way towards

meeting our mission of conducting our activities related to water management in an environmentally and socially responsible manner. Our vision of environmental sustainability, however, remains a challenge.

I am confident that we are on course to achieve the challenge of providing safe water for all the people in our area of supply in a manner which is both responsible and sustainable.

A handwritten signature in black ink, appearing to read 'B. Walford', written over a horizontal line.

Brian Walford
Chief Executive

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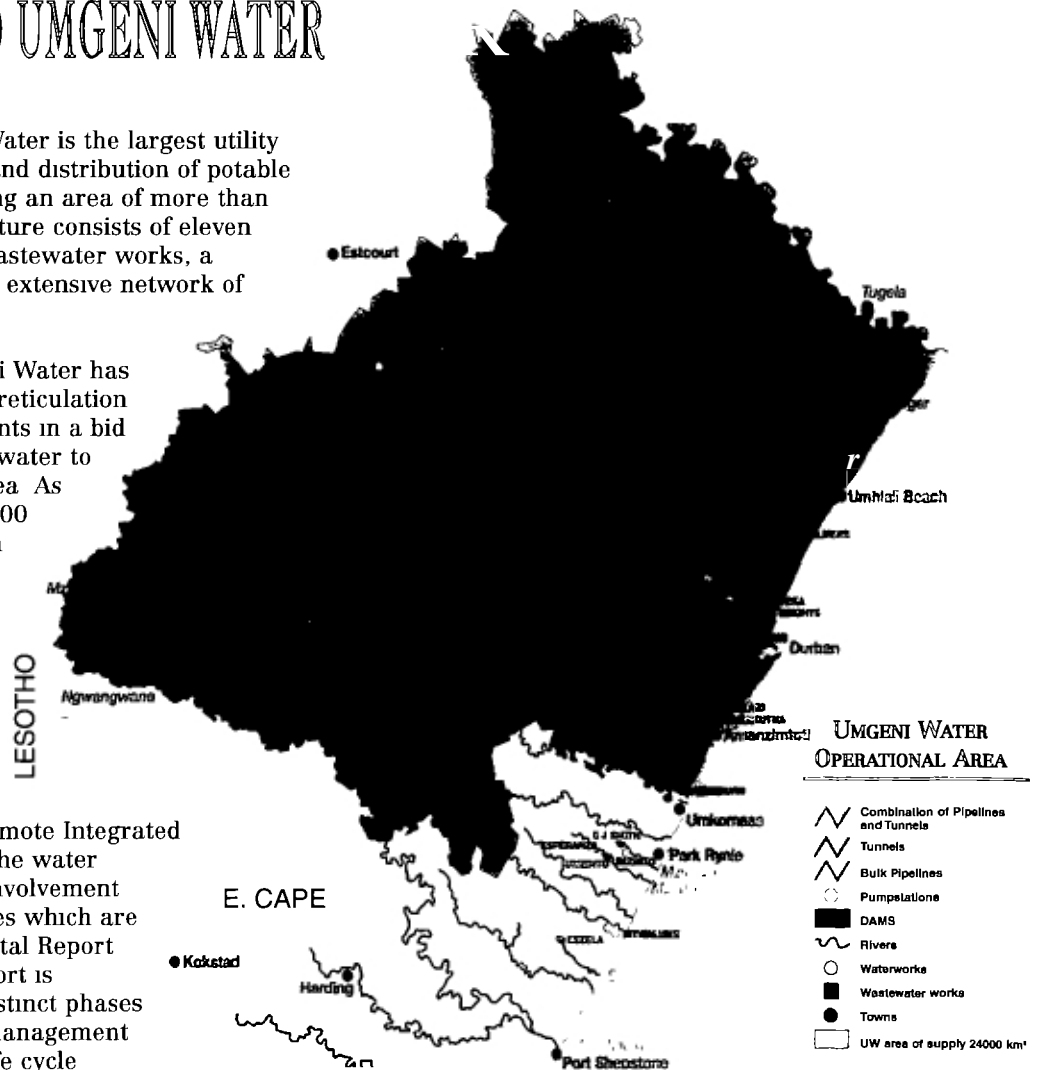
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INTRODUCTION TO UMGENI WATER

Established in 1974, Umgeni Water is the largest utility for bulk storage, treatment and distribution of potable water in KwaZulu-Natal, servicing an area of more than 24 000 km². The main infrastructure consists of eleven dams, twelve waterworks, ten wastewater works, a number of pump stations and an extensive network of tunnels, aqueducts and pipelines.

During the past six years Umgeni Water has become increasingly involved in reticulation to rural and peri-urban settlements in a bid to fulfil the mission of providing water to all who live within the supply area. As the situation stands, about 800 000 rural dwellers have already been serviced, but the challenge is to provide safe and secure water to the current, but expanding 2,5 million inhabitants of our supply area.

Recognising the need for a more holistic approach to water resources management, Umgeni Water has started to promote Integrated Catchment Management within the water industry. This has necessitated involvement in a broad range of water services which are outlined in both this Environmental Report and the Annual Report. This report is structured to demonstrate the distinct phases (and associated environmental management initiatives) in a water project's life cycle.



Review of 1996/1997

ENVIRONMENTAL PERFORMANCE

A SERIES OF ENVIRONMENTAL TARGETS WERE ESTABLISHED IN THE 1995/96 ENVIRONMENTAL REPORT. PROGRESS AGAINST THESE TARGETS IS REPORTED BELOW.

△ Target has been achieved ■ Target has been partially achieved ✕ Target has not been achieved

<i>Issue</i>	<i>1996/97 Target</i>	<i>Progress</i>	<i>Target</i>
ENVIRONMENTAL MANAGEMENT PROGRAMME	Compile an Environmental Action Plan consisting of remedial measures arising from the Environmental Review	An Environmental Action Plan has been compiled	△
	Extend the environmental management system to all waterworks, dams and wastewater works	Staff limitations have limited the implementation of an EMS to only certain operational sites	■
	Further implement the Integrated Environmental Management procedure in the planning, design and construction departments	The IEM procedure has been successfully implemented	△
	Continue monitoring and reporting on compliance with the environmental procedures governing planning and construction activities, and extend this to operational sites	Compliance monitoring and reporting has been achieved but needs to be extended to operational sites	■
	Finalise the existing Environmental Procedures Manual	Development of the Procedures Manual has begun. Anticipated completion November 1997	■
	Recruit an Environmental Officer/ Engineer to implement the EMS in the New Works Division	An Environmental Officer was appointed during August 1996	△
	Review the organisational management structure for the environmental function	The management structure was reviewed and further discussions surrounding integration of health, safety and risk management will be conducted	△
	Participate actively in the development of new South African environmental policy and law	Umgenti Water has been actively involved in policy and law formulation	△
	Submit an official response to the Discussion Document and Green Paper on a new National Environmental Policy that will include a strong motivation for integrated catchment management	An official response was delivered in January 1997	△
	Continue to increase environmental awareness amongst staff	A number of environmental awareness initiatives were successfully implemented	△
WATER RESOURCES PLANNING	The preparation of an environmental impact management plan which will focus on the implementation of recommended mitigation measures	This target refers specifically to the Mooi/Mgeni transfer scheme and has been achieved	△
PLANNING OF WATER SUPPLY INFRASTRUCTURE	The preparation of an environmental management planning framework which will link early planning recommendations for the mitigation of impacts with their eventual implementation during construction and commissioning.	Target was achieved by ensuring that the Integrated Environmental Management Procedure has been implemented	△
DESIGN AND CONSTRUCTION	Inclusion of environmental specifications into 'Construction Manager' type documents	Environmental specifications are included in 'Construction Manager' documents	■
	Ensure HAZOP studies are a standard component of process plant design	HAZOP studies were undertaken for the Wiggins Waterworks upgrade and may be extended to other sites during 1997/98	■
	Production of an audio-visual to increase environmental awareness of consultants and contractors	The production of the video will hopefully be accomplished during the 1997/98 financial year	✕
	Production of a proforma to standardise environmental audit reports	A proforma is in place to aid environmental auditing	△

<i>Issue</i>	<i>1996/97 Target</i>	<i>Progress</i>	<i>Target</i>
	Continued evaluation of the effectiveness of the environmental specification	This is an ongoing process with site auditing which highlights areas of the specification which require improvement	■
	Incorporation of the environmental specifications into an Environmental Procedures Manual (EPM)	The EPM is not yet complete This will contain the environmental specifications which will be updated on an ongoing basis	■
PUBLIC COMPLAINTS	Place public complaints registers at all major construction sites and report these matters in the Environmental Officer's audit reports	Public complaints registers are provided at all major construction sites	■
HYDROBIOLOGY	Develop toxicity testing procedures and produce a GIS-based map of the rivers in our operational area showing the condition of river life, as represented by the invertebrates	Toxicity procedures have been developed and are planned to be implemented during 1997/98	■
MGENI CATCHMENT MANAGEMENT PLAN	Implement plans to address problems in the Pietermaritzburg and Midmar management units	Catchment advisory structures have been established in both of these management units This means prioritizing the catchment problems and developing appropriate strategies to resolve them	△
AFFORESTATION REVIEW PANEL	High level screening investigation of catchments within Umgeni Water's operating areas to assess their present yield and anticipated future water demand as a basis for evaluating their afforestation potential	Umgeni Water has provided input on identifying strategic catchments and investigations within its operational area	△
	Develop a rigorous in-house evaluation procedure for permit applications	An evaluation procedure was developed by Umgeni Water for permit applications	△
WORKING FOR WATER CAMPAIGN	The completion of a planning phase study and the preparation of business plans	Planning phase study partially completed Conceptual structure for the Working for Water project has been developed	■
	Setting up of a monitoring programme and the formulation of management structure for the suite of individual projects comprising the programme	This is awaiting the completion of the planning phase study	×
PUBLIC HEALTH	Strengthen the sanitation facilitation process	Major workshops have been convened to address the problem of water-borne diseases in an integrated way	△
HAZARDOUS WASTE MANAGEMENT	Screen suitable locations for the establishment of a waste disposal site	Umgeni Water held a workshop to initiate the screening process Other initiatives to locate suitable locations are presently being carried out by private waste companies Umgeni Water is supporting these initiatives	■
PUBLIC DISCLOSURE AND STAKEHOLDER CONSULTATION	Improve the quality of existing environmental reporting media	A user survey was carried out resulting in the improved user friendliness of reporting media	△
EMPLOYEES	Introduce an Award Scheme to recognize outstanding environmental achievements by our staff	This is an ongoing scheme in which staff are awarded through the Environmental Committee of Umgeni Water	△
ENVIRONMENTAL TRAINING	Identify environmental training needs for Operations' staff	Training needs are yet to be identified by Operations' personnel	×
	Include environmental issues in the curriculum of the Adult Basic Education Programme	This has been partially achieved and is hoped to be completed during 1997/98	■
	Investigate the feasibility of using industrial theatre as a means of raising environmental awareness amongst illiterate staff	This was unfortunately not achieved and no plans are in place at the moment to implement this target	×
THE REDUCE PROGRAMME	Extend the programme to the Coastal Region	This was successfully implemented	△
	Develop and implement a strategy for further reducing paper use and helping to create a demand for higher quality recycled paper in South Africa than that currently available	This is an ongoing process	■

△ Target has been achieved

■ Target has been partially achieved

×

THE ENVIRONMENTAL POLICY

THE FOLLOWING ENVIRONMENTAL MISSION STATEMENT WAS ADOPTED IN 1993

“UMGENI WATER WILL CONDUCT ITS ACTIVITIES RELATED TO WATER MANAGEMENT IN AN ENVIRONMENTALLY AND SOCIALLY RESPONSIBLE MANNER ”

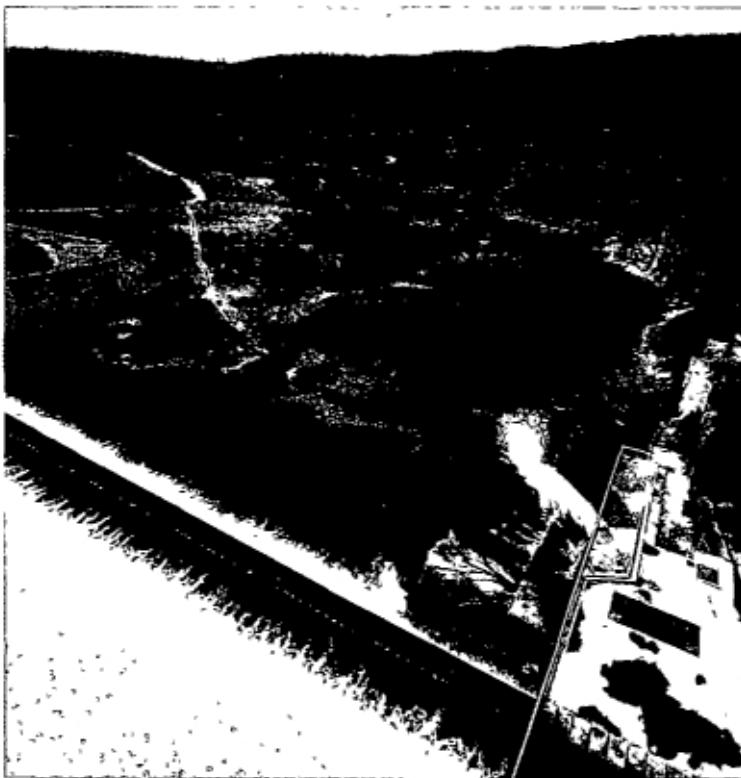
The current environmental objectives, established to focus effort on measures to address the main environmental issues, are to

- *promote environmental protection and social upliftment,*
- *implement integrated catchment management,*
- *maintain active involvement in water quality management, pollution prevention and environmental education,*
- *apply the Integrated Environmental Management procedure,*
- *measure and report on the environmental performance of the organisation,*

- *ensure openness and community involvement in environmental issues, and*
- *improve staff awareness of the Environmental Policy and encourage their participation*

The mission statement and objectives are collectively known as the Environmental Policy and were the first step in the formalisation of environmental management in the organisation. At the time that the Environmental Policy was formulated there was little or no external pressure for environmental accountability and the main impetus came from inside the organisation

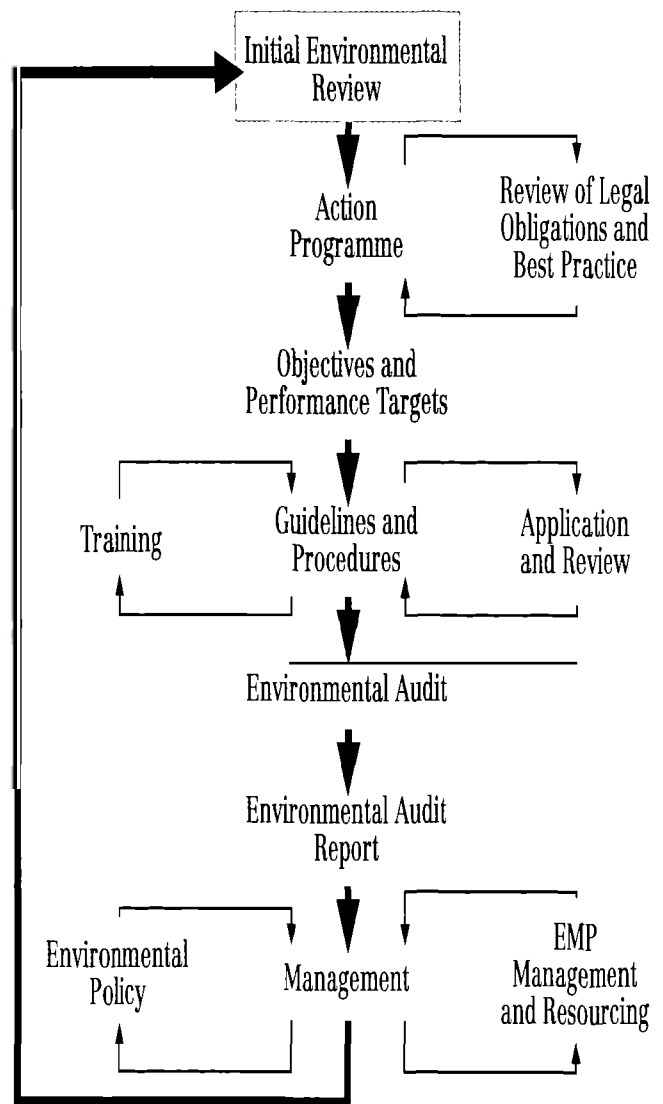
ENVIRONMENTAL MANAGEMENT PROGRAMME (EMP)



Inanda Dam

The main elements of the EMP

Umgeni Water's Environmental Management System (EMS), known as the Environmental Management Programme (EMP), was initiated in 1994. The purpose of developing, implementing and maintaining an EMS was to ensure compliance with the environmental mission statement and objectives. The team responsible for the first phase of its development, the Environmental Review, was assisted by an inter-divisional steering committee, known as the EMP Working Group.



T A R G E T S

EMP

- To determine the feasibility of incorporating the ISO 14001 Environmental Management System within Umgeni Water
- To continue to develop an Environmental Procedures Manual.
- To extend the EMP to Operations Division
- To develop and document a company-wide policy on integrated catchment management.
- To audit progress with EMS action plans in all divisions

ALL DIVISIONS

- To provide a system to receive and process public complaints and to ensure that all complaints are addressed within a reasonable time period.
- To promote a "good neighbourliness" campaign by disseminating information on environmental aspects to communities adjoining Umgeni Water sites
- To further promote general environmental awareness amongst staff via training courses and internal publications
- To formulate and implement waste minimisation and resource conservation strategies within Umgeni Water

INTEGRATED ENVIRONMENTAL MANAGEMENT and the Project Life Cycle



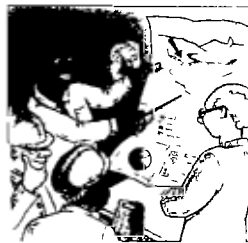
PRE-FEASIBILITY STUDY Screening

- Earliest planning phase involving environmentalists, engineers and other technical specialists
- Considers the need for and purpose of a development
- Incorporates a problem statement and project motivation
- Operating life of development is identified
- Investigates a range of options for meeting the stated needs
- Desktop study using existing data
- Indicates a preferred option
- Defines the scope of work for the next planning phase



FEASIBILITY STUDY Environmental Impact Assessment (EIA)

- An initial environmental assessment for preferred option/s is prepared
- People and organisations who are interested in and affected by the development are consulted
- Public consultation process commences
- Impacts on the socio-economic environment (people) are considered
- Impacts on the biophysical environment are considered
- Environmentalists work with engineers to identify any significant issues or problems
- **Decision is made on whether project will proceed – if not, return to drawing board**
- Recommendations to guide the project along an environmentally sensitive path are made
- The preparation of a planning framework to manage the impacts of the projects is initiated



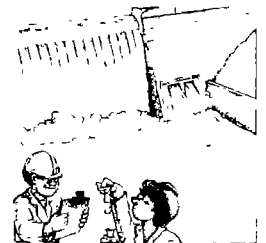
DESIGN Preparation of Environmental Management Plan

- Technical specialists focus on the detailed design for the project
- Environmentalist completes an environment management plan with engineers to manage impacts during construction and operation
- Environmental conditions and rules are laid down in writing in the construction contract
- Environmental officer is appointed to ensure that environment is protected during construction
- Operating procedures for the projects to comply with environmental requirements



CONSTRUCTION Initiation of Environmental Management Plan

- Site engineer is appointed to oversee construction
- Community liaison is undertaken
- Company awarded contract to construct
- Environmental officer advises site engineer and contractor
- Environmental officer conducts regular inspections and monitors the site
- Results of the Environmental Audit reported to the Board



OPERATION Ongoing Implementation of Environmental Management Plan

- Monitor environmental conditions and audit .Did we get it right? – Did we successfully protect the environment?
- Feed back audit findings and recommendations to planners, designers, managers and operators
- Revise operating procedures for the system to comply with environmental requirements
- Environmental awareness and training for operators is undertaken
- Ongoing community liaison takes place
- Incident and emergency procedures are developed
- Environmental Management Plan for decommissioning of project is initiated

PLANNING

IEM Water Resources Planning

The following environmental planning initiatives were undertaken during the reporting period

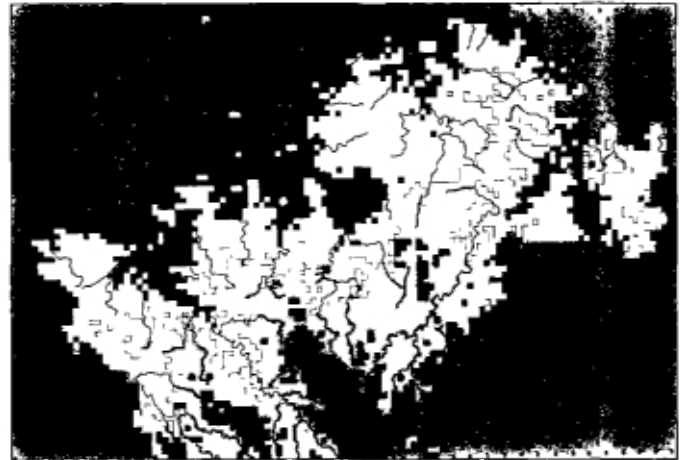
The Mooi-Mgeni inter-basin transfer scheme: In parallel with the technical investigations, an environmental impact assessment was commissioned to examine impacts of the transfer scheme on the receiving Mpofana, Lions and Mgeni rivers which supply Midmar Dam. A linked social impact and biophysical environmental impact assessment and an impact management planning framework were prepared.

Goals for 1997/98 include the completion of an environmental management plan for both the donor and receiving catchments.

Transfer of water from the Mkomazi River to the Mgeni catchment: The pre-feasibility study will include an initial environmental assessment which will assist in the identification of an appropriate dam site and tunnel/pipeline alignment.

Supply options for Stanger and the northern KwaZulu-Natal coast. The Mvoti Dam feasibility study was completed and the EIA indicated that environmental conditions in the downstream stretch of the river and estuary will improve as a result of the proposed dam.

Off-channel storage scheme on the lower Mkomazi: This scheme will supply Sappi-Saiccor as well as the domestic needs of the mid-South Coast. An EIA found the scheme to be acceptable from an environmental perspective.



A GIS Raster image of an Umgeni supply region

1 9 9 7 - 1 9 9 8

PLANNING

T A R G E T S

- Environmental screening of water resources development options to meet the water supply needs of Greytown
- Environmental screening of a number of surface water options which will supply the rural communities with water

IEM and the Planning of Water Supply and Wastewater Treatment Infrastructure

Detailed feasibility studies for the upgrading of the North Coast bulk water supply scheme have been commissioned in parallel with an initial environmental assessment. The EIA was completed for the project, confirming feasibility. A framework was prepared for the environmental management plan which will guide impact mitigation during construction. The plan will be expanded during the design and construction phase of the project to commence in the forthcoming year.

An initial EIA was conducted for the Doornrug reservoir and pipeline. The EIA assisted in guiding route alignment for the pipeline and confirmed project feasibility with respect to the environment.

A strategic EIA was integrated with a pre-feasibility investigation into future wastewater treatment infrastructure

requirements for Pietermaritzburg. The EIA highlighted the environmental trade-offs associated with the various technical options for meeting needs.

An environmental audit was undertaken for the acquisition of wastewater infrastructure on the KwaZulu-Natal North Coast. The goal of the exercise was to assess compliance of the infrastructure with Umgeni Water's environmental policy and to provide estimates of the costs of rectifying problems prior to negotiations for acquiring the infrastructure.

Environmental screening of the reticulation and reservoir components of the Zwelibovu rural water supply project was done. Planning and design recommendations to meet environmental requirements were made.

DESIGN & CONSTRUCTION PHASES

An Environmental Officer, employed in the third quarter of 1996, has provided an increased level of service to assist with the implementation of the EMS within the New Works Division. This has raised the level of environmental awareness and sensitivity within Divisional staff and external contractors

Whilst all civil contracts have the standard environmental specifications included in them, an increasing number of contracts include project-specific specifications. These, together with Environmental Management Plans which are being developed, allow for much greater control of the contractor on site, and as such, help to reduce the construction impacts of the project on the environment

With detailed contract specifications being provided, there has been a tendency to move away from the bonus-penalty system previously implemented to a penalty system for non-compliance. A standardised audit report sheet is compiled by the Environmental Officers on site, in which non-compliance with the environmental specifications and penalties imposed are recorded. Information from these reports is compiled and submitted monthly to various stakeholders and senior management as part of the organisation's reporting structure

ALL SOURCES OF PUBLIC COMPLAINTS HAVE BEEN ATTENDED TO WITHOUT DELAY AND IMMEDIATE SOLUTIONS ARE SOUGHT TO MITIGATE EACH ISSUE

Included in the audit report are incidents of public complaints. Complaints tended to be

Laying pipes for water supply



associated with the construction phase, this being the most disturbing stage of any project. Given the number of projects in progress at this stage, the complaints received have been minimal and have been primarily related to noise, dust, road damage and non-reinstatement of fences at construction sites. Several complaints were received due to a high suspended solid load in a community water supply downstream of a construction site. All public complaints have been attended to without delay and immediate solutions are sought to mitigate each issue.

Approximately 60% of 'infrastructure' projects and 30% of the Rural Areas Water and Sanitation Supply Plan (RAWSP) schemes in the design and/or construction phases have received environmental input during 1996/1997. Although these percentages appear low, all the major projects, as well as those in more environmentally sensitive areas, have received attention.

DESIGN & CONSTRUCTION PHASES

T A R G E T S

- Produce a training programme to increase environmental awareness.
- Broaden the base of environmental knowledge and increase environmental skills amongst site staff and project managers, i.e. multi-skilling of personnel
- Develop procedures for generic issues related to construction sites and include these in the Environmental Procedures Manual
- Train Umgeni Water Quality Assurance Inspectors to act as Environmental Officers
- Undertake quantitative monitoring of selected parameters on construction sites.
- Improve the level of service to projects in the design and construction phase from 30% to 50% of RAWSP schemes and from 60% to 80% of all 'infrastructure' projects

OPERATIONS AND MAINTENANCE

Water Quality Monitoring

The Umgeni Water routine monitoring programme provides data for assessing the quality of water resources (rivers, dams, abstractions), potable water (process and final), and wastewater (process and final). To assure credibility of results certified techniques are used both in sample collection and laboratory analysis.

OPERATIONS AND MAINTENANCE

T A R G E T S

- To review and implement the Environmental Management Plans in the Operations Division
- To provide all staff involved with hazardous processes with environmental safety training

Quality of Water Resources

The river and dam monitoring programme is designed to provide answers to the following: Are certain constituents present in water and if so, what are their concentrations and where did they arise? How is the water quality and quantity fluctuating during the year and from one year to the next? The map on pages 18 and 19 shows the status of water quality and river health, for the period March 1996 to February 1997. Water quality and biotic indices were used to summarise the data. A water quality summary per river system is shown in Figure 1, with targets for the next year indicated in Figure 2.

Monitoring the biological condition of the rivers and converting the species present into a biotic index gives an indication of the state of health of a river. This is becoming

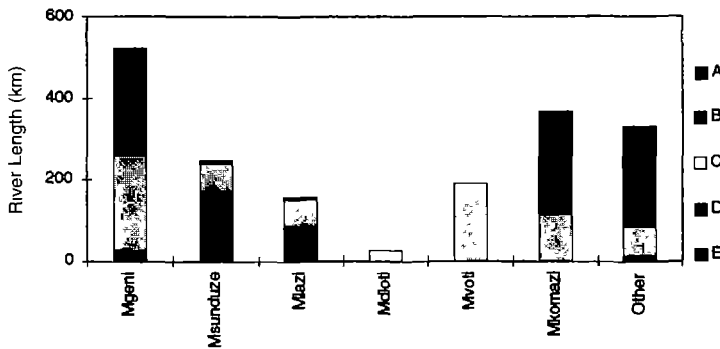


Figure 1: Summary Per River System - 1996/97 Chemical Index

an increasingly recognised way of monitoring river health internationally and nationally. Umgeni Water will be driving the implementation of this system in KwaZulu-Natal.

The bacteriological quality of rivers in the catchment is shown in Figure 3, with the major sources of pollution highlighted.

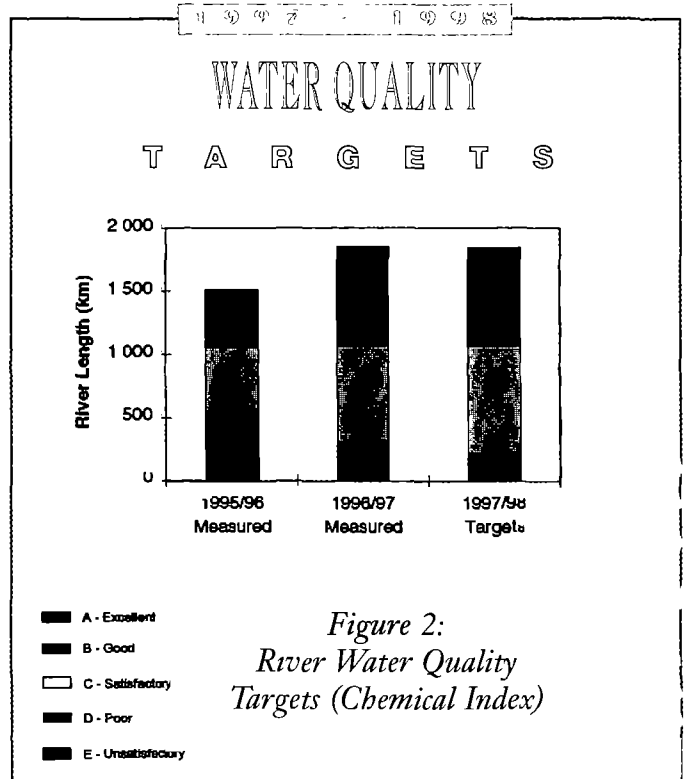


Figure 2: River Water Quality Targets (Chemical Index)



Inanda Dam overflowing

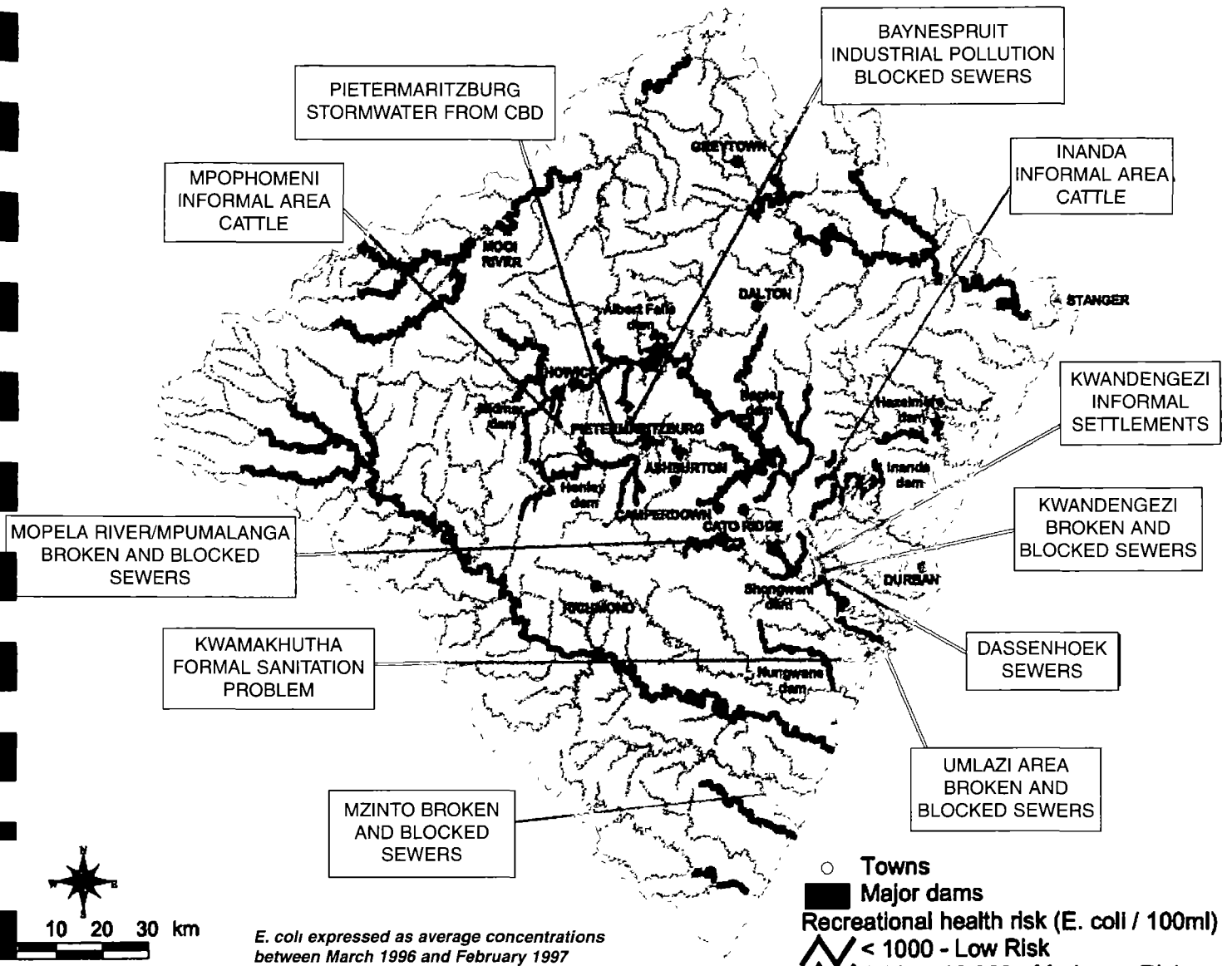


Figure 3: Sources of Bacterial, Viral and Parasitic Pollution

Potable Water Monitoring, Assessment and Control

The potable water monitoring programme provides a water quality database for evaluation against standards. Domestic water supply is provided by large waterworks, distribution reservoirs and small community water systems. Drinking water quality standards, which are established on public health, aesthetic, corrosion and scaling criteria are used to evaluate all sources of drinking water supply. Refer to Bar charts (overleaf on pg 10)

The development of standards is a continuous and dynamic process with improvements being made as additional information on health effects becomes available from national and international sources

BIOMONITORING

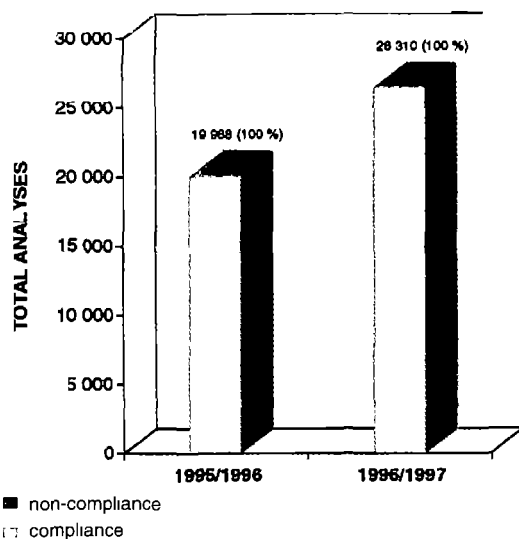
T A R G E T S

- To complete the development, and commence with implementation of toxicity testing procedures
- To integrate our internal biomonitoring programme for aquatic ecosystems with the national programme

Potable Water Monitoring

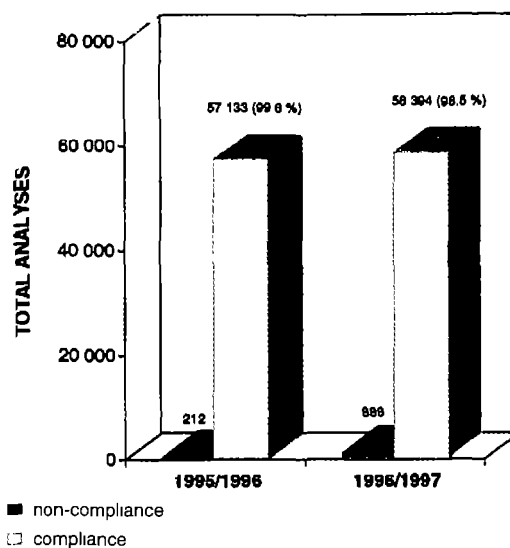
CHEMICAL

Conductivity, Alkalinity, Ca, Mg, K, NO₃, NO₂, NH₃, SO₄, Cl, F, Cu, Pb, Cd, Cr, Hg, As, Se, Ni, Ba, Ag, Sb, B and CN



MICROBIOLOGICAL AND DISINFECTION

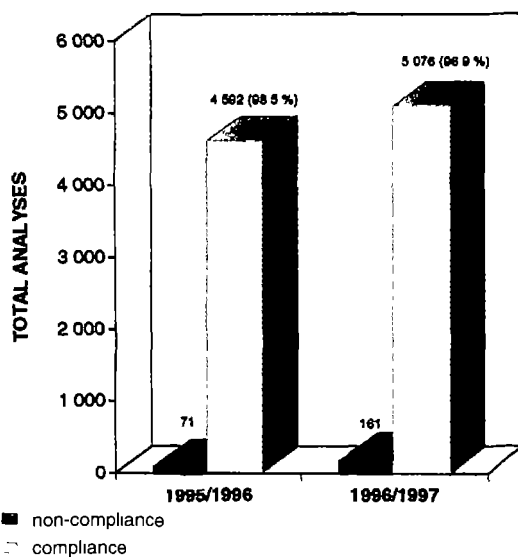
Total Chlorine, Free Chlorine, *E. coli*, Coliforms, Faecal Streptococci, Colony Counts @ 22°C and 37°C and BNLFs @ 37°C



The increase in out-of-ranges for the microbiological and disinfection category was largely due to an increase in the number of low chlorine measurements (500 in total) This corresponded to monitoring of several new RAWSP sites for which appropriate treatment measures are still being assessed

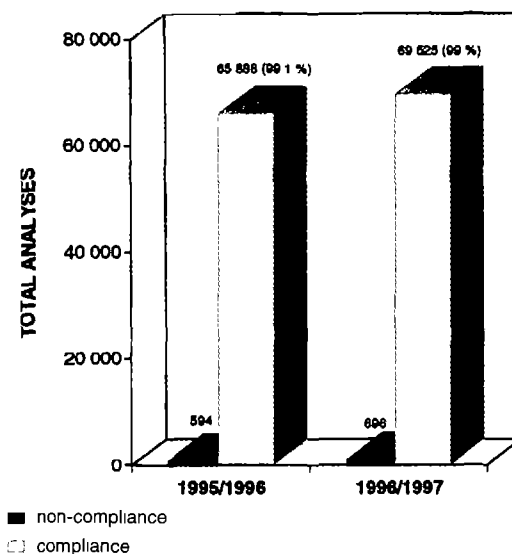
ORGANIC

Phenols, Total THMs, Pesticides, Chloroform, SMIB, Bromodichloroform, Dibromochloroform, Bromoform and Geosmin



AESTHETIC, CORROSIVITY AND SCALING

Odour @ 60°C Appearance, Taste, Odour, pH, Colour, Turbidity, Total Al, Soluble Al, Total Hardness, Na, Fe, Mn and Zn



The increase in out-of-range organics was largely due to high trihalomethane concentrations in South Coast systems, particularly the newly acquired Umzinto Waterworks

Out-of-ranges in the aesthetic, corrosion and scaling category corresponded to high turbidity and pH for new RAWSP schemes and South Coast waterworks acquired in 1996

Microbiology and Public Health

The main function of this department is to ensure that the treated drinking water produced by Umgeni Water is microbiologically safe to drink. Final waters are routinely screened for indicator organisms like Coliforms and *E. coli*, faecal streptococci and coliphages. Monitoring of rivers, dams and sewage effluent is also carried out to provide an early warning of possible health hazards in the raw water supplies. This is not only important to Umgeni Water, but also to recreational users and people who rely on rivers as their sole source of drinking water. Monitoring for *Salmonella*, *Shigella* and *Vibrio* species, *Cryptosporidium*, *Giardia*, *Ascaris* worms, taste and odour producing *Actinomyces* is also carried out on selected samples.

The department is also involved in the promotion of public health through education, a good example being the recent Epidemic Dysentery Seminar. Our Public Health Scientists regularly represent Umgeni Water at meetings and seminars on primary health care matters.

MICROBIOLOGY AND PUBLIC HEALTH

T A R G E T S

- Optimisation of methods for the detection and culture of *Legionella* species from cooling water samples.
- Assimilable Organic Carbon in ozonated water samples is being measured by means of a bio-assay to establish the potential for microbial regrowth in distribution systems.
- Chromogenic media will be evaluated, since the implications of their use include use of less materials and a shorter waiting period for confirmed results.

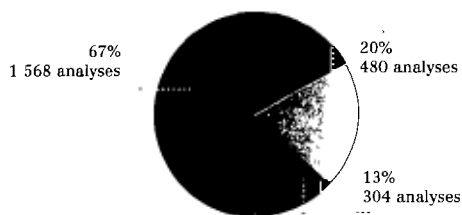
Wastewater Monitoring, Assessment and Control

The wastewater monitoring programme provides a database for evaluation against the Department of Water Affairs and Forestry's General Standard and Special Phosphate Standard.

The graphs show both compliance and non-compliance and the tables show details of constituents that did not comply. For *E. coli* and chlorine the working limits are less stringent than the General Standard since compliance with

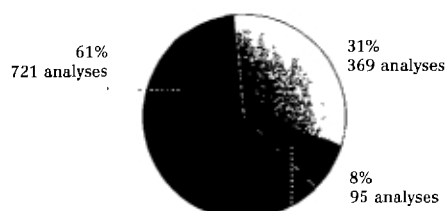
a zero *E. coli* limit and 0,1 mg/l chlorine limit has been found to be unattainable with existing treatment technology. For the same reason, following discussion with the Department of Water Affairs and Forestry, working limits less stringent than the General Standard, have been set for colour and conductivity for the Hammarsdale Wastewater Works, while technological options are being investigated.

Compliance with General/Special Phosphate Standards
 Compliance with working limits
 Non-compliance



DARVILL WWW (74,7 M/d)

Constituent	Number of Analyses	General Standard	Out-of-Ranges (General Std)	Out-of-Ranges Concentration	Working Limit	Out-of-Ranges (Working Limit)
<i>E. coli</i> (per 100 ml)	478	0	456	1 - 360 000	500	175
Total Chlorine (mg/l)	478	0,1	271	0,15 - 4	0,3	72
Suspended solids (mg/l)	139	25	8	41 - 103		
SRP (µg/l)	138	1 000	47	1 040 - 8 610		
Manganese (mg/l)	10	0,4	2	0,5 - 0,65		



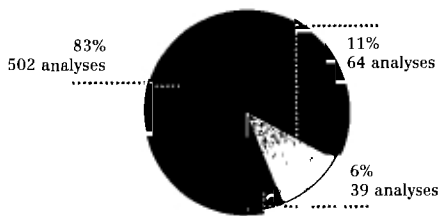
HAMMARSDALE WWW (10,2 M/d)

Constituent	Number of Analyses	General Standard	Out-of-Ranges (General Std)	Out-of-Ranges Concentration	Working Limit	Out-of-Ranges (Working Limit)
<i>E. coli</i> (per 100 ml)	221	0	213	2 - 28 000	500	3
Total Chlorine (mg/l)	224	0,1	92	0,15 - 1	0,4	16
Colour (°H)	52	40	49	71 - 113	70	18
Conductivity (mS/m)	52	85	52	131 - 199	200	0
Ammonia (mg/l)	52	10	5	13 - 34,1		
Suspended solids (mg/l)	52	2	7	27 - 47,5		
Oxygen absorbed (mg/l)	52	10	42	10,6 - 17,7		
COD (mg/l)	51	75	4	75 - 130		

Compliance with General/
Special Phosphate Standards

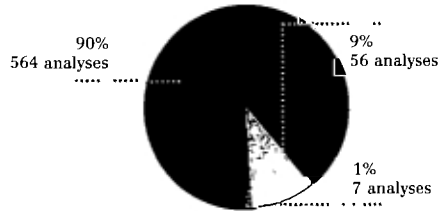
Compliance with
working limits

Non-
compliance



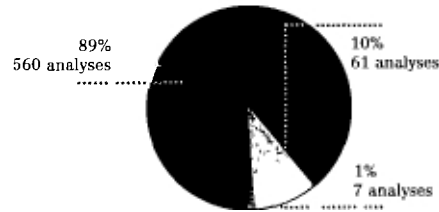
UMLAZI WWF (15,3 M/d)

Constituent	Number of Analyses	General Standard	Out-of-Ranges (General Std)	Out-of-Ranges Concentration	Working Limit	Out-of-Ranges (Working Limit)
<i>E coli</i> (per 100 ml)	50	0	48	2 - 79 000	500	9
Total Chlorine (mg/l)	51	0,1	29	0,15 - 1	0,3	4
Colour (°H)	51	40	7	41 - 66		
Conductivity (mS/m)	51	105	6	106 - 193		
Ammonia (mg/l)	51	10	3	11,5 - 16,5		
Arsenic (μ g/l)	3	500	1	655		
Oxygen absorbed (mg/l)	51	10	5	12,1 - 18,8		
COD (mg/l)	51	75	4	95,2 - 119		



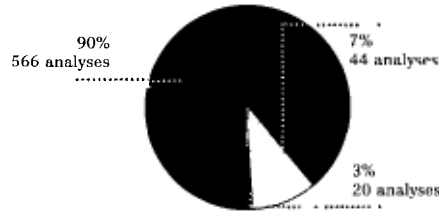
KWADABEKA WWF (6,7 M/d)

Constituent	Number of Analyses	General Standard	Out-of-Ranges (General Std)	Out-of-Ranges Concentration	Working Limit	Out-of-Ranges (Working Limit)
<i>E coli</i> (per 100 ml)	51	0	39	2 - 30 000	500	5
Total Chlorine (mg/l)	52	0,1	24	0,15 - 0,4	0,3	2



KWADENGEZI WWF (2,8 M/d)

Constituent	Number of Analyses	General Standard	Out-of-Ranges (General Std)	Out-of-Ranges Concentration	Working Limit	Out-of-Ranges (Working Limit)
<i>E coli</i> (per 100 ml)	52	0	47	2 - 34 000	500	5
Total Chlorine (mg/l)	51	0,1	20	0,15 - 4	0,3	1
Ammonia (mg/l)	52	10	1	10,8		



MPUMALANGA WWF (2 M/d)

Constituent	Number of Analyses	General Standard	Out-of-Ranges (General Std)	Out-of-Ranges Concentration	Working Limit	Out-of-Ranges (Working Limit)
<i>E coli</i> (per 100 ml)	52	0	45	2 - 1 730	500	8
Total Chlorine (mg/l)	51	0,1	13	0,2 - 1	0,3	6
Suspended solids (mg/l)	52	25	4	27 - 98,8		
SRP (μ g/l)	52	1 000	2	1 040 - 1 260		



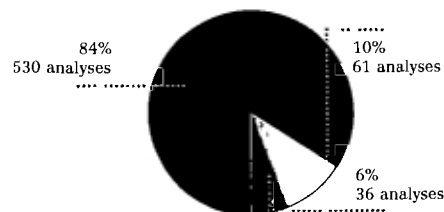
MPOPHOMENI WWF (2 M/d)

Constituent	Number of Analyses	General Standard	Out-of-Ranges (General Std)	Out-of-Ranges Concentration	Working Limit	Out-of-Ranges (Working Limit)
<i>E coli</i> (per 100 ml)	55	0	50	2 - 5 200	500	5
Suspended solids (mg/l)	55	25	5	41 - 103		
COD (mg/l)	55	75	1	106		



KWAMAKUTHA WWF (1,6 M/d)

Constituent	Number of Analyses	General Standard	Out-of-Ranges (General Std)	Out-of-Ranges Concentration	Working Limit	Out-of-Ranges (Working Limit)
<i>E coli</i> (per 100 ml)	51	0	45	2 - 1 240	500	2
Total Chlorine (mg/l)	52	0,1	12	0,15 - 1	0,3	3
Colour (°H)	52	40	15	42 - 49		
Ammonia (mg/l)	51	10	43	10,4 - 27,1		
Suspended solids (mg/l)	52	25	21	25,8 - 54,5		
Oxygen absorbed (mg/l)	51	10	6	10,1 - 13		
COD (mg/l)	51	75	21	75,4 - 131		



IXOPO WWF (0,55 M/d)

Constituent	Number of Analyses	General Standard	Out-of-Ranges (General Std)	Out-of-Ranges Concentration	Working Limit	Out-of-Ranges (Working Limit)
<i>E coli</i> (per 100 ml)	52	0	49	2 - 420 000	500	20
Total Chlorine (mg/l)	53	0,1	37	0,15 - 3,3	0,3	5
Ammonia (mg/l)	51	10	4	13,2 - 17,4		
COD (mg/l)	51	75	1	91,4		
Total Sulphides (mg/l)	2	1	2	3 - 15,5		
Soap (mg/l)	4	2,5	4	3 - 6,8		

Sludge Quality and Utilisation

What is treated sewage sludge?

Treated sewage sludge is an inevitable by-product of the process of wastewater purification. The sludge material is actually the biomass of all the microbial populations which were employed in the biological treatment process. As organic



Treated sewage sludge

Why measure sludge disposal performance?

The objective of this scoring system is to measure the degree of environmental protection our sludge disposal systems afford, and to highlight which specific areas require attention to optimise this protection. A scoring system will allow for the setting of targets, so that goals for improvement may easily be identified. Future reports will then be able to reveal where improvements in the system have been made, and where new improvements are required.

This system only serves to rate the disposal of sewage sludge to dedicated land disposal sites. Umgeni Water presently

material, sewage sludge chemically binds a wide variety of pollutants, effectively removing them from the water being treated. This facilitates the removal of materials such as heavy metals in the purification of wastewater which has an industrial component within it. In purely domestic effluents, the sludge is also the final destination for pathogens such as tapeworm and roundworm eggs, some of which may survive the purification process.

The chemical and pathogenic characteristics of sewage sludge mean that the disposal of this material needs to be done with a great deal of care. At present the legal requirements for the safe disposal of sewage sludge to land is under review by a number of government departments. The issue is a complex one, since control of sludge disposal to land, is not governed by any single regulatory body.

In an attempt to introduce a means of self-regulating our sewage sludge disposal activities, Umgeni Water has introduced a system to rate the performance of our land disposal activities

undertakes this means of sludge disposal at all the wastewater works it operates, and will, in all likelihood, continue to do so in the short to medium term.

However, both internationally and within Umgeni Water, such disposal systems are currently receiving a great deal of attention to determine whether more beneficial uses could be made of waste sewage sludge. As an organic material, properly treated sludge, often termed 'bio-solids', serves a useful purpose as a soil conditioner. As a means of investigating this possibility, further work is currently underway at the Darvill and Hammarsdale sludge disposal sites, to establish the viability of crop plants in these soils.

- 1 = MPUMULANGA
 2 = KWAMAKUTHA
 3 = UMLAZI
 4 = KWANDENGEZI
 5 = KWADABEKA
 6 = HAMMARSDALE
 7 = MPOPHOMENI
 8 = DARVILL
 9 = IXOPO

LAND DISPOSAL PERFORMANCE RATINGS FOR SEWAGE SLUDGE DISPOSAL FROM UMGENI WATER OPERATED WASTEWATER WORKS

	1	2	3	4	5	6	7	8	9
Sludge volume produced (m ³ dry mass/month)	6,2	6,2	56	9,3	21	208	6,16	735	2,9
DISPOSAL SITE CHARACTERISTICS									
Formal disposal site	1	N/A	0	N/A	N/A	1	N/A	1	N/A
Stormwater control	0	0	0	0	0	1	N/A	0	0
Soil erosion control	N/A	N/A	0	N/A	N/A	1	N/A	1	0
Access control	1	1	0	1	1	0	1	0	1
Complete containment	1	1	0	1	1	1	1	0	1
Effective sludge management	1	0	0	0	1	1	0	1	1
IMPACT MONITORING									
Surface water quality monitoring	N/A	N/A	1	0	N/A	1	0	1	1
Groundwater quality monitoring	0	0	0	0	0	1	0	0	0
Sludge constituent monitoring	1	1	1	1	1	1	1	1	1
RECORD-KEEPING									
Sludge volume records kept	1	0	1	0	0	1	1	1	0
Sludge destination records kept	N/A	N/A	0	N/A	N/A	1	N/A	0	N/A
Pollutant load monitoring done	N/A	N/A	0	N/A	N/A	0	N/A	0	N/A
PUBLIC RELATIONS									
Complaints received? (No=1, Yes=0)	1	1	0	1	1	0	1	0	1
SCORE (PERCENTAGE)	78	50	23	44	6,3	7	1,3	0	60

Scoring system rates the disposal of sludge to ensure that safe methods are used. Categories include disposal site characteristics, impact monitoring, record-keeping and public relations - key items for safe sewage sludge disposal. If one of the above is implemented it scores a 1 for that category. If not it gets a 0. If not applicable, N/A is recorded. The total score is recorded as a percentage of the possible total for each individual wastewater works. The closer the score to 100, the more is being done to protect the environment. The estimated sludge volume produced was included to indicate the relative size of the various works.

HEALTH AND SAFETY

Umgeni Water's commitment to health and safety was greatly enhanced by management's initiative in 1996 in establishing a corporate Safety Services section whose aim is to assist management in achieving the company's health and safety objectives

During 1996, the health and safety needs of the company were assessed by the newly formed Safety Services with a view to establishing updated, current goals and objectives for the company's management to strive for. This assessment entailed conducting structured and comprehensive internal audits of the current risks within the working environments, and of the existing health and safety management systems in place at these workplaces. These audits helped determine the needs and priorities required by management to ensure that their existing systems are effectively and efficiently managing the identified risks in accordance with current Health and Safety legislation. The audits identified the following areas of non-conformance

Health and safety training, updating legal appointments, written safe work procedures, incident reporting and investigating, hazardous substance control, contractors' compliance to Umgeni Water's health and safety requirements, vehicle accidents

Each of these areas identified was prioritised and an action plan implemented. Those particularly relevant to the environment are discussed in this report with the balance included in the Annual Report

Hazardous chemical accidents

Eight incidents of hazardous chemical handling exposures were reported. Two incidents resulted in injuries to two employees. Investigations and inquiries into these incidents indicated both a lack of training in how to handle emergency situations and the lack of standardisation of chlorine gas handling equipment throughout Umgeni Water workplaces. The Purchasing and Training Departments were informed of recommendations to minimise further exposure to employees.

Written Safe Work Procedures

Written Safe Work Procedures (WSWP) is a crucial step in management's endeavour to comply with current Health and Safety Legislation. With this in mind a project was initiated by Safety Services to address these needs. During this period the DV Harris and Umlaas Road WSWP were completed but only DV Harris WSWP have been implemented. However, no training has been carried out

At this stage the continuation of the WSWP project was prioritised by senior Operations Management as the major objective to be accomplished in 1997

Courses / Training

In order for Umgeni Water to maintain its commitment towards obtaining its health and safety objectives, a major education drive was initiated by Safety Services and the Training Department to ensure complete health and safety awareness throughout Umgeni Water employees. This was achieved by determining what basic health and safety training was required by the workforce and thus providing the necessary courses/lectures/seminars to match these needs

From this statistical data almost 50 % of employees have undergone some form of health and safety training during 1996.

Safety Achievement Awards in 1996

Umgeni Water's Operations Division obtained a couple of firsts in the safety field during 1996.

Umgeni Water's DV Harris Waterworks succeeded in becoming the first workplace to obtain a five-star grading award from NOSA for its Health and Safety Management workplace programme. NOSA then nominated DV Harris Waterworks in the local authorities category of NOSA's 1996 Annual Safety Awards for the KwaZulu-Natal coastal region, which it won

Another feather in Umgeni Water's cap was the three-star grading awarded to Albert Falls Dam for its Health and Safety management programme. This is the first accredited health and safety grading for a dam in both South Africa and Africa as a whole

HEALTH AND SAFETY T A R G E T S

- The accident rate within our organisation is unacceptably high when compared to the national average for our industry category. It is Umgeni Water's vision for 1997 to reduce our accident rate to below this average.
- With this in mind a joint programme between Safety Services and the Training Department will be initiated to effectively educate and train all employees in relevant health and safety aspects throughout 1997

HAZARD AND OPERABILITY STUDIES

Like any other company, Umgeni Water has a legal obligation to operate its plants safely. It has to meet stringent regulations on the quality and reliability of its performance in relation to the public at large. Faced with the legal consequences of an accident or failure, Umgeni Water has been giving increasing attention to ways and means of handling this risk situation. One of the tools which is being applied is HAZOPS, or a Hazard and Operability Study. While a comprehensive HAZOPS can be time-consuming and costly, once completed it gives an operator a much clearer idea of where the most serious risks lie, and therefore what remedial action needs to be taken.

DURING THE YEAR TWO HAZOP STUDIES WERE CARRIED OUT AT THE ORGANISATION'S WATERWORKS. THE STUDIES INCLUDED

- hazards and risk assessment for the new ozone facility, at Wiggins Waterworks including instrumentation and control systems (design stage)
- chlorine risk assessment at Durban Heights Waterworks

HAZOP studies enable our organisation to assess its degree of risk, aid decision-making and improve operating performance. Several managers and operators attended our HAZOPS courses.



Construction workers are briefed about the Environmental Management Plan

UMGENI WATER'S ENVIRONMENTAL OUTREACH

ENVIRONMENTAL OUTREACH

T A R G E T S

Suppliers and Contractors

- To assess major Umgeni Water suppliers in terms of their environmental policy, practices and objectives. To promote suppliers' environmental responsibility as a decision-making factor in the procurement process.

Awareness

- To identify current paper consumption and develop a waste minimisation strategy.
- To continue with the environmental award scheme for staff.

Water Conservation

- To assess water demand strategies for the industrial sector.
- To implement water demand strategies in the urban domestic sector.

Integrated Catchment Management

- To assess the feasibility of implementing Working for Water projects in the Mvoti, Lovu and Midmar catchments.
- To establish integrated catchment management structures to address catchment problems in the Albert Falls, Valley of a Thousand Hills and Durban management units in the Mgeni River Catchment.



The proposed site for the new Mearns Dam on the Mooi River

POLLUTION PREVENTION

The pollution prevention section has procedures in place which enable staff to assess the risk to surface and groundwater sources and it promotes good pollution prevention practices

During 1996 our Pollution Prevention section held a number of meetings with industries (including edible oil industries), with a view to encouraging companies to safeguard the water environment. Effort was applied to identify problem areas, and to educate senior management within the companies concerned about their legal obligation, their management needs and possible ways to improve their operational practices. Expertise from Umgeni Water has also been offered to identify innovative and optimum solutions

Umgeni Water was also involved in initiatives to encourage safe management of wastes resulting from farming activities in supply catchments

Umgeni Water's 'problemsheds' campaign attacks pollution problems at source by promoting joint initiatives with parties having common concerns to identify innovative, practical and cost-effective solutions. This approach has started to show positive results in addressing problems

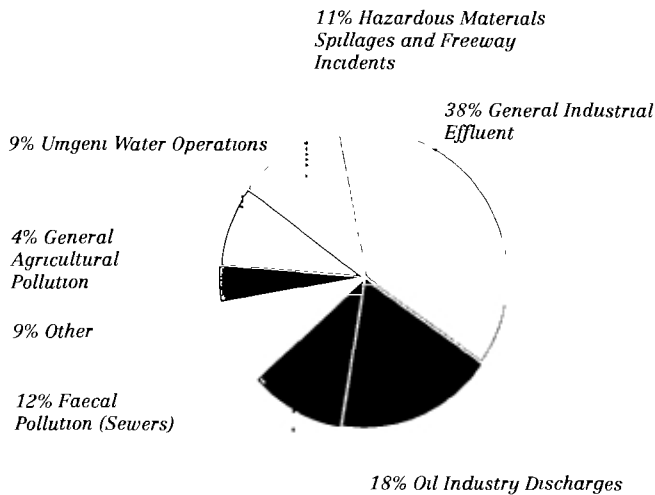
around leaking and broken sewers in Mpumalanga township. Plans are underway to apply the same technique in dealing with edible oil pollution in the Baynespruit River

All these initiatives draw attention to activities where an individual's action affects the environment

EDIBLE OIL PROCESSING COMPANIES IN PIETERMARITZBURG
REMAINED THE DOMINANT IDENTIFIED POINT SOURCE OF
DISCHARGES TO SEWER AND RIVER

YEAR	INCIDENTS OF UNACCEPTABLE DISCHARGES TO RIVER AND SEWER
1996/7	17
1995/6	21

Types of Incidents that caused Contamination of Water Sources



PUBLIC HEALTH/ ENVIRONMENTAL HEALTH

The organisation has actively supported the national campaign to eradicate dysentery and diarrhoea. A survey in Mpolweni where faecal contamination of rivers occurs, indicated that the incidence of diarrhoea amongst the population was 56%. At present there are no proper sanitation facilities or water supply. These studies will provide information about direct medical costs and indirect costs such as the loss of man-hours and productivity. These can be correlated with the cost of control measures, such as education, provision of sanitation and potable water facilities. They will also provide a baseline for measuring the success of interventions in reducing these impacts. The education intervention has commenced with initiatives at schools, together with the local health committee and the entire community, as well as a festival which included educational theatre.

CONSERVATION, RECREATION AND ECO-TOURISM

The Shongweni Resources Reserve project was initiated over four years ago when Umgeni Water formed a partnership with Msinsi Holdings to manage the area surrounding the dam. Msinsi Holdings is a private conservation company, which through sustainable environmental management, community development and sound business principles, continually strives to uplift the human spirit.

The approach draws from the Zimbabwean "campfire" philosophy which provides a model for community conservation in Africa and for sustainable upliftment of communities within ecologically sensitive areas.

Following on from the success of Shongweni Resources Reserve project, Umgeni Water appointed Msinsi Holdings

to manage three other environmentally sensitive areas, namely Nagle Dam Estate, the bird sanctuary at Darvill Wastewater Works and the area surrounding Inanda Dam. During the 1996/97 financial year, Msinsi Holdings was appointed to take over the management of Albert Falls and Hazelmere recreational areas when the Natal Parks Board moved out. The Msinsi approach has realised considerable benefits in terms of wise environmental management and community development operating within a framework of sound business principles. This has attracted considerable local and international attention which was demonstrated by the recent visit of American Vice-President Al Gore to the Shongweni Resources Reserve in February 1997.

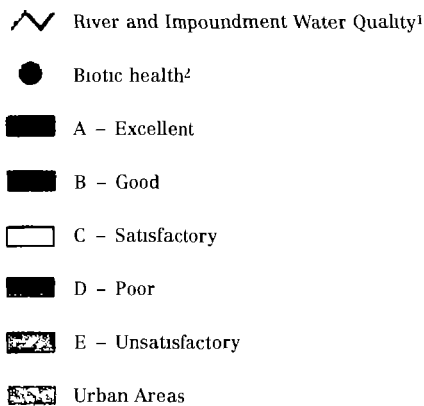
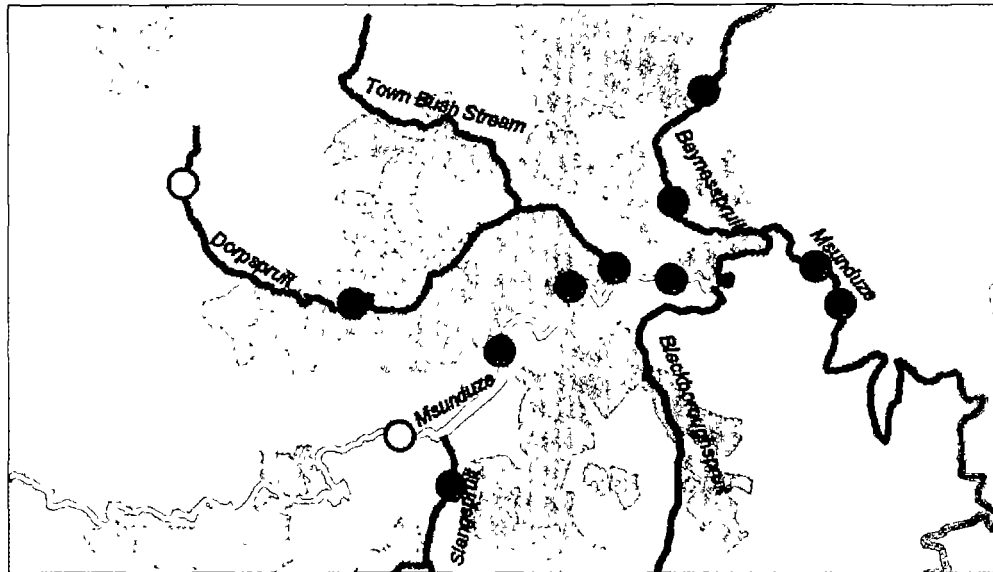


Removing water hyacinth from Inanda Dam is an ongoing task

WATER QUALITY STATUS AND BIOTIC HEALTH

for Rivers and Dams

MARCH 1996 – FEBRUARY 1997

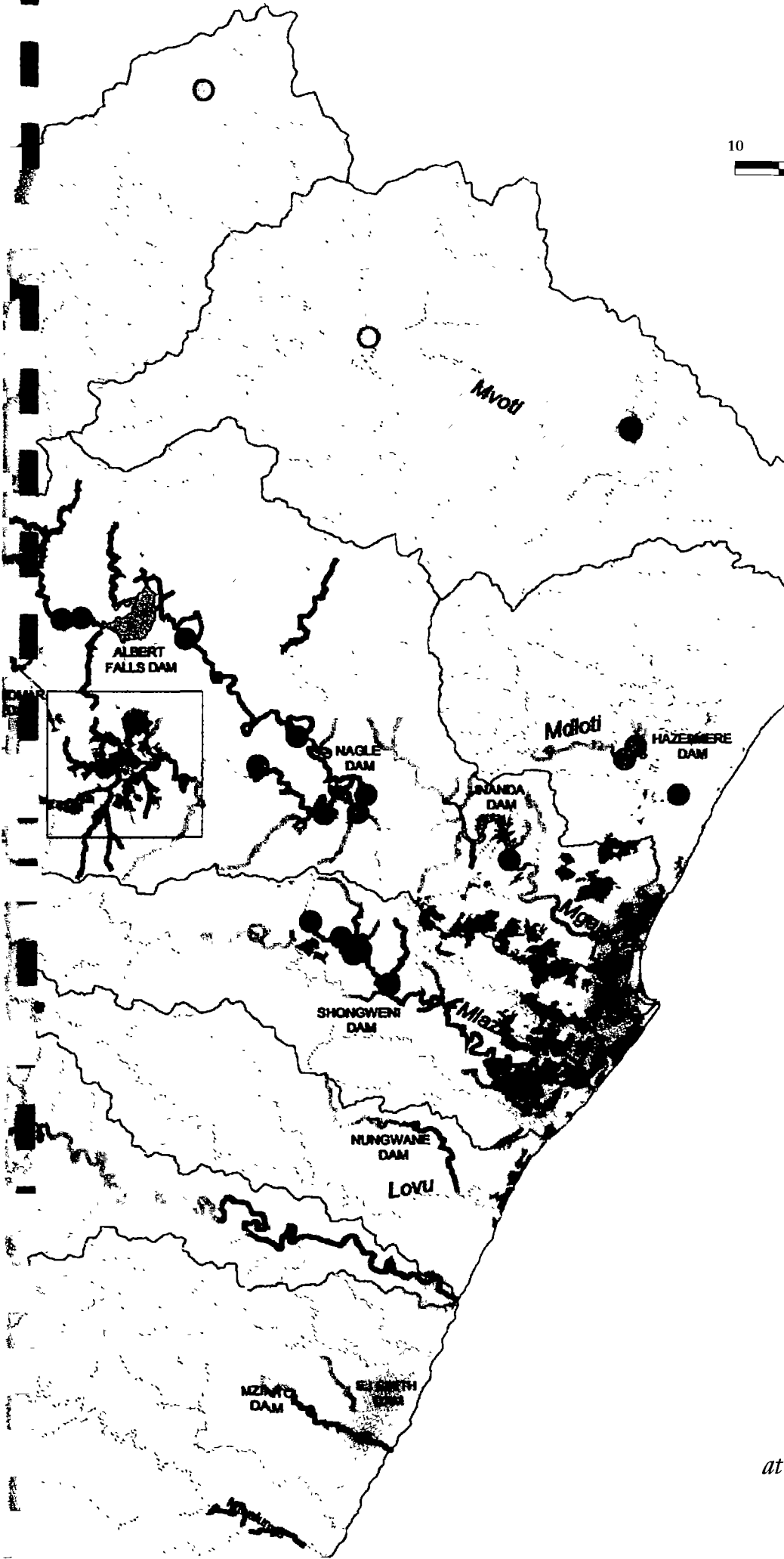










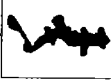


1 The Water Quality Index includes the following Water Quality Variables Algal Count (Filter clogging, taste and odour), Chlorophyll a, E coli, Turbidity, Conductivity, Nitrate, Ammonia, TP, SRP, Suspended Solids and TOC

2 The Biotic Health Index is based on Aquatic Insects with unique indicator potentials



10 0 10 20 km



-  Hazelmere Dam
100,8%
-  Midmar Dam
101%
-  Albert Falls Dam
100,8%
-  Nagle Dam
100,1%
-  Henley Dam
102,3%
-  Camp's Drift
-  Inanda Dam
101,4%
-  Shongweni Dam
100,8%
-  Nungwane Dam
100%
-  E J Smith Dam
99,4%
-  Mzimba Dam
100,8%

DAM VOLUME
at the end of February 1997

THE REDUCE PROGRAMME

The target for 1996/97 was to start paper-recycling initiatives at our offices in the Coastal Region. This was successfully achieved and over a two and a half tons of paper was recycled. During the 1996/97 financial year a total of just over eleven tons of paper and plastic was recycled, generating about R3 500 in revenue. A charity organisation was responsible for recycling paper and cardboard from our Inland Regional offices with the proceeds managed and used by the charity itself.

Recycling can only work if there is use for the recycled material. The Public Affairs Department of Umgeni Water is investigating the feasibility of using recycled paper for all newsletters and brochures. With this initiative Umgeni Water hopes to stimulate suitable end-use markets for recycled paper.

THE MGENI CATCHMENT MANAGEMENT PLAN

The Mgeni Catchment Management Plan embodies the principles of Integrated Catchment Management as they might be applied in order to achieve sustainable water resources management. The plan, co-financed by the Department of Water Affairs and Forestry and Umgeni Water, relies on a partnership between government, industry, farmers and civil society. The needs and aspirations of the various user groups are key considerations in the establishment of targets for water quality and yield. This is ensured by enlisting the support and active involvement of water users both in the development and implementation of the plan. During the past year, a frame-

work for an integrated management plan for the Mgeni catchment was developed and circulated to key role-players. The Mgeni catchment has been divided into six Management Units (sub-catchments with similar land use and water-related problems) and catchment management initiatives have commenced in earnest on the Midmar and Henley - Pietermaritzburg Management Units. Activities in the Midmar Management Unit are the most advanced, with the development of a Catchment Advisory Committee, and considerable input into the planning and development process already underway.

The External Education Services Unit



The External Education Services Unit was awarded the prestigious Green Trust Water Conservation award for the most effective Water Conservation Campaign in South Africa in 1996.

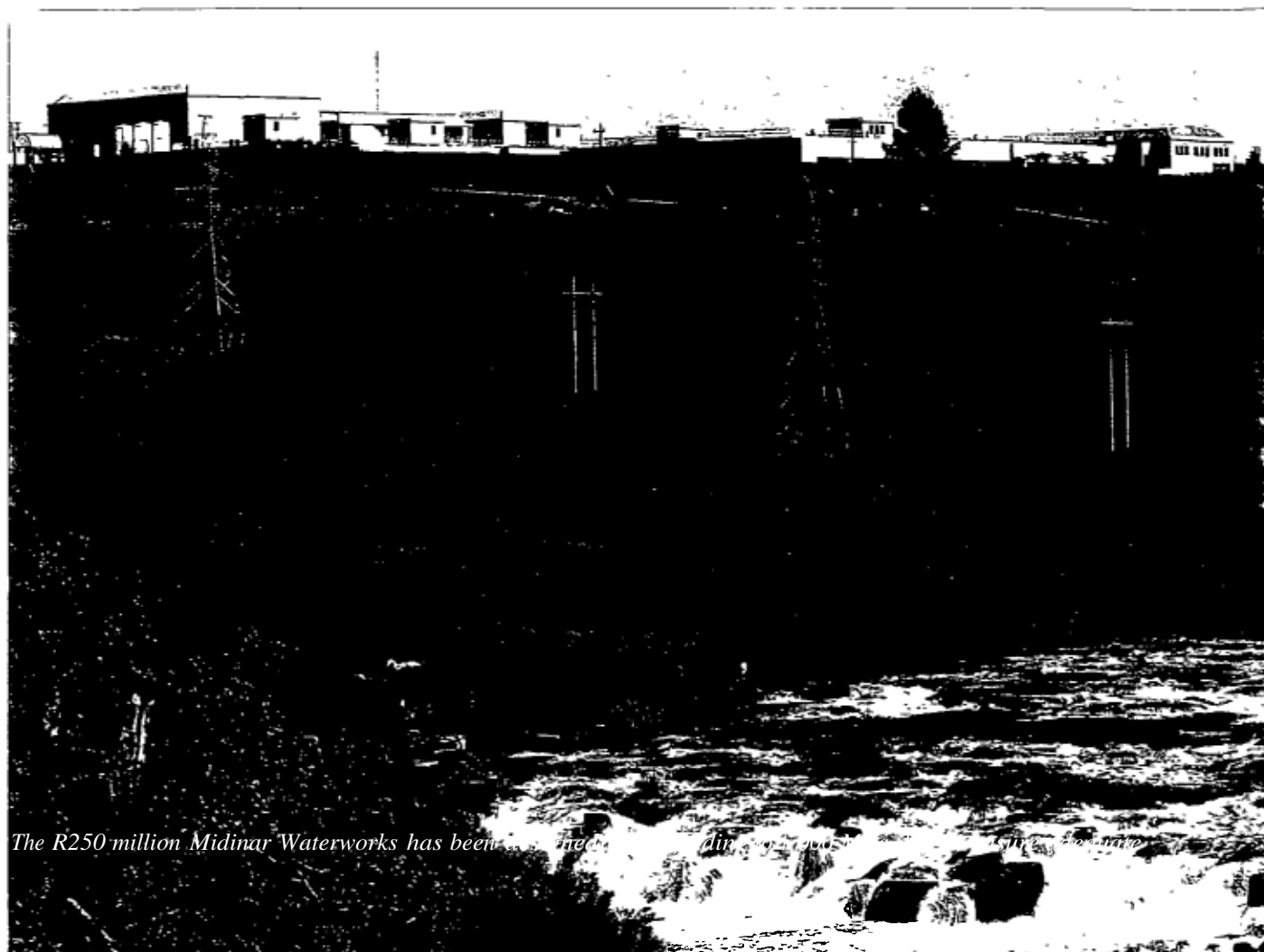
The External Education Services Unit team with the award are from left Steve Camp Manager External Education Services and Education Officers Sunita Raghur, Penny Gumede and Bongie Thabede. Middle back Val Sheppard who processes all mail orders.

1 9 9 7 - 1 9 9 8

THE MGENI
CATCHMENT
MANAGEMENT
PLAN

T A R G E T S

- During 1997/98 initiatives in the Albert Falls and Durban Management Units will be established



The R250 million Midmar Waterworks has been designed for upgrading to 1 000 Ml a day to ensure adequate supplies are available to meet the growing needs of large water-demanding industries

The R250 million Midmar Waterworks has been designed for upgrading to 1 000 Ml a day to ensure adequate supplies are available to meet the growing needs of large water-demanding industries

EXTERNAL EDUCATION SERVICES

During the past year, the External Education Services Unit staff held more than 300 water workshops that directly involved 18 000 students at the request of the communities themselves, without any direct marketing on the part of Umgeni Water

- In an effort to promote water conservation the Water Education Mail Order Catalogue was launched three years ago. The demand for water education resources through the catalogue has grown enormously nationwide. During the past year the External Education Services processed 630 requests (to the value of R80 000) for the water education resources
- A dedicated water classroom was established at Durban Heights Waterworks in April last year. Schoolchildren who visit the classroom have an opportunity to learn about the water treatment process in

detail and other water-related topics before being taken on a tour of the waterworks. Since inception over 4 000 students have attended the water classroom

- A range of water education resource material has been developed in the past year. Some of this material has been used for national water education initiatives. For example, the useful publication entitled "A Guide to Water Saving in South Africa" was used by the National Water Conservation Campaign for their 20/20 Vision Programme
- The "On Stream" newsletter, now in its fourth year, continues to provide useful water awareness information nationally to organisations, environmentalists, schools and other interest groups. Over 25 000 copies of "On Stream" were distributed nationally last year

HOW TO FIND OUT MORE

*If you wish to know more about environmental management at Umgeni Water
or to enquire about any information contained in this report,
please contact the appropriate person from the list given below:*

TYPE OF INFORMATION REQUIRED	CONTACT PERSON	TELEPHONE NUMBER
Environmental Management System and Auditing	Mr Thulani Duma	(0331) 341 1360
Environmental Education (External)	Mr Steve Camp	(0331) 341 1305
Hydrobiology and Instream Flow Requirements	Dr Chris Dickens	(0331) 341 1151
Environmental Awareness (Internal)	Mr Peter Neal	(0331) 341 1060
Pollution Prevention	Dr. Quentin Espey	(0331) 341 1198
Environmental Management – Planning	Mr Mike Haynes	(0331) 341 1384
Environmental Management – Design and Construction	Ms Joanne du Preez	(0331) 341 1221
Environmental Policy and Intergrated Catchment Management	Dr John Howard	(0331) 341 1118
Water Quality Planning	Ms Manu Pillay	(0331) 341 1315
Hazard and Operability Studies	Mr Pradeep Ramlall	(031) 81 1358
Geographic Information Systems (Environmental)	Ms Rene Dutlow	(0331) 341 1172
Safety Management	Mr Daryl Wilkinson	(0331) 341 1065
Microbiology and Public Health	Mr Ian Bailey	(0331) 341 1136
Sludge Quality and Utilisation	Mr Neil McNab	(0331) 341 1324
Sponsorships	Ms Rebecca Thody	(0331) 341 1065

SPONSORSHIPS

UMGENI WATER SUPPORTS AND ENCOURAGES CHARITIES AND COMMUNITIES PROMOTING SOUND ENVIRONMENTAL PRACTICES DURING THE YEAR SPONSORSHIPS ROUGHLY TO THE VALUE OF R 25 000 WERE MADE TO THE FOLLOWING ORGANISATIONS

*C.R.O.W
Natal Parks Board
Drakensberg Wetland Project
Greater Edendale Environmental Network
Chamber of Commerce & Industries Anti-litter Campaign
Ntshongweni Environmental Club
Sobantu Environmental Club
Keep Pietermaritzburg Clean Association*

MEMBERSHIPS

UMGENI WATER IS A MEMBER OF THE FOLLOWING BODIES

*World Wide Fund for Nature (Southern Africa)
Wildlife Society of Southern Africa
Industrial Environmental Forum
Environmental Education Association of Southern Africa*

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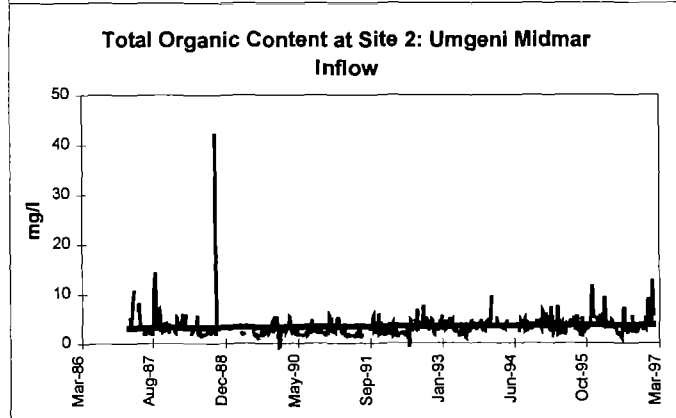
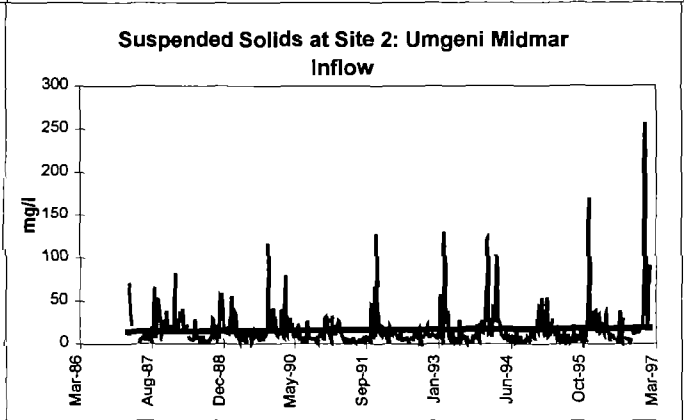
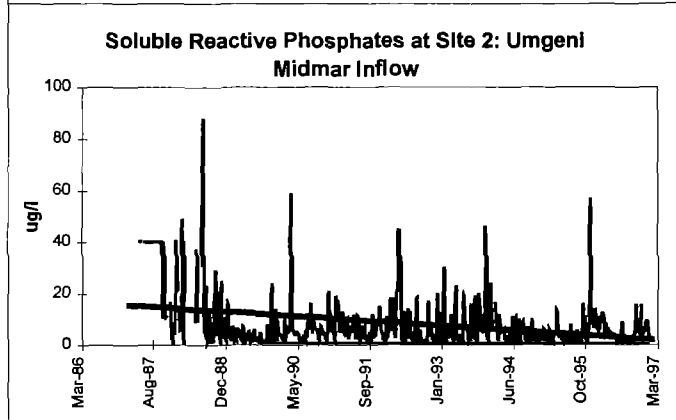
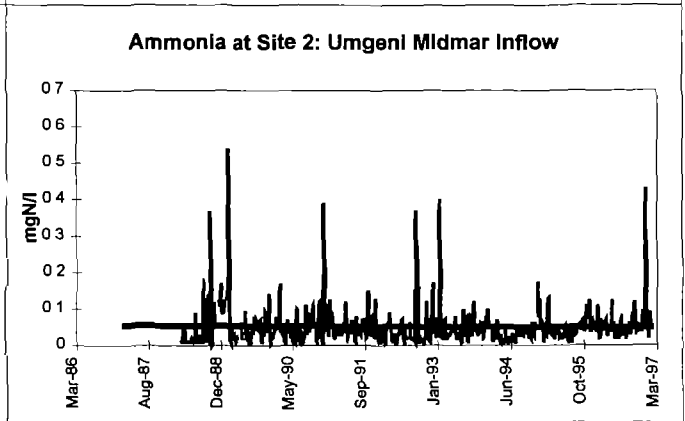
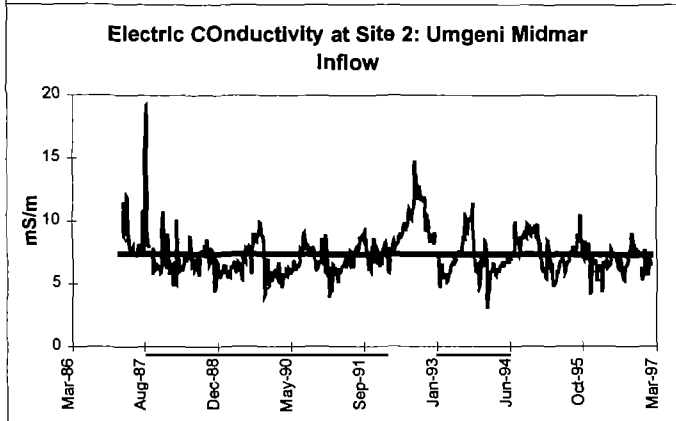
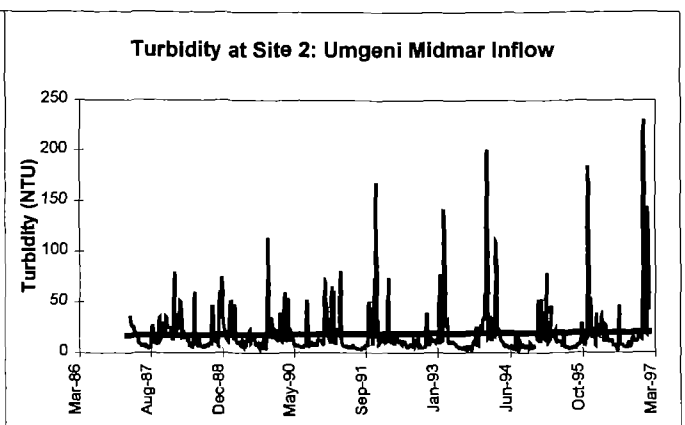
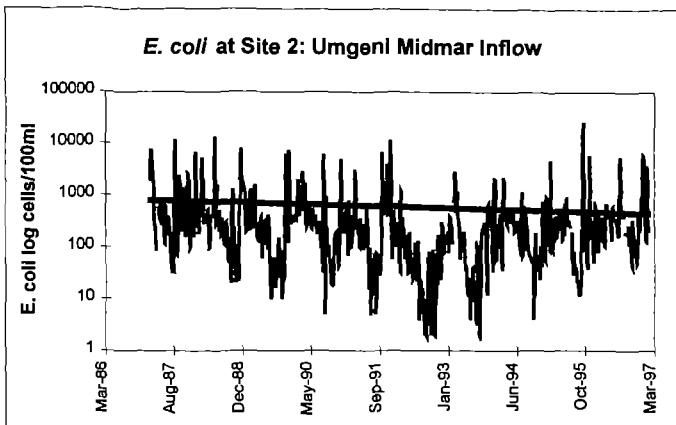
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ENVIRONMENTAL

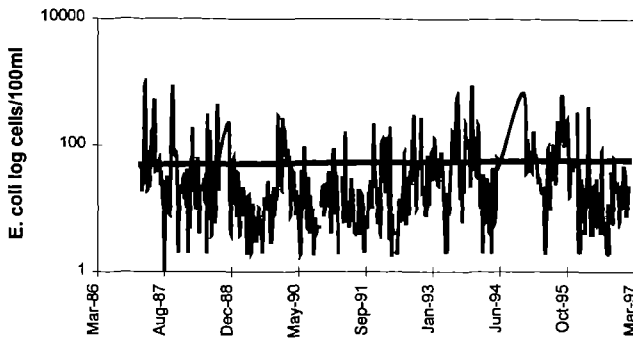
Report

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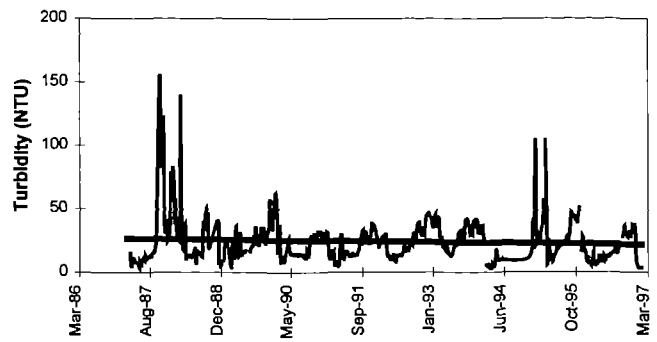
Time series water quality determinants.



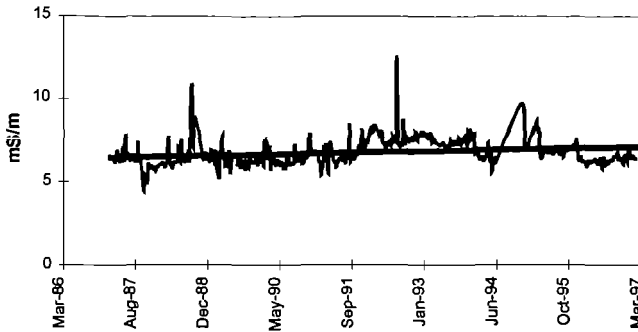
E. coli at Site 3: Umgeni Midmar Outflow



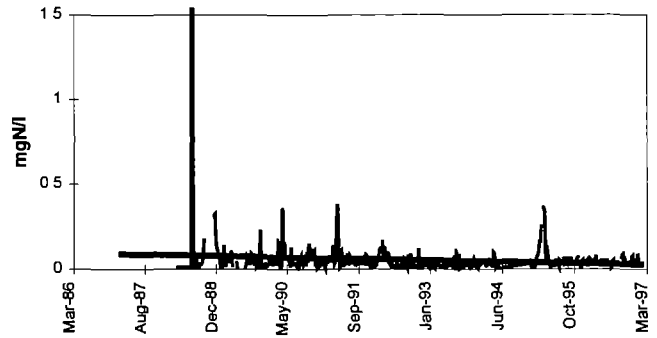
Turbidity at Site 3: Umgeni Midmar Outflow



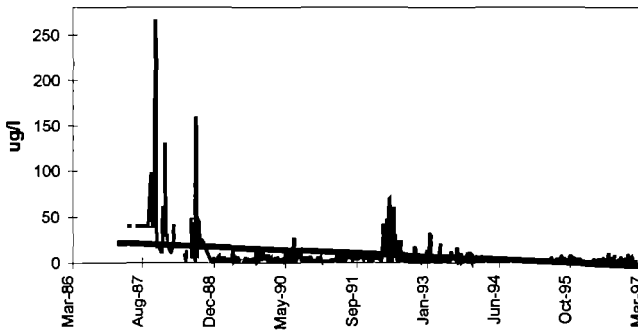
Electric Conductivity at Site 3: Umgeni Midmar Outflow



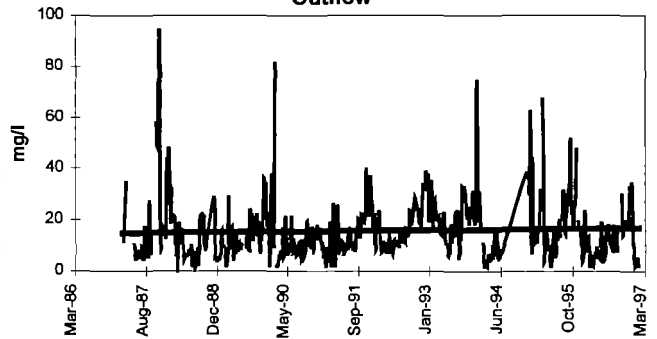
Ammonia at Site 3: Umgeni Midmar Outflow



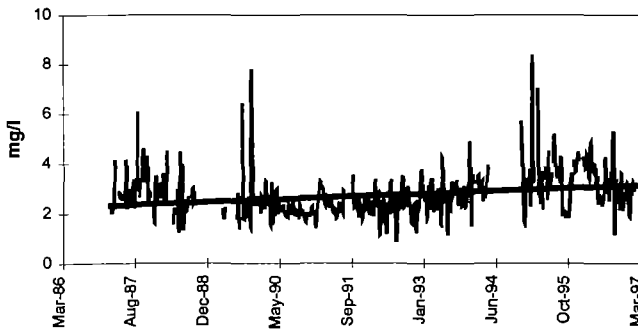
Soluble Reactive Phosphates at Site 3: Umgeni Midmar Outflow



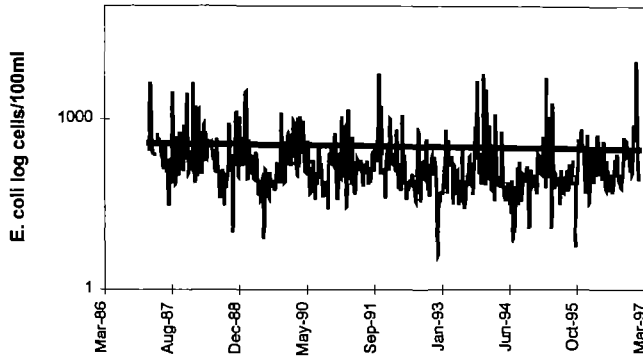
Suspended Solids at Site 2: Umgeni Midmar Outflow



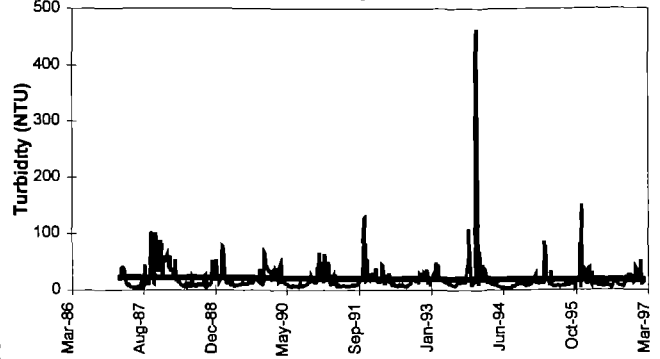
Total Organic Content at Site 2: Umgeni Midmar Outflow



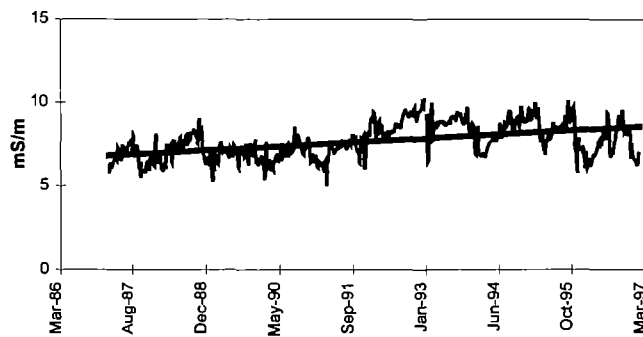
E. coli at Site 6: Umgenlat Mortons Drift



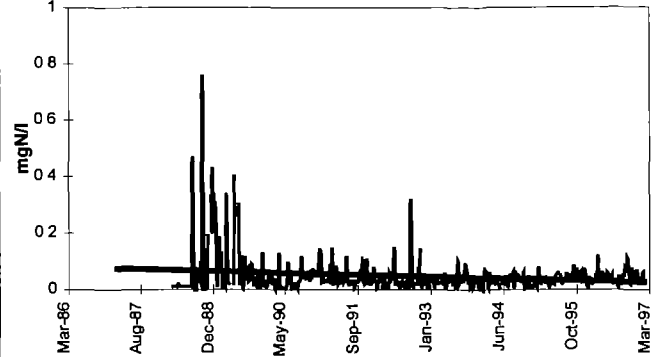
Turbidity at Site 6: Umgeni Mortons Drift



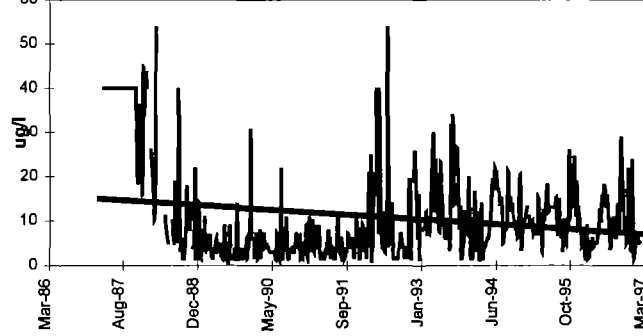
Electric COnductivity at Site6: Umgeni Mortons Drift



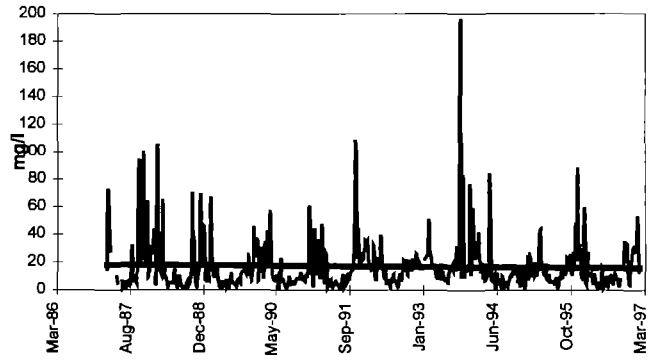
Ammonia at Site 6: Umgeni Mortons Drift



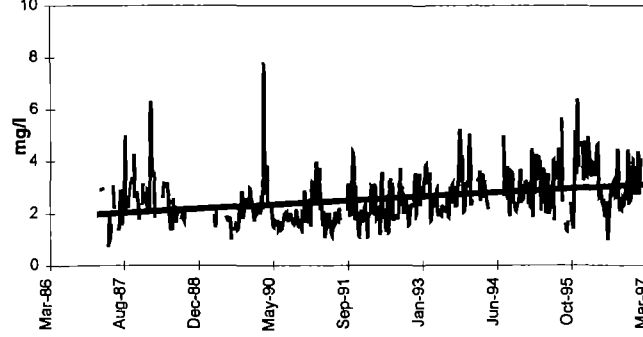
Soluble Reactive Phosphates at Site6: Umgeni Mortons Drift



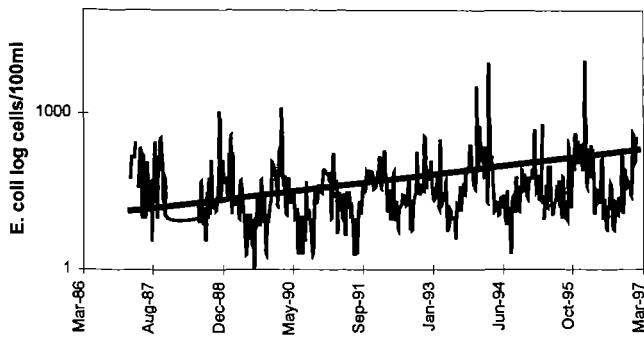
Suspended Solids at Site 6: Umgeni Mortons Drift



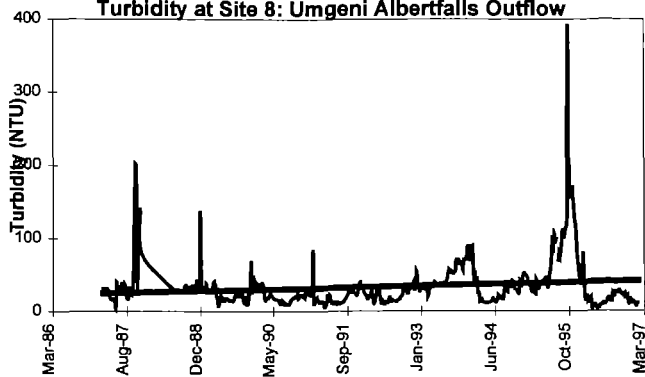
Total Organic Content at Site 6: Umgeni Mortons Drift



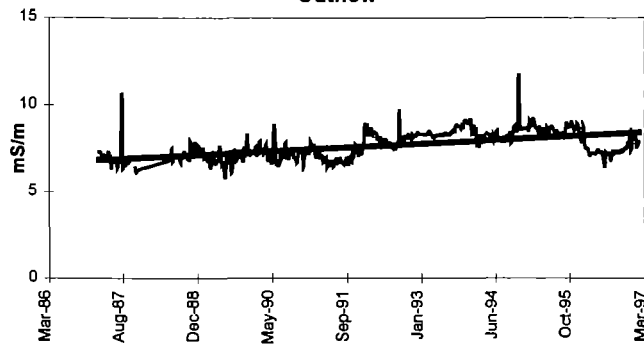
E. coli at Site 8: Umgeni Alberfalls Outflow



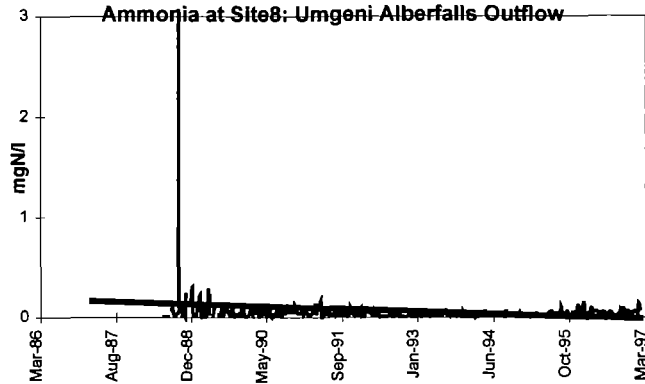
Turbidity at Site 8: Umgeni Alberfalls Outflow



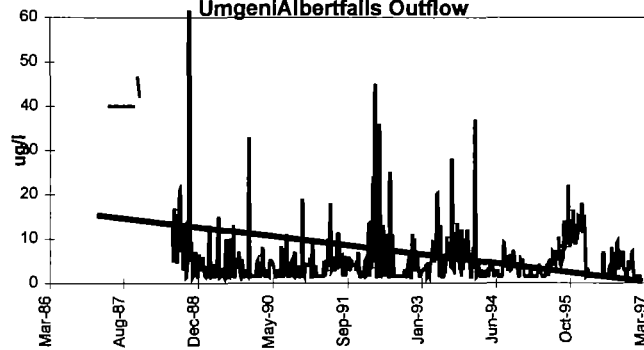
Electric COnductivity at Site8: Umgeni Alberfalls Outflow



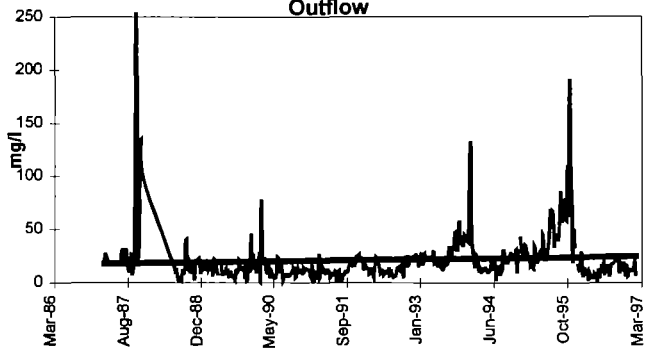
Ammonia at Site8: Umgeni Alberfalls Outflow



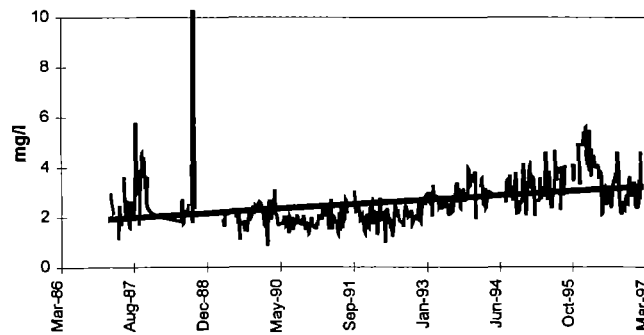
Soluble Reactive Phosphates at Site8: UmgeniAlberfalls Outflow



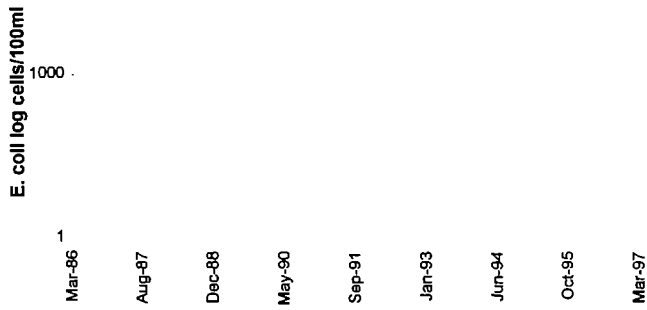
Suspended Solids at Site 8: Umgeni Alberfalls Outflow



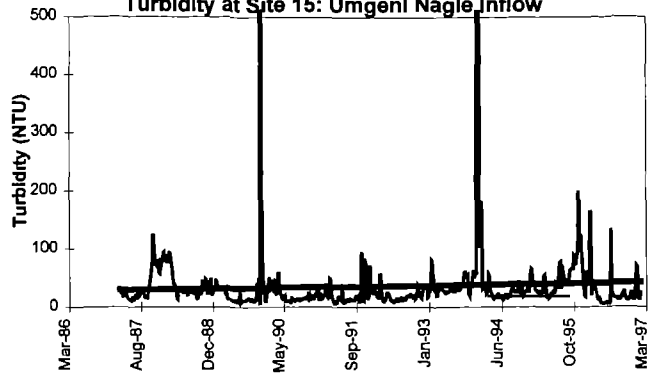
Total Organic Content at Site 8: Umgeni Alberfalls Outflow



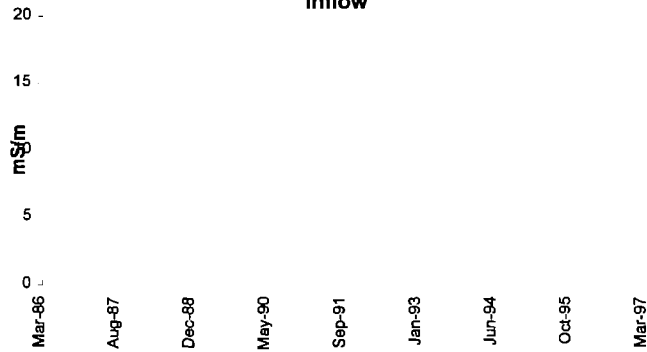
E. coli at Site 15: Umgeni Nagle Inflow



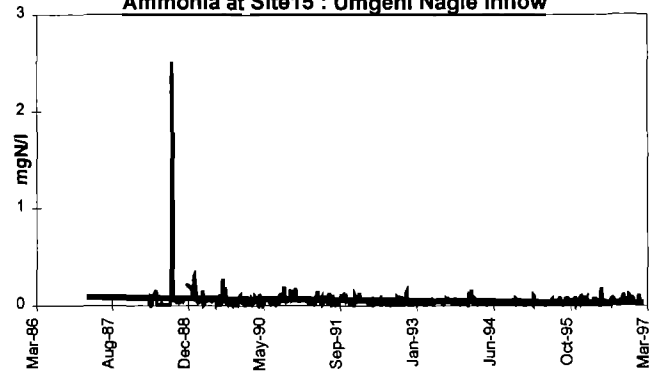
Turbidity at Site 15: Umgeni Nagle Inflow



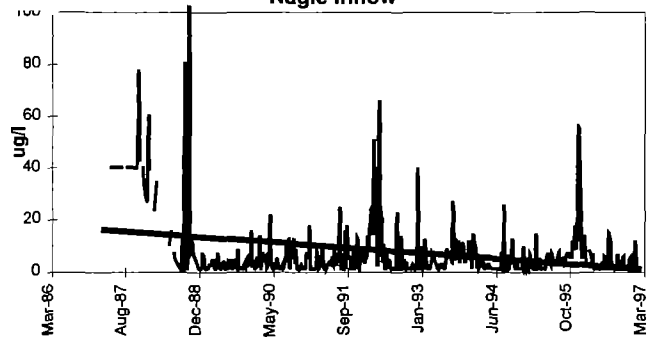
Electric Conductivity at Site 15: Umgeni Nagle Inflow



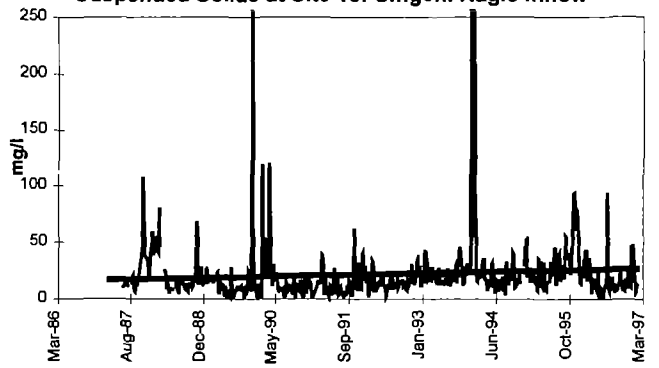
Ammonia at Site 15 : Umgeni Nagle Inflow



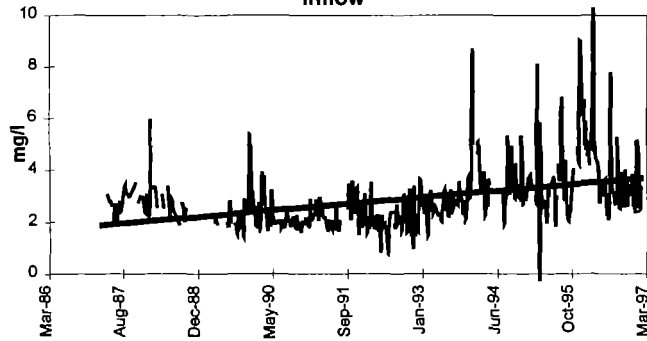
Soluble Reactive Phosphates at Site 15: Umgeni Nagle Inflow



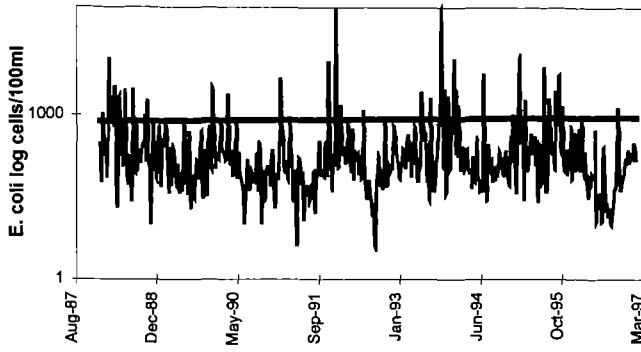
Suspended Solids at Site 15: Umgeni Nagle Inflow



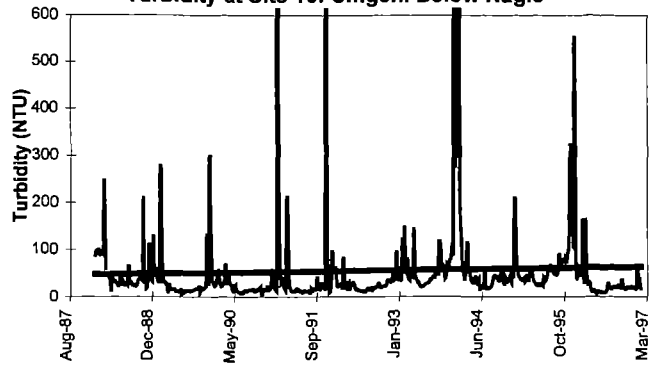
Total Organic Content at Site 15: Umgeni Nagle Inflow



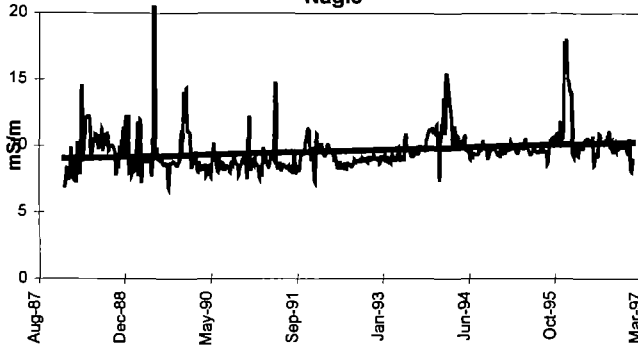
E. coli at Site 16: Umgeni below Nagle



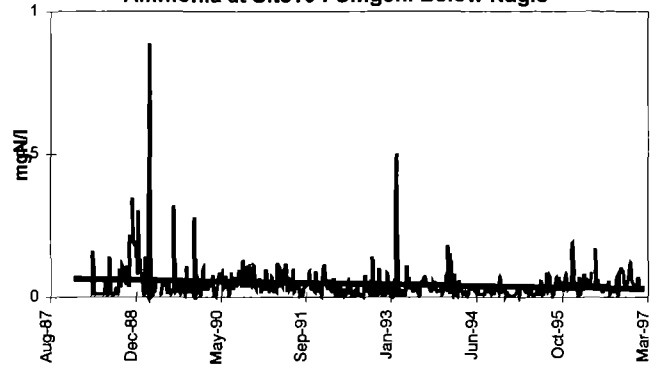
Turbidity at Site 16: Umgeni Below Nagle



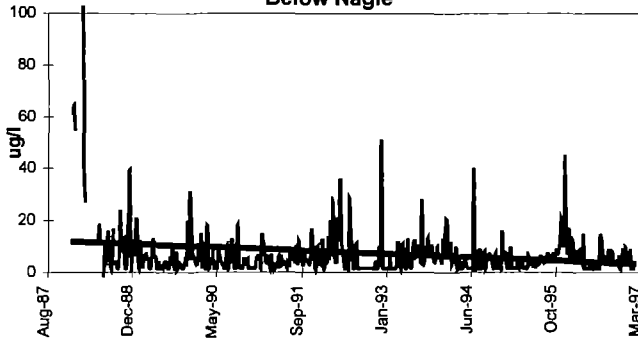
Electric COnductivity at Site 16: Umgeni Below Nagle



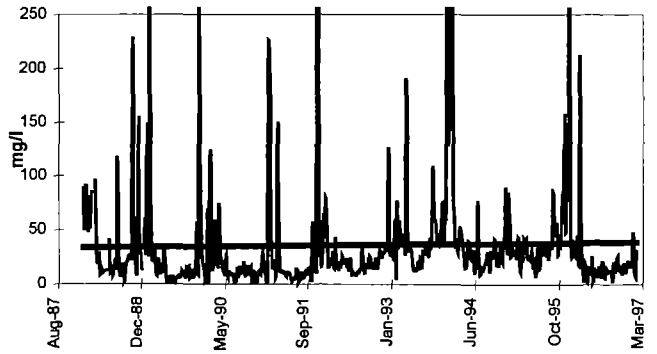
Ammonia at Site 16 : Umgeni Below Nagle



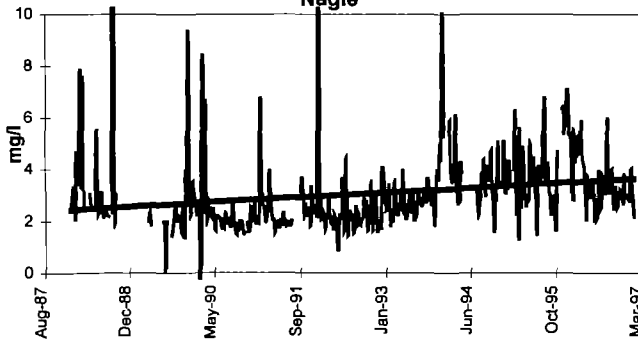
Soluble Reactive Phosphates at Site 16: Umgeni Below Nagle



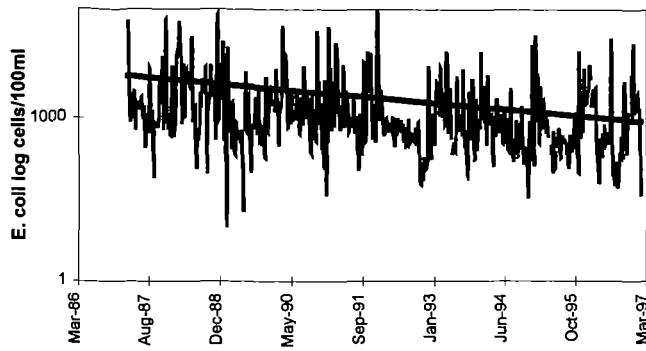
Suspended Solids at Site 16: Umgeni Below Nagle



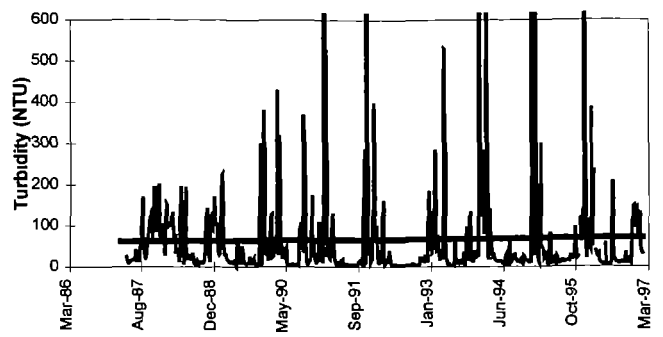
Total Organic Content at Site 16: Umgeni Below Nagle



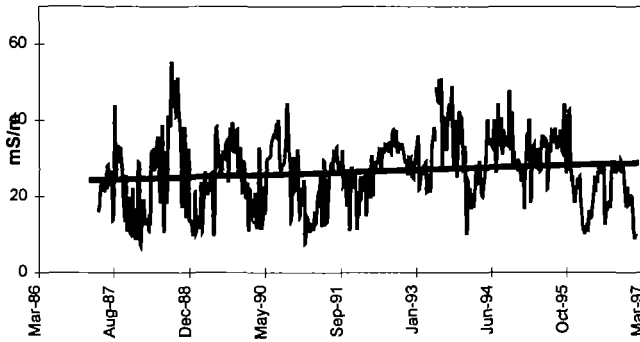
E. coli at Site 20: Umgeni New Inanda Weir



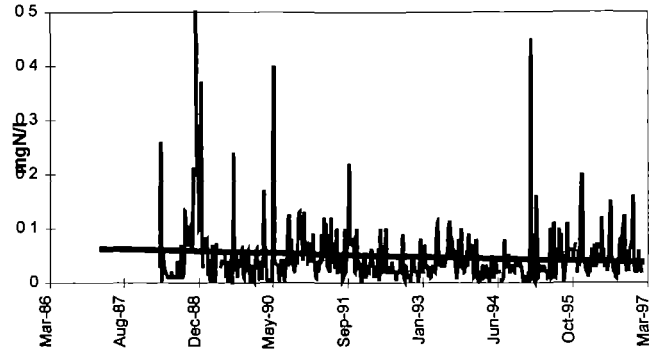
Turbidity at Site 20: Umgeni New Inanda Weir



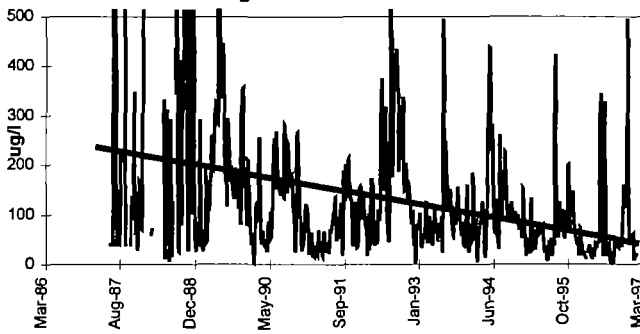
Electric Conductivity at Site 20: Umgeni New Inanda Weir



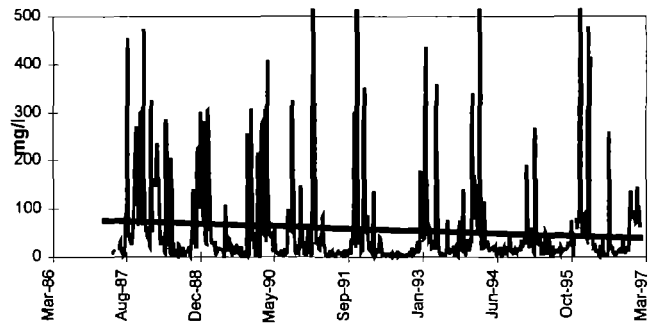
Ammonia at Site 20 : Umgeni New Inanda Weir



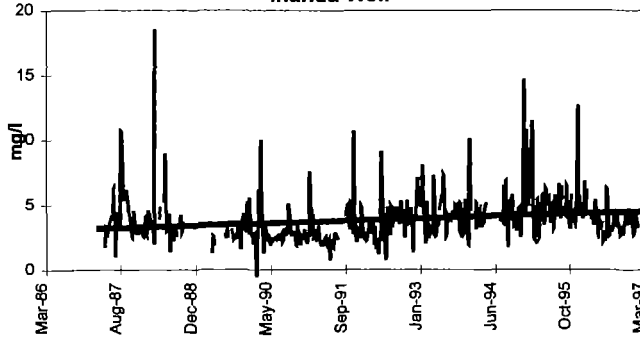
Soluble Reactive Phosphates at Site20: UmgeniNew Inanda Weir



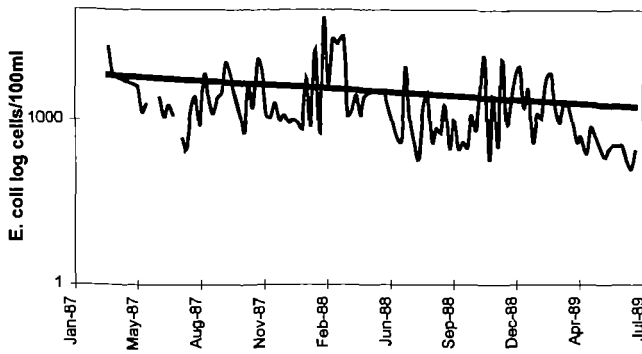
Suspended Solids at Site 20: Umgeni New Inanda Weir



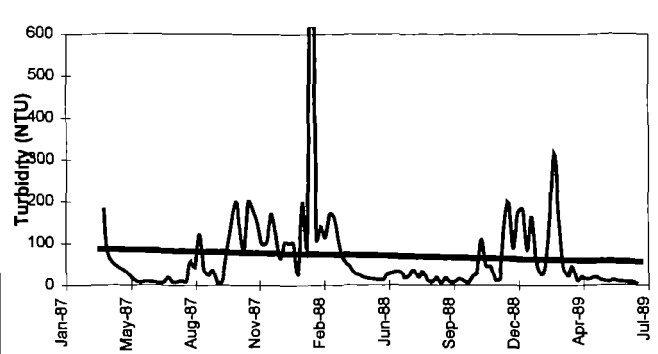
Total Organic Content at Site 20: Umgeni New Inanda Weir



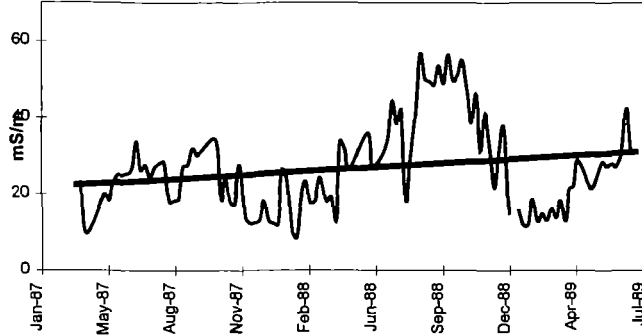
E. coli at Site 26: Umgeni Mshazi Weir



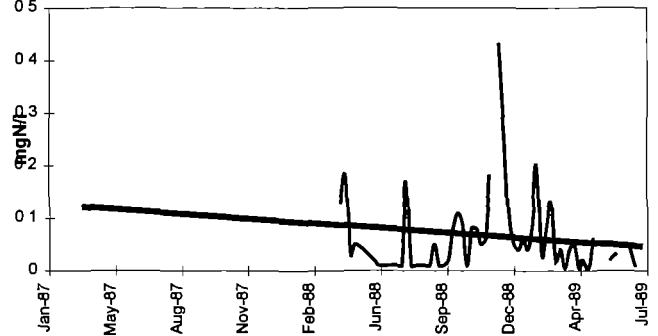
Turbidity at Site 26: Umgeni Mshazi Weir



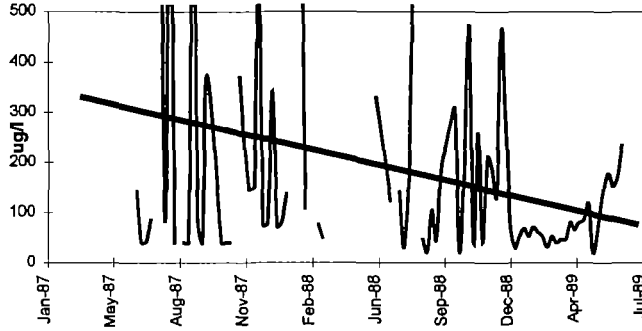
Electric COnductivity at Site 26: Umgeni Mshazi Weir



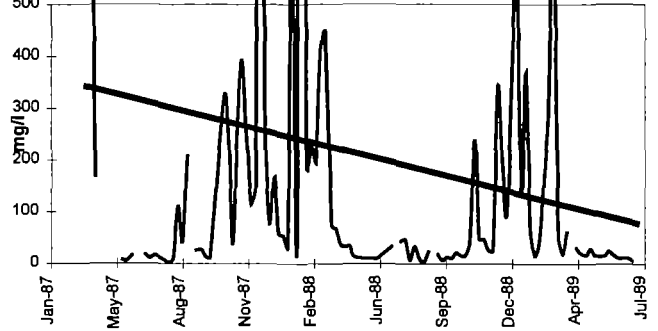
Ammonia at Site 26 : Umgeni Mshazi Weir



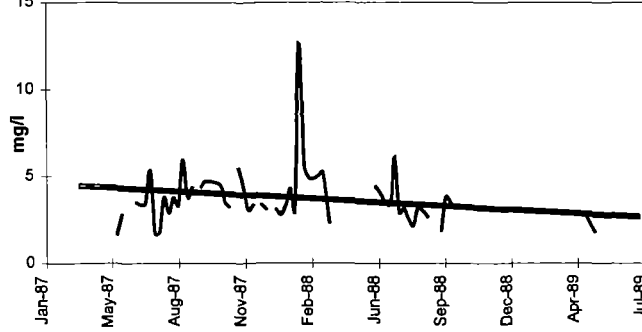
Soluble Reactive Phosphates at Site 26 : Umgeni Mshazi Weir

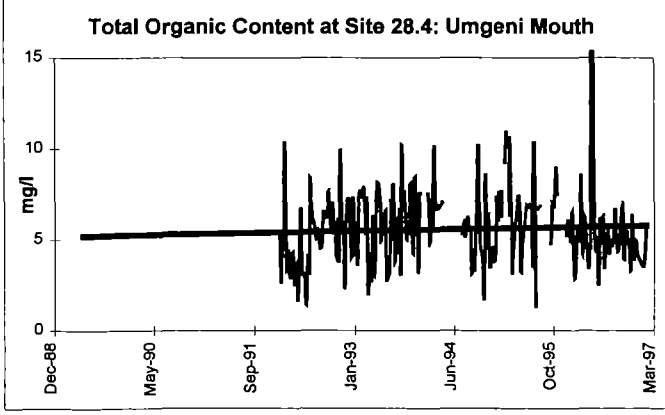
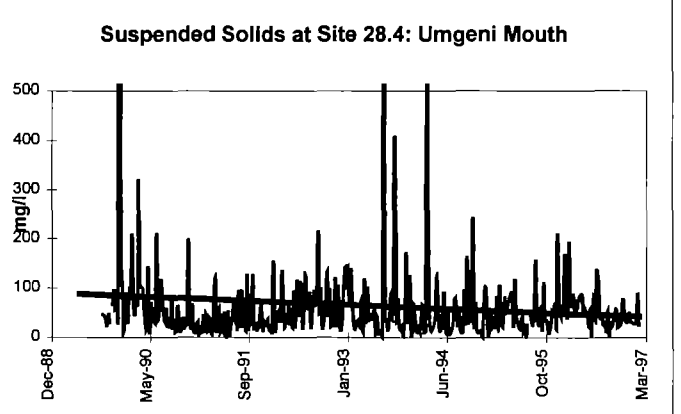
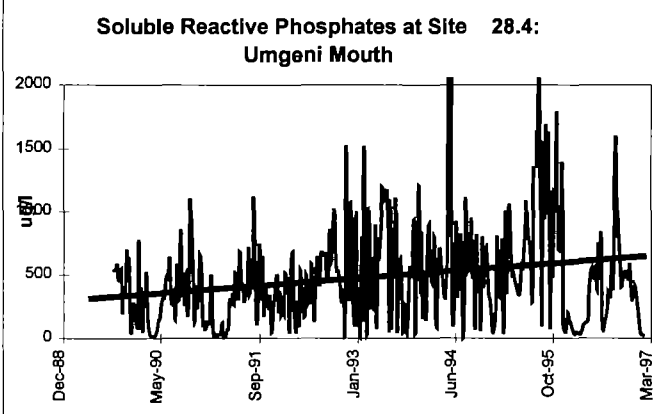
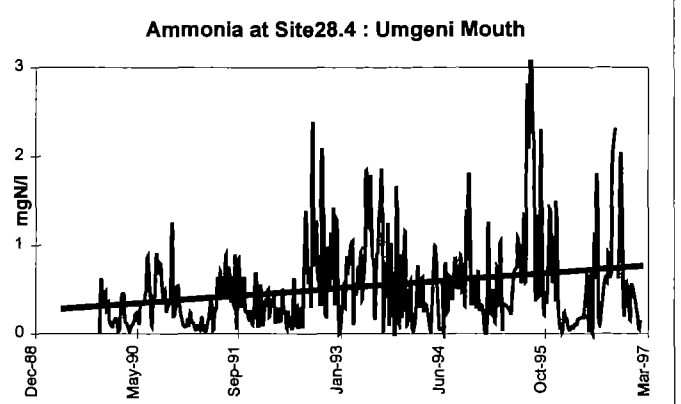
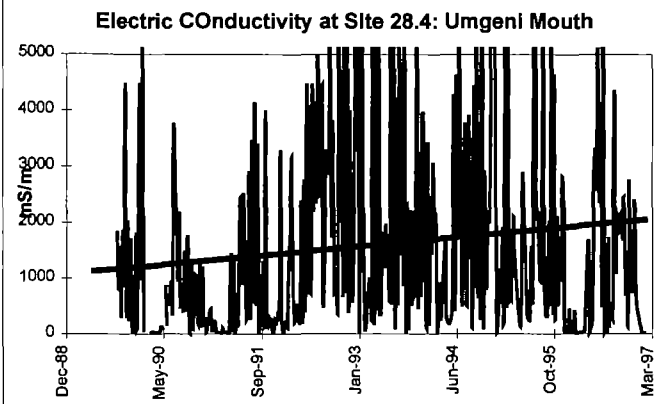
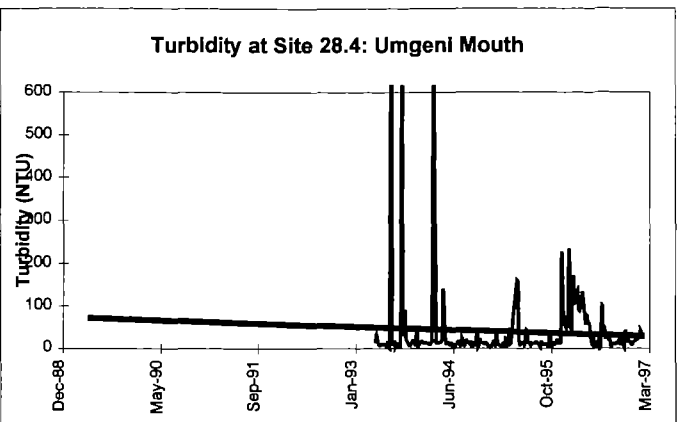
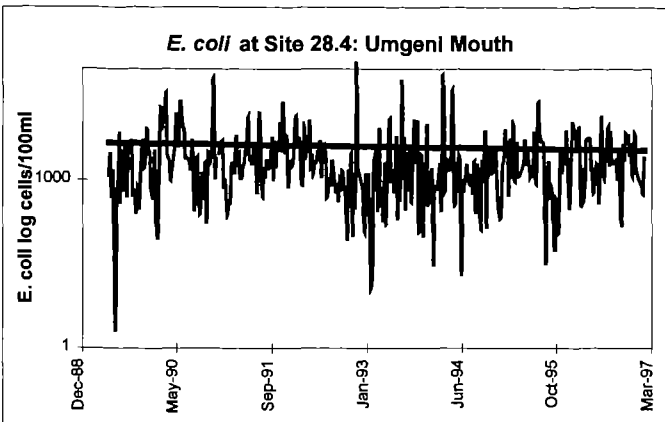


Suspended Solids at Site 26: Umgeni Mshazi Weir

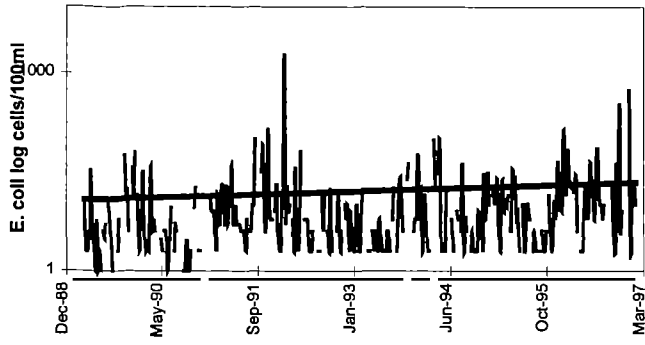


Total Organic Content at Site 20: Umgeni New Inanda Weir

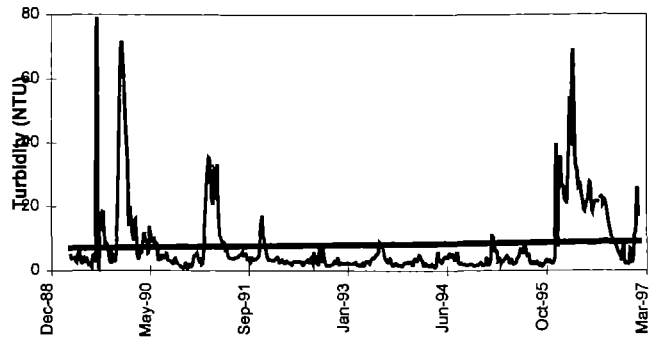




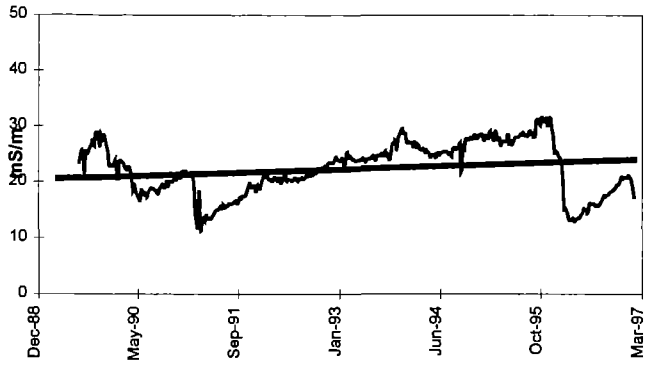
E. coli at Site 51.1: Inanda Surface



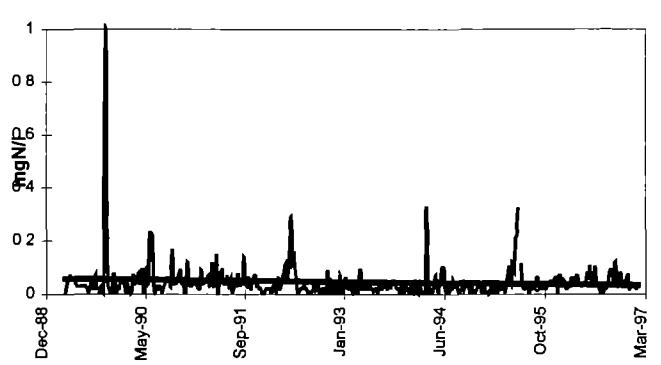
Turbidity at Site 51.1: Inanda Surface



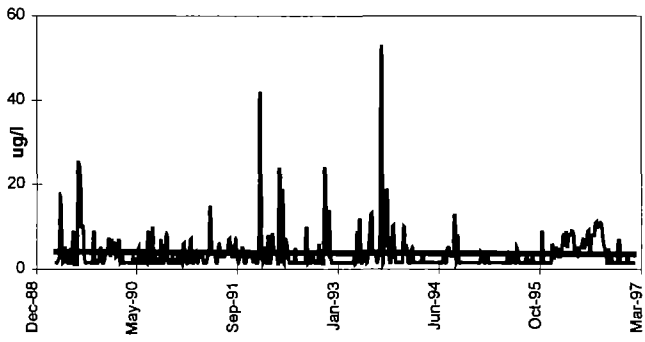
Electric COnductivity at Site 51.1: Inanda Surface



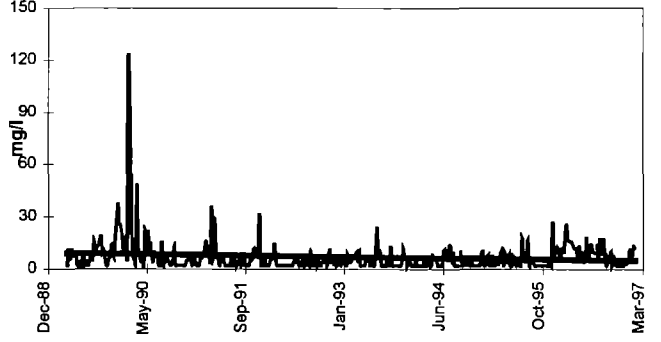
Ammonia at Site 51.1: Inanda Surface



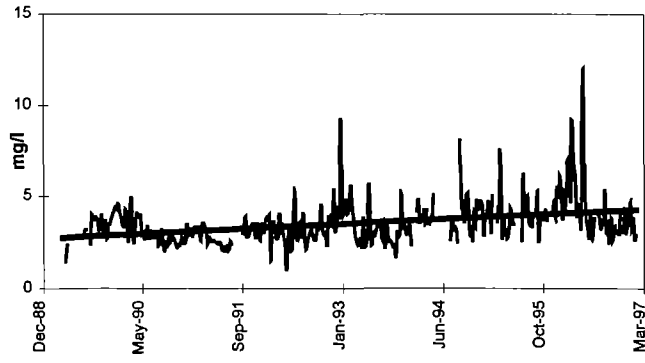
Soluble Reactive Phosphates at Site 51.1: Inanda Surface



Suspended Solids at Site 51.1: Inanda Surface



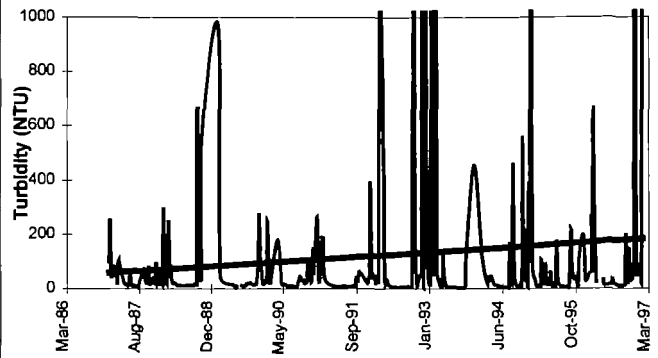
Total Organic Content at Site 51.1: Inanda Surface



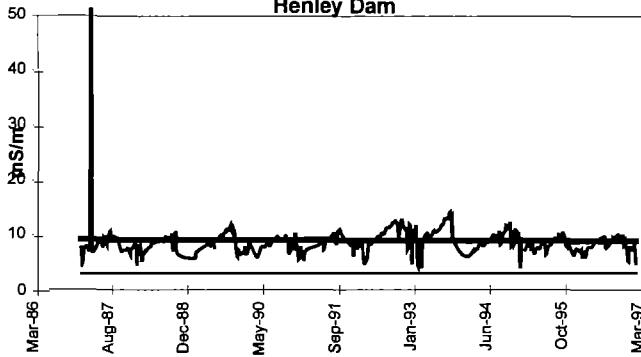
E. coli at Site 58: Duzi Inflow to Henley Dam



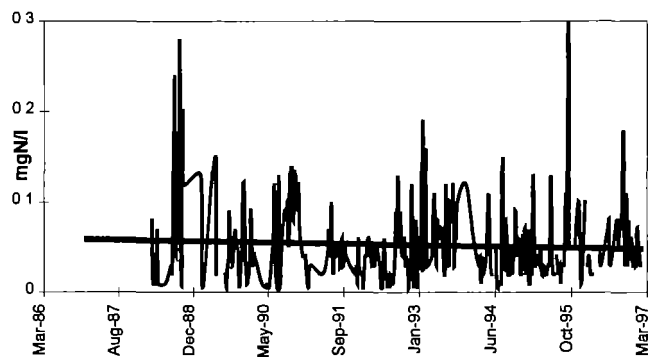
Turbidity at Site 58: Duzi Inflow to Henley Dam



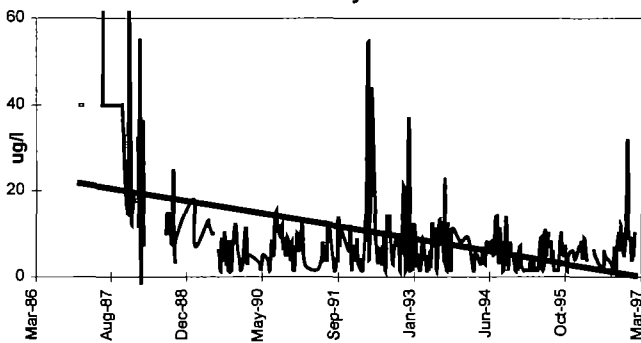
Electric Conductivity at Site 58: Duzi Inflow to Henley Dam



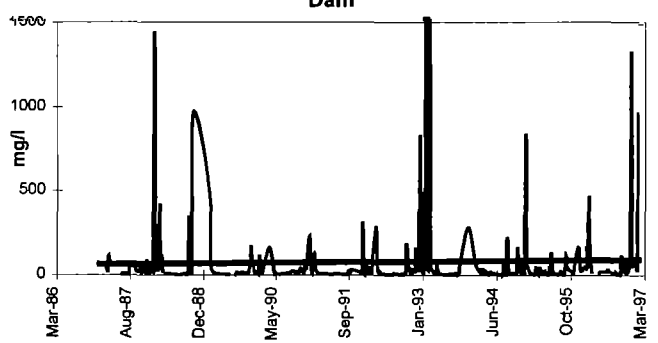
Ammonia at Site 58: Duzi Inflow to Henley Dam



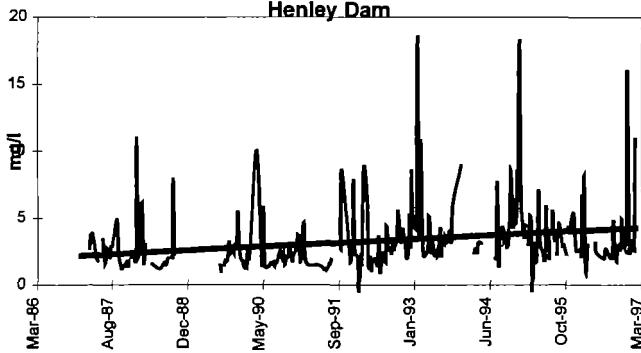
Soluble Reactive Phosphates at Site 58: Duzi Inflow to Henley Dam



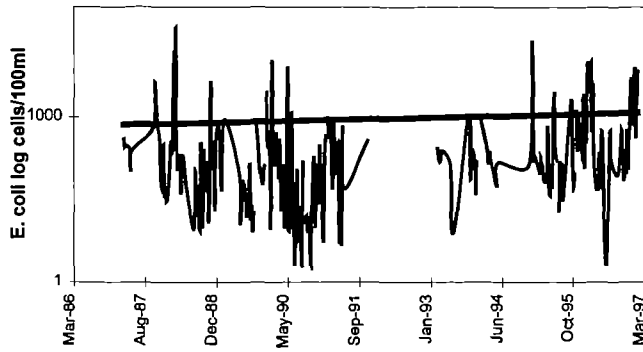
Suspended Solids at Site 58: Duzi Inflow to Henley Dam



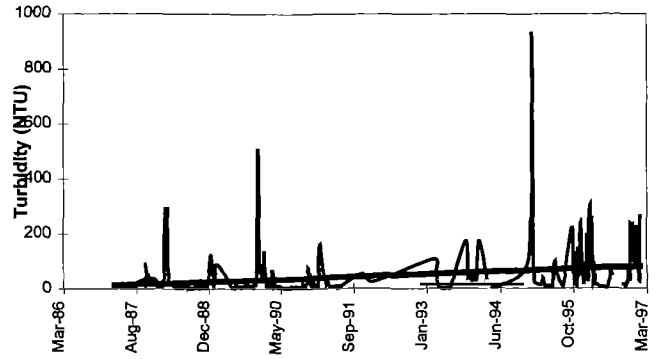
Total Organic Content at Site 58: Duzi Inflow to Henley Dam



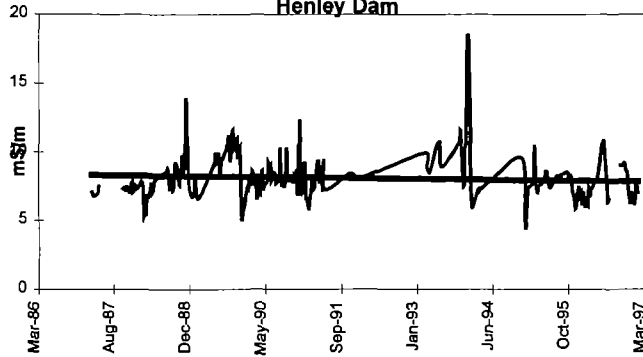
E. coli at Site 59: Duzi outflow from Henley Dam



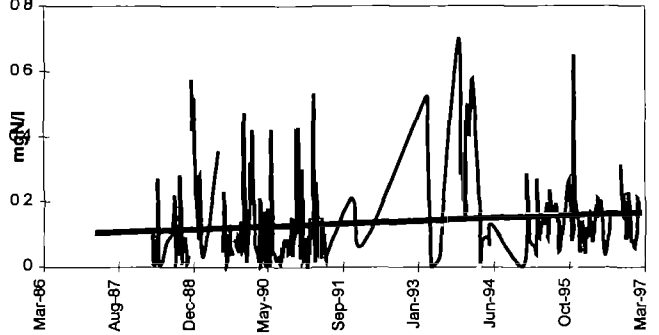
Turbidity at Site 59: Duzi outflow from Henley Dam



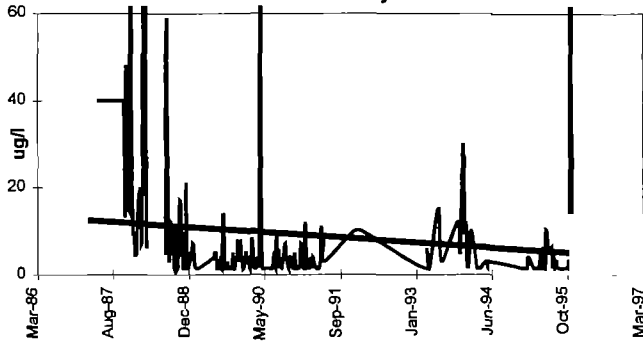
Electric Conductivity at Site 59: Duzi Outflow from Henley Dam



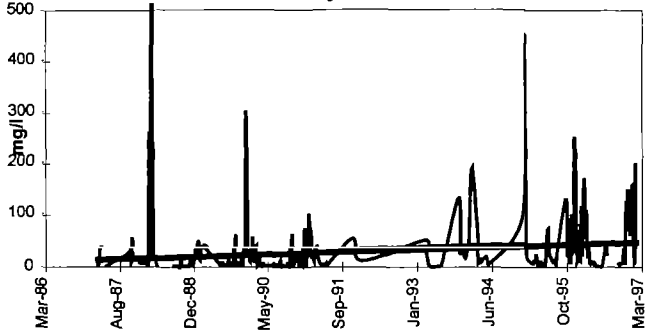
Ammonia at Site 59: Duzi Outflow from Henley Dam



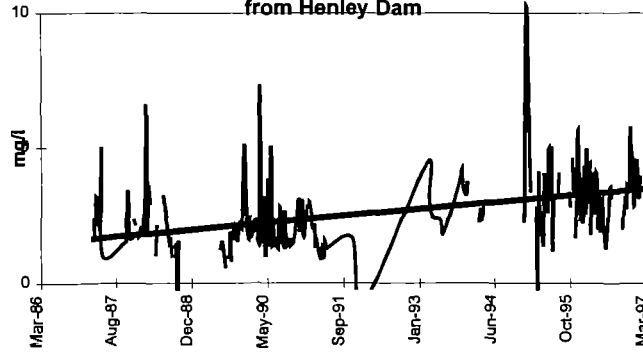
Soluble Reactive Phosphates at Site 59: Duzi Outflow From Henley Dam



Suspended Solids at Site 59: Duzi Outflow from Henley Dam



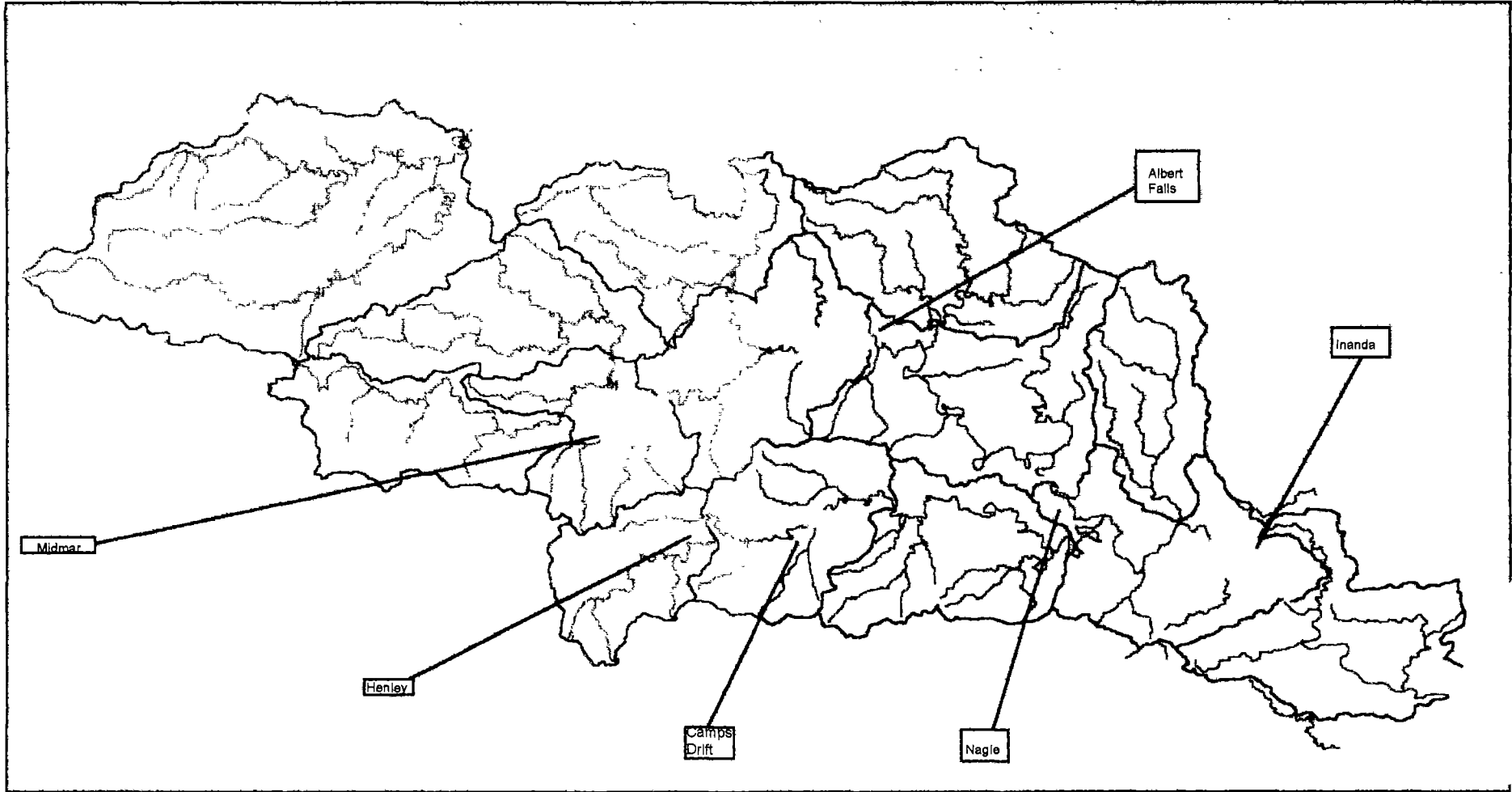
Total Organic Content at Site 59: Duzi Outflow from Henley Dam



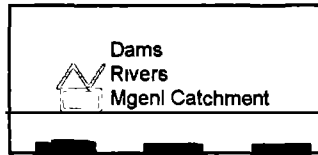
3. Water quality raw data.

4. Representative GIS coverages (maps).

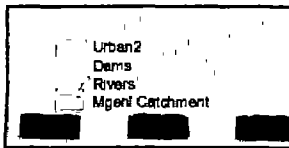
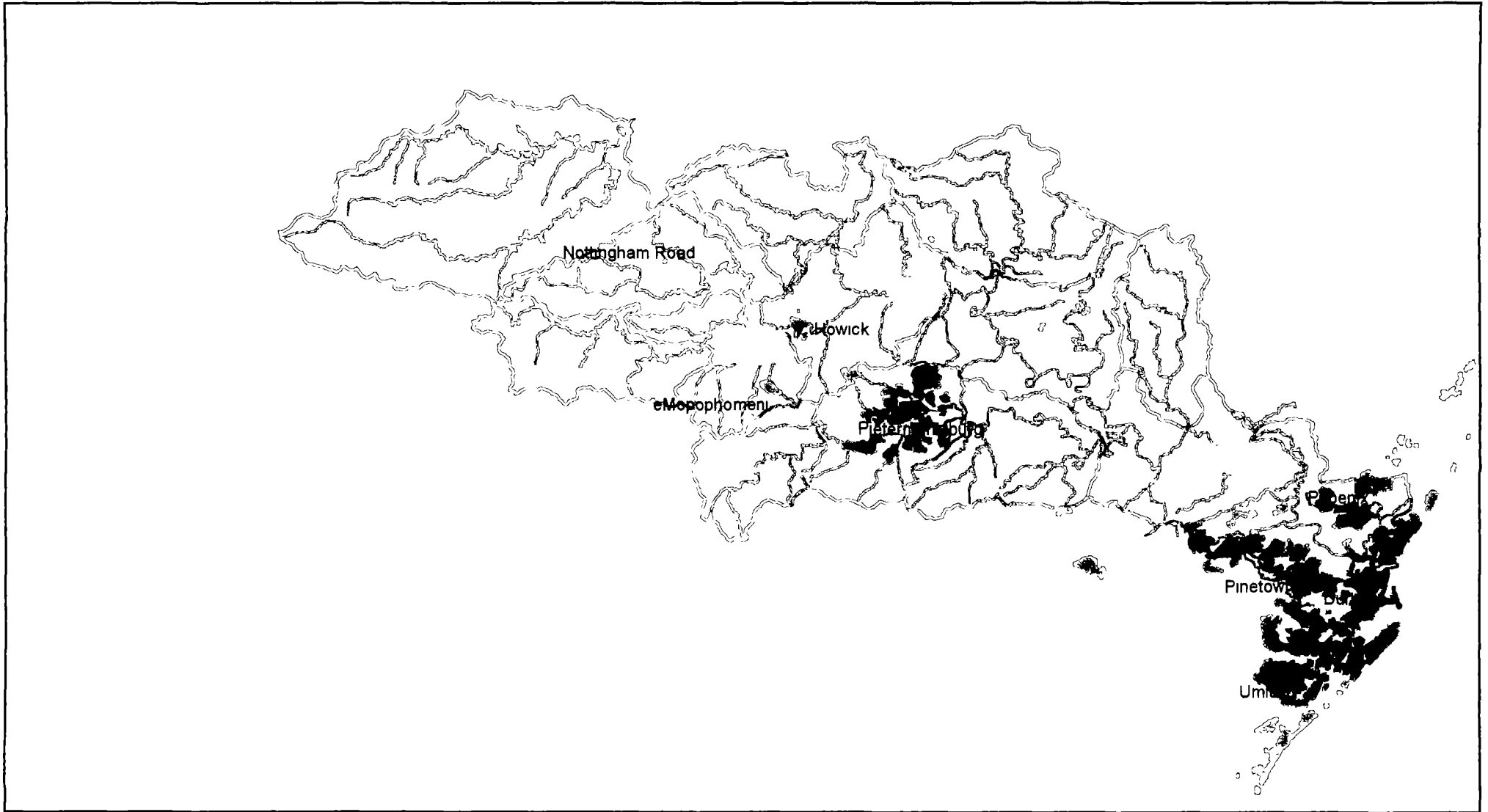
Mgeni Catchment



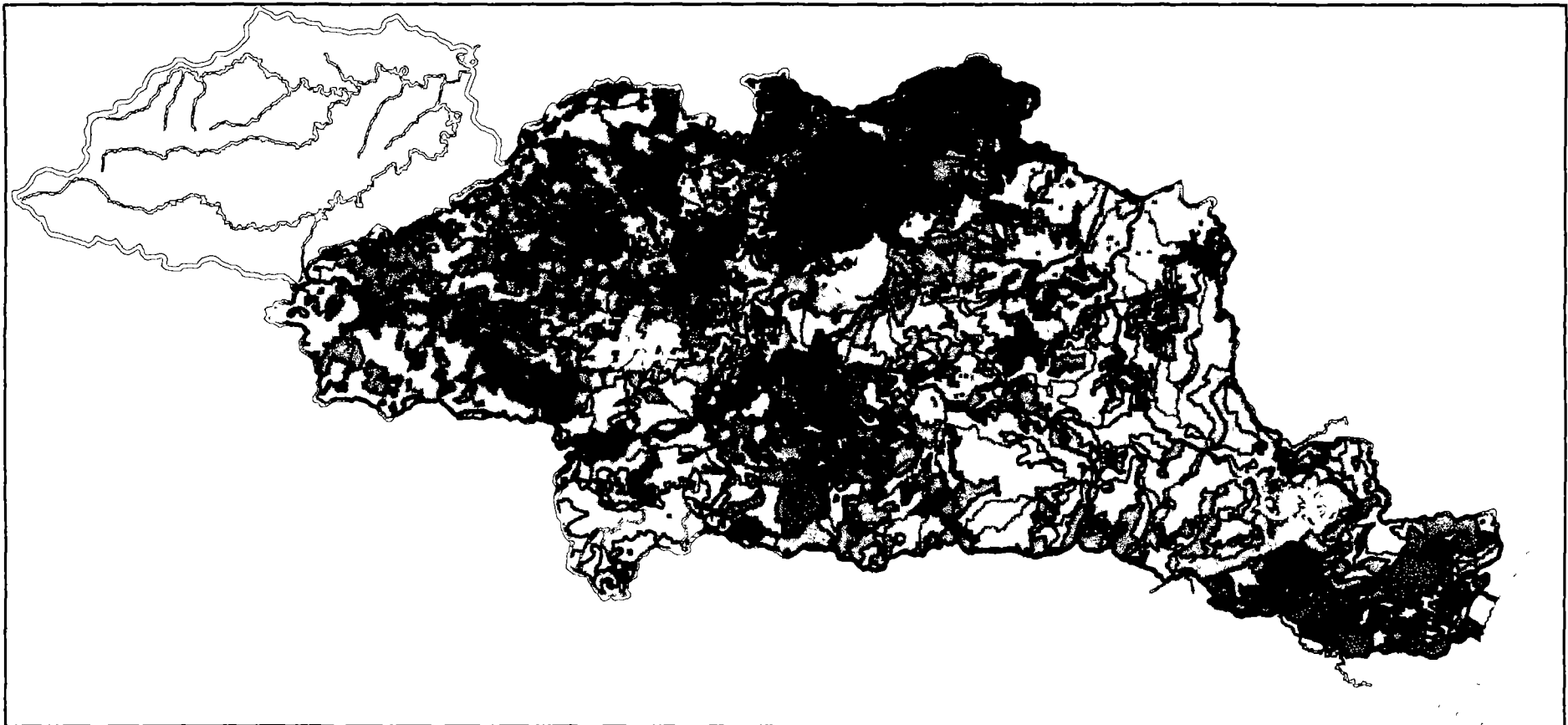
0 49 98 Meters



Mgeni Catchment: Urban Areas



Mgeni Catchment: Landuses

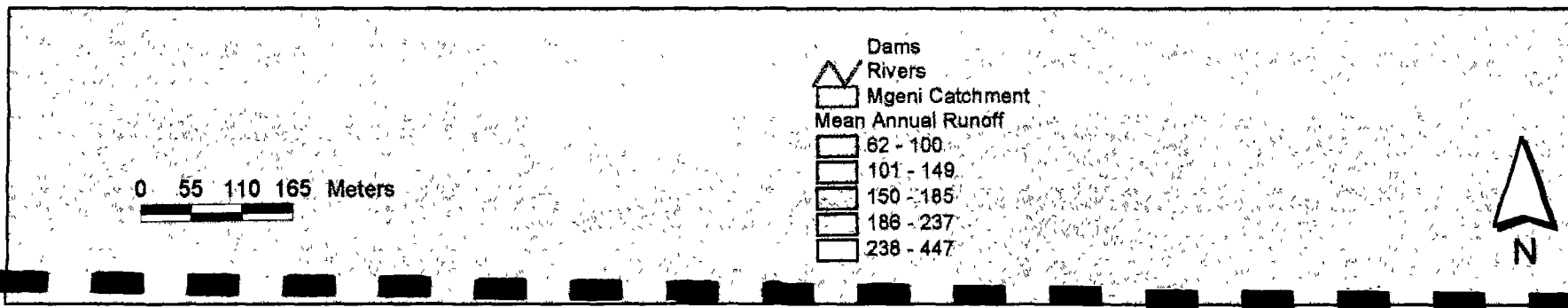
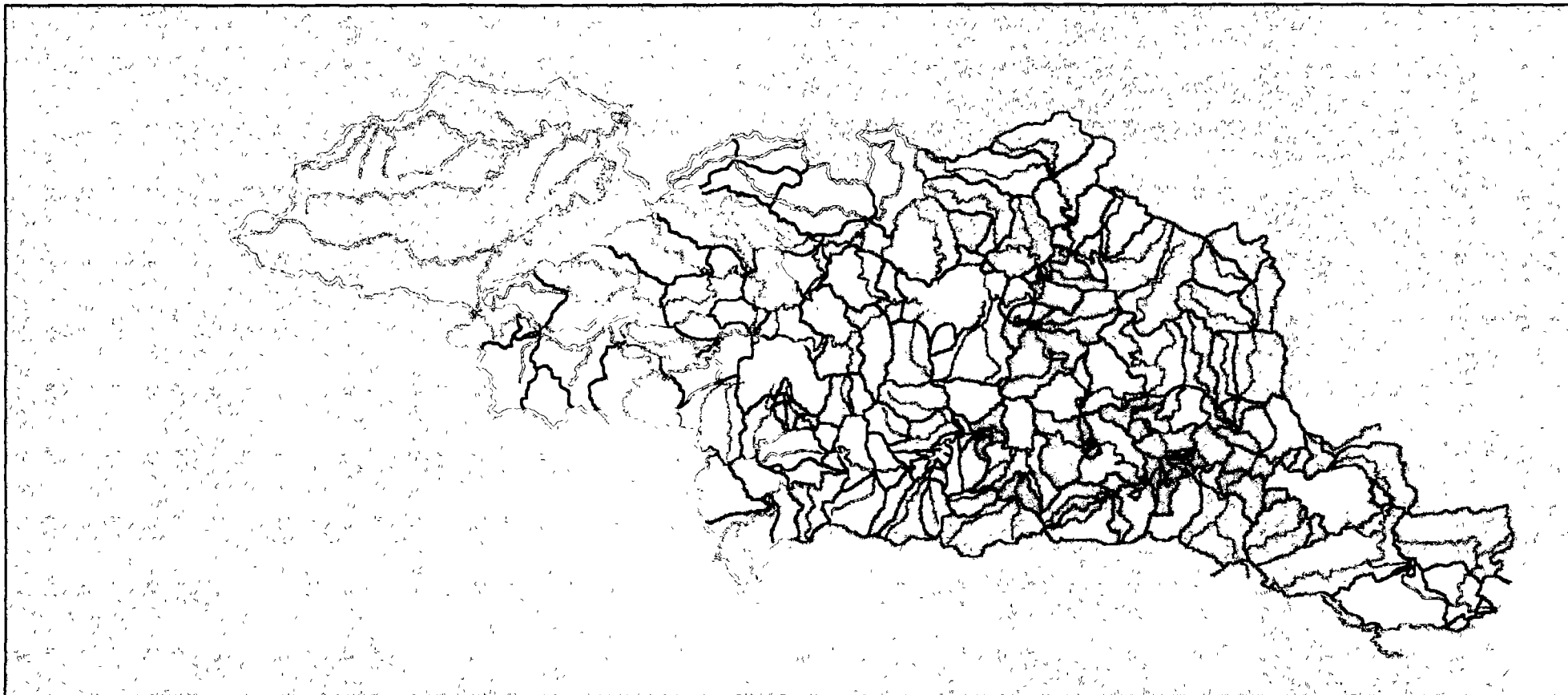


- Dams
- Rivers
- Mgeni Catchment
- Landuse
- Barren rock
- Cultivated permanent - commercial irrigated
- Cultivated permanent - commercial sugarcane
- Cultivated temporary - commercial dryland
- Cultivated temporary - commercial irrigated
- Cultivated temporary - semi-commercial/subsistence dryland
- Degraded thicket & bushland (etc)
- Degraded unimproved grassland
- Forest
- Forest plantations
- Improved grassland
- Mines & quarries
- Thicket & bushland (etc)
- Unimproved grassland
- Urban / built-up land commercial
- Urban / built-up land industrial / transport
- Urban / built-up land residential
- Urban / built-up land residential (small holdings bushland)
- Urban / built-up land residential (small holdings grassland)
- Wetlands

0 110 220 Meters



**Mgeni Catchment:
Mean Annual Runoff (mm)**



Mgeni Catchment: Spatial Distribution of Sub-Catchments



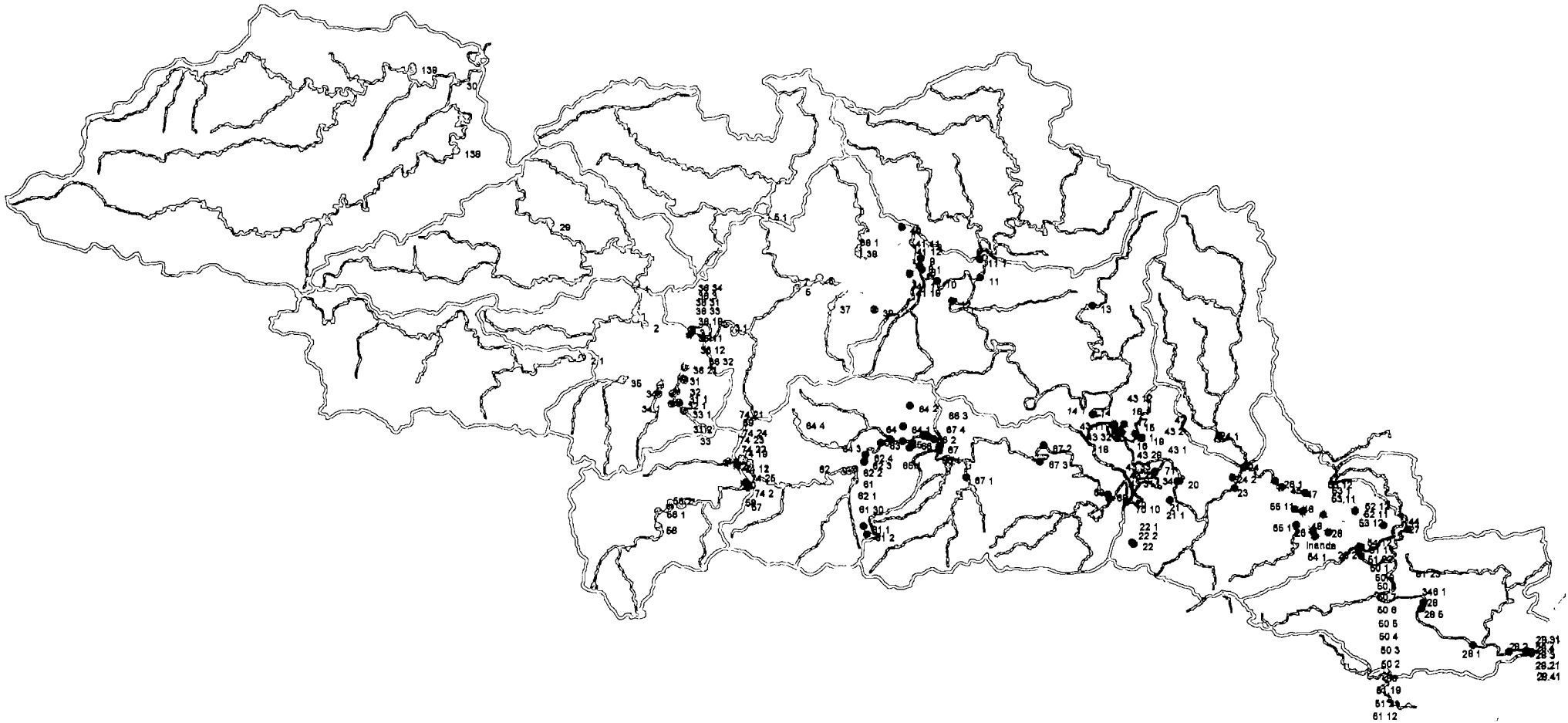
0 35 70 Meters



- Dams
- Rivers
- Mgeni Catchment
- Albert Falls
- Durban
- Henley
- Inenda
- Karkloof
- Lions
- Midmar
- Mpendle
- Mqeku
- Nagle
- New Hanover
- Pietermaritzburg
- Table Mountain
- Upper Mool



Mgeni Catchment: Routine Monitoring Sites

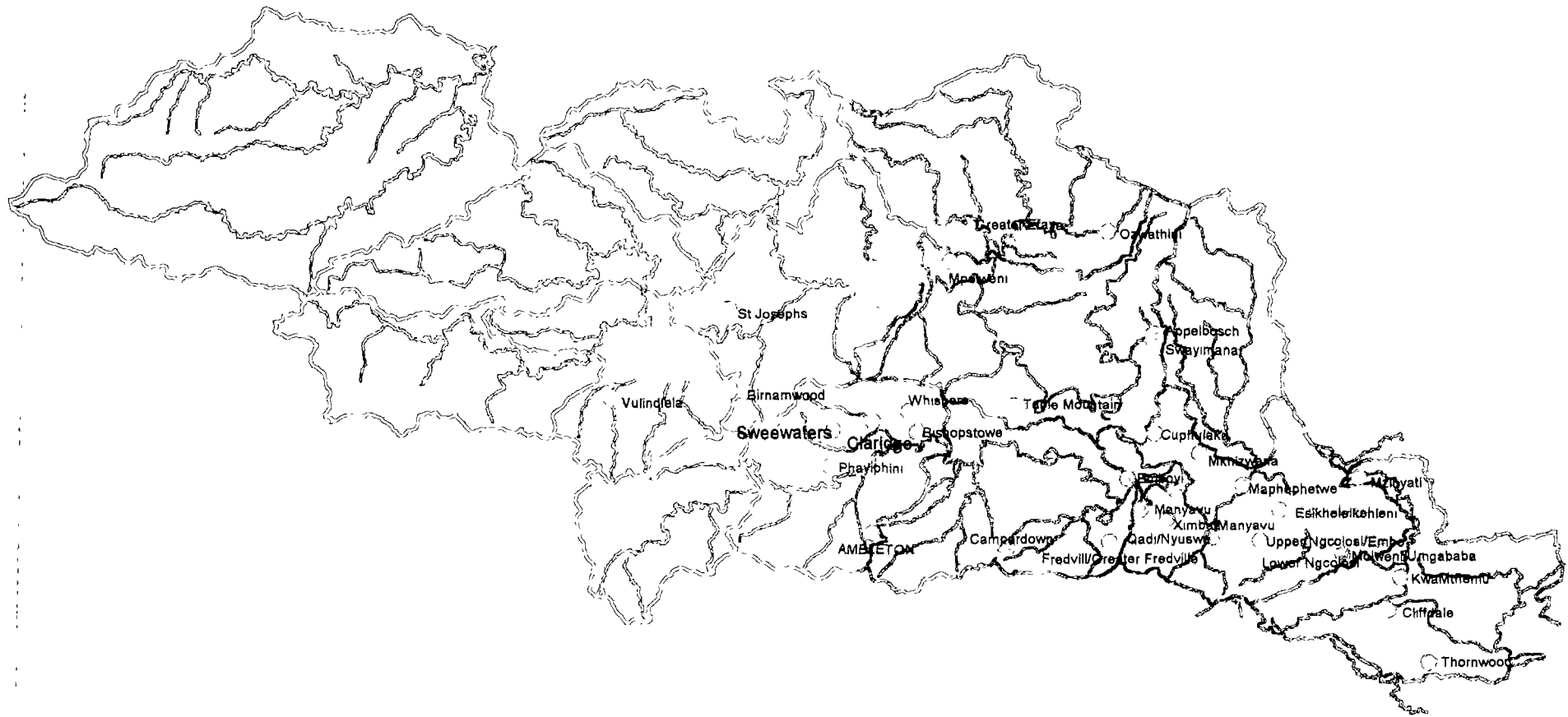


- Sampling Points
- Dams
- ▭ Rivers
- ▭ Mgeni Catchment

0 86 172 Meters



Mgeni Catchment: Locations of Rural Areas Water Supply and Sanitation Schemes



- Mg_rawsp.shp
- ▭ Dams
- ▬ Rivers
- ▬ Mgeni Catchment

0 260 Meters



5. Photographs of important features in the catchment.

6. Umgeni Water's Annual Report.

A N N U A L R E P O R T

1 9 9 6 - 1 9 9 7



UAGENI

WATER • AMANZI

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Board of Wazirani Water	Fold Out
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OUR VISION

To be a world class organisation which provides water services to improve the quality of life.

OUR MISSION

To provide quality water services to meet the needs of our customers.

1
Annual Report and Financial Statements,
1997-98 February 1997. Submitted to the
Ministry of Water and Forestry in terms of
the Water Act 1956 (Act No. 54 of 1956).



Brian Wallett
Chairman

The past year has proven that challenges to the teams at Umgeni Water have been met with competence and addressed in a manner that befits a company striving for World Class standards.

The findings of the Fisher Hoffman Sithole audit commissioned by the Minister of Water Affairs and Forestry led

to Umgeni instituting a number of changes and, indeed, making improvements which have brought it to almost full compliance in respect of Corporate Governance. It has been a year when Umgeni has consolidated its accounting practices and market-making has regained its previous levels, leaving the organisation favourably geared for its future capital requirements.

Looking to the future, Umgeni is entering a phase where massive infrastructure developments are both being planned and commissioned. These include the new Midmar Waterworks which is scheduled to be fully commissioned by mid-1997, the Vulindlela Presidential Lead RDP water supply scheme which will begin delivery soon, plans for the Mooi/Mgeni transfer, building of two and, possibly three large dams, and their concomitant network of pumpstations, tunnels and pipelines for inter- and intra-basin transfers. All these capital-intensive projects have been planned and are awaiting final funding approval. These capital projects are in addition to Umgeni's planned developments in the rural areas where, with the assistance of RDP and external funding, about R500 million is planned to be spent in the next five years.

This past eventful year culminated in a Financial Mail Special Report commissioned by Umgeni and written by David Gleason (the journalist who published most of the articles regarding Umgeni's market-making activities). It was heartening to see him pay tribute to the response of the Board and management in the findings of the audit and I quote him saying, "This is an organisation which has emerged from its own baptism, bloodied but unbowed. It goes into 1997 with a new Board which has a lot to be thankful for to its predecessor."

Mr Gleason was referring to the Minister's decision to terminate the two-year terms of office of members of all the water boards with effect from end December 1996. However, this term has since been extended to the end of April 1997 when new boards will be announced. I wish to thank all the members who have served on our Board for their insight and dedication over the past two years.

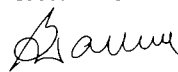
The Board's involvement in the Treasury Strategy Committee, Audit Committee and Remuneration Committee with Manco has completely eliminated any "us and them" relationship between Board and management and a team spirit of considerable proportions has developed.

Tours of the operations with the Chief Executive took us to many of the work sites and I must say they were a credit to the Manco team and the employees. I was most impressed with the management/staff relationships and the dedication to duties displayed by all. Equally impressive were the levels of cleanliness, hygiene and orderliness. It was also pleasing to note that Affirmative Action is very much part of the culture of the organisation and is accepted as, and proving to be good for the organisation.

In the interests of investigating commercialisation and privatisation of Water Boards in South Africa, Chief Executive Brian Walford and I toured seven of the ten water authorities in the United Kingdom to examine how they had been affected by privatisation. I was impressed with the reputation Umgeni enjoys overseas, and this is a credit to South Africa. As a result of this visit several reciprocal visits to Umgeni have occurred.

It has been a pleasure to be part of a dynamic team leading Umgeni to fulfil its new vision: 'To be a world-class organisation which provides water services to improve the quality of life'.

I congratulate and thank all those who have worked hard and shown dedication to the mission of providing quality water services to meet the needs of our customers.


Brian Wallett
Chairman

OUR VISION TO BE A WORLD-CLASS ORGANISATION



The R250 million
Midmar Waterworks
has been designed
for upgrading to
1 000 Mℓ a day
to ensure
adequate
supplies are
available to meet
the growing needs
of industries
such as Hulett
Aluminium





Brian Walford
Chief Executive

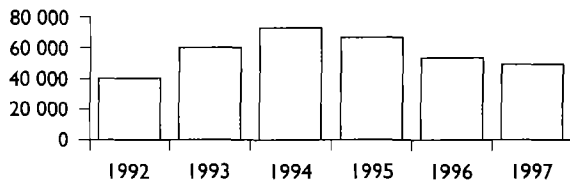
OVERVIEW

The region was blessed with abundant rain and, for the first time in many years, Umgeni entered spring with full dams. The high rainfall tested both the infrastructure and the employees who had to manage the continual high volumes of water and control flooding whilst ensuring

water quality standards were maintained. In all instances we were successful proving that mechanisms and infrastructure improvements made since the 1987 floods have been worthwhile.

Annual Net Income in Excess of R10 Million

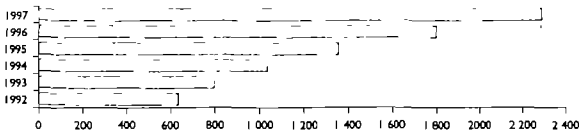
Annual Net Income (R000)



The accumulated reserves are used to finance contingencies and capital expenditure, thus contributing to achieving financial independence in the long term.

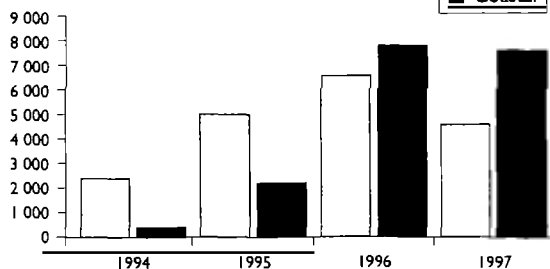
Average Annual Growth Rate in Capital Expenditure

Growth in Capital Expenditure (R million)



Over the last five years, annual infrastructural growth averaged 37%. This is a reflection of our commitment to supplying Water to All in our area of operation.

Number of Direct Metered Consumers



Although overall water sales have increased, the responsibility for reticulation to a number of direct metered consumers, particularly in the Inland Region, has been transferred to the Durban Metropolitan Council.

Operations had a busy year with water sales increasing to 315 182 Mℓ (1995/96 296 106 Mℓ) bringing in revenue of R393 million (R346 million) to the organisation. The increase in water sales was 6,8% in the Coastal and 6,3% in the Inland Region. Reticulation has become a major challenge as rapid expansion is in place to meet the goals of the RDP. Sales to rural customers rose from R152 000 to R3 558 000 as the customer base increased from 4 000 to over 16 000 customers. For the first time Umgeni had to embark on a debt recovery campaign as the climate of non-payment began making itself felt. This has been highly successful and various administrative changes have been made to facilitate better collection.

The year was an exciting one which saw Umgeni winning a Green Trust Award for the most successful Water Conservation Campaign in South Africa. The award was for the outstanding work done by the External Education Services Unit. Our 1995/96 Environmental Report was one of three finalists in the World Wide Fund for Nature (WWF) Southern Africa Environmental Reporting Awards which we had won in the previous period.

INFRASTRUCTURE: CONSTRUCTION AND PLANNING

Major construction works were completed during the year, all work being conducted along Integrated Environmental Management procedures as laid down in our Environmental Policy. The R250 million Midmar Waterworks entered its commissioning phase on schedule in November 1996. These works, which will initially supply 250 Mℓ a day to the greater Pietermaritzburg area as far south as Pinetown, will officially be opened in June 1997.

In addition, the Groenkloof Augmentation (R24 million) and upgrade of Wiggins Waterworks (R41 million) were almost complete at year-end. Planning was done to take into account the increase in area of supply and thereby ensure adequate infrastructure is in place to meet growing demands over the next twenty years. These plans were published in the 20-year Infrastructure Masterplan, which is available on request.

PROVIDING WATER SERVICES TO IMPROVE QUALITY OF LIFE



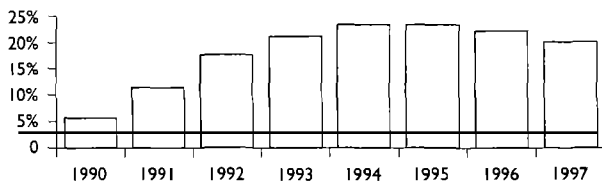
The Coastal Region
consumes some
85% of Umgeni's
production and a
water classroom at
Durban Heights has
been in great
demand for lessons
in water health,
conservation
and pollution
prevention



Since inception our Rural Areas Water and Sanitation Plan (RAWSP) has provided water to approximately 800 000 people. With the assistance of RDP funding over the past two years this programme has been accelerated and plans are well advanced to ensure that safe water supplies are on tap to our customers in all the rural areas. The teams, made up of our Rural Planning Officers, community Water Committees, engineers and consultants continually face and overcome the challenges of difficult topography, inadequate road and other infrastructure, and the vagaries of the weather to meet deadlines for delivery.

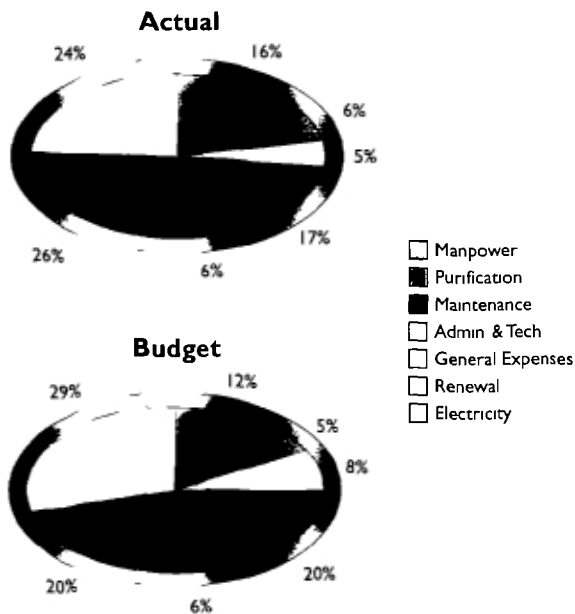
The largest of our RAWSP projects is situated at Vulindlela which lies to the north-west of Pietermaritzburg. This R200 million project is one of twelve Presidential Lead RDP water supply schemes

Water Tariff Reduced by 21% in Real Terms
Cumulative Tariff Reduction



Using 1989 as the base year, the cumulative reduction in real terms in water tariff at the end of the 1997 financial year was 21%, which contributed to the annual reduction in household expenditure.

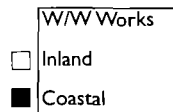
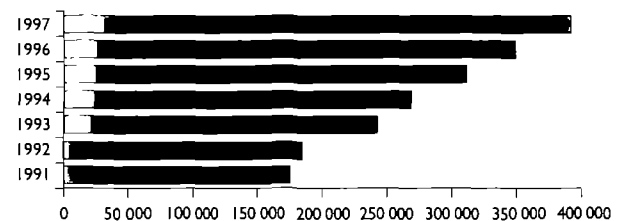
Comparison of Actual Operating Expenses to Budget 1996/1997



which were identified by the President for immediate implementation in 1992. It is reaching commissioning phase and safe water should be delivered to the area by mid-1997. It is estimated that an additional 200 000 people will be supplied with safe water. The project was funded by an RDP grant of some R110 million with Umgeni contributing the balance.

Other RAWSP projects are detailed in the leaflet included with this report.

Increase in Sales Revenue in Nominal Terms
Total Sales per annum (R000)



The annual growth rate of water sales in nominal terms was 15,3%. Annual demand for water for domestic and industrial use continues to grow, with rural areas showing a phenomenal growth rate primarily because of water provision in areas where there was no supply.

OPERATIONS: EXPANSION AND UPGRADING

All our existing water and wastewater works were being operated at full capacity during the year, and on some days capacity is being exceeded. This situation is receiving urgent attention and renovations, extensions and upgrades are being finalised for all the works. The most urgent need is at Darvill Wastewater Works in Pietermaritzburg where the plant's age and capacity does not make it viable for a further upgrade, and alternatives are being investigated.

Work on the infrastructure on the South Coast, which was included in our area of responsibility late in the previous financial year and which is in need of upgrading, is currently being undertaken.

Some of the rural schemes which Umgeni Water operated now fall within the Durban Metropolitan Council boundaries and will, in future, be managed by Durban Water and Waste.

Our employees play
a vital role in
ensuring that the
quantity and
quality of our
water is not
compromised as
the supply area
and number of
customers grow
through our
expansion into
outlying
rural areas



This also entails the handover of a number of wastewater works during 1997. Negotiations are, however, underway regarding Umgeni retaining the management of some of those wastewater works which are in particularly environmentally sensitive areas and which could impact on Umgeni's ability to apply its Total Catchment Management objectives.

COASTAL REGION

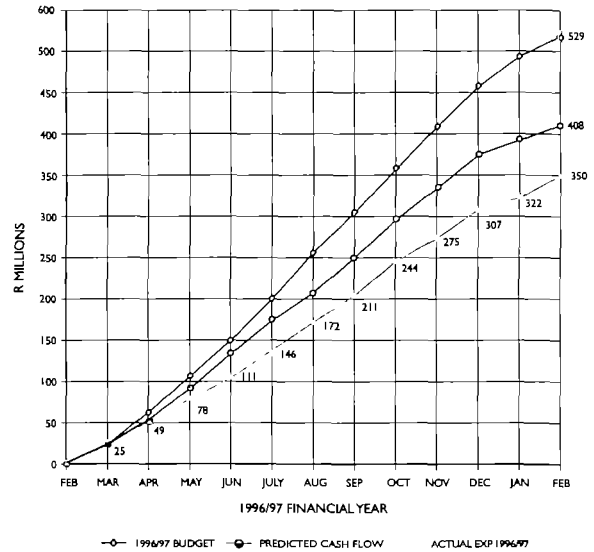
Some 85% of our total water production is supplied to customers in this region, which has been divided into three main areas. Central (Durban Metro), Northern and Southern. Water sales in the total region were 6,8% above last year and 1,6% below budget. Operating costs were 0,3% below budget. The upgrade of Wiggins Waterworks to supply 350 Mℓ a day is nearly complete and will reduce the load on Durban Heights Waterworks

INLAND REGION

Consisting mainly of the greater Pietermaritzburg area, water sales were 6,3% above last year and 2,2% below budget. The region experienced major changes in its bulk supply network with the completion of the Midmar Waterworks and the consequent closure of HD Hill, Mill Falls and Howick Waterworks. These closures will contribute greatly to economies of scale afforded by the single large works

With sludge production increasing in this region, plans are underway to ensure sludge disposal is carried out efficiently whilst conforming with environmental standards. Most of the waterworks and wastewater works will be undergoing sludge disposal upgrades in the coming year.

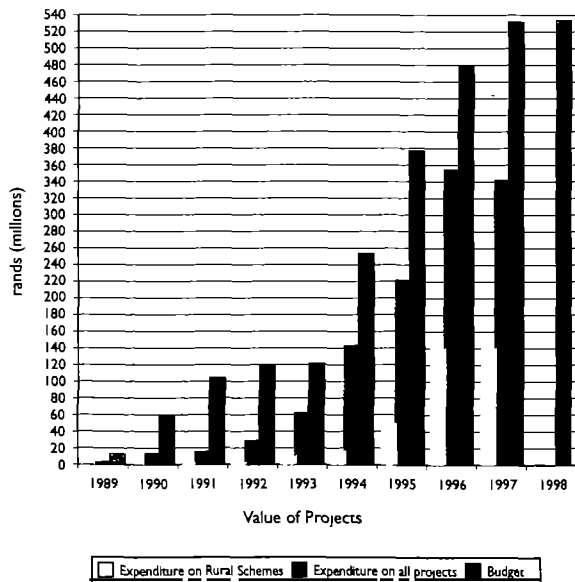
Capex Budget



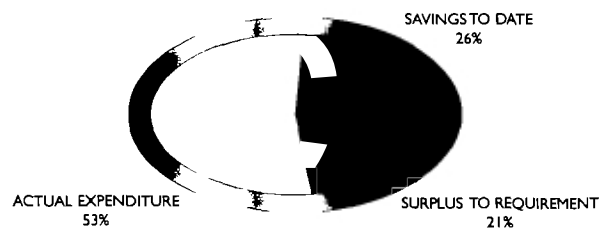
Notes to Graph

	(R000)
1996/97 Budget	529 368
Less Actual Expenditure 96/97 Financial Year	350 220
	<u>179 148</u>
Less Adjustment for Closed Projects	2 904
	<u>176 244</u>
Less Approved Rollover	33 859
	<u>142 385</u>
Surplus to requirement	142 385

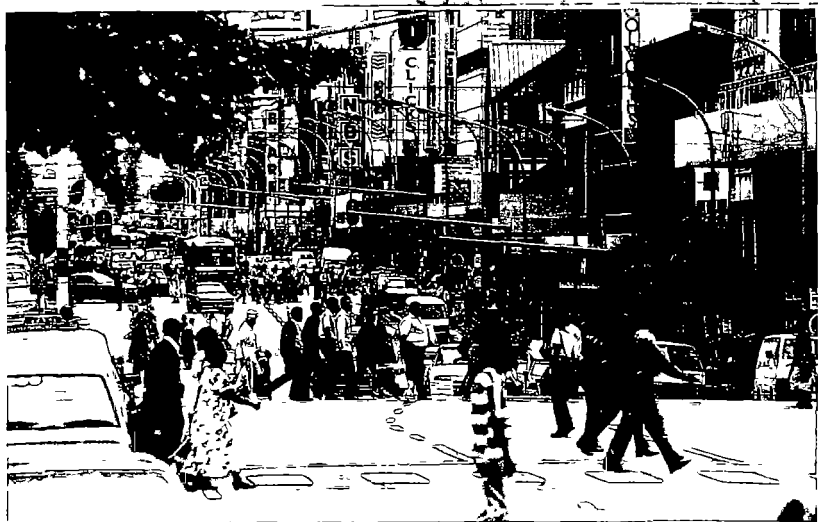
Capital Expenditure from 1989 to 1997



Capex Budget



All figures exclude Direct and Indirect Administration and Technical Costs, Pre-production Interest and VAT



Even as Inanda
Dam spills its
abundant water
reserves there
remains an urgent
need to upgrade
the capacity of
the region's
storage and
treatment facilities
to be able to cope
with the growing
urban and rural
demands



OUR KEY ASSETS

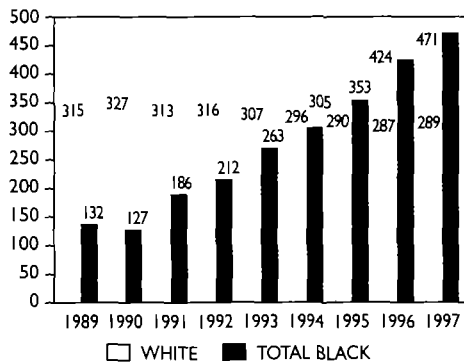
This past year will stand out as a year in which transformation became a reality as democratisation heightened expectations from all quarters, with relationships between management and labour being redefined. The Human Resources Division has remained focused and an effective catalyst for change while undertaking its core activities

The decentralization of some human resources functions has been successful, with Human Resources staff in the Regions now being fully functional. They are responsible for recruitment up to middle management level, and this has helped reduce recruitment turn-around time

STAFF DEVELOPMENT

In 1994 about 20 black staff members were identified for a special development programme in order to achieve our affirmative action objectives. Out of this group, 12 have already been promoted to higher level jobs. During 1996, Umgeni Water had 41 trainees undergoing specific development programmes. During the year we were able to place 18 trainees into substantive positions, whilst eight employees wrote trade test examinations and passed

PERMANENT STAFF (GRADES 2 - 13)
as at end of February 1997



During the year a total of three hundred and forty-two employees were on an Adult Basic Education programme and wrote examinations set by the Independent Examinations Board (IEB). One of our facilitators, Ms Marion Witte and one of our learners, Mr Paulos Maduna were voted the best in their categories in a national competition

A total of 123 employees received financial assistance through our Assisted Education Scheme, whilst 20 bursaries were offered for various fields of study.

INDUSTRIAL RELATIONS

Good relationships continued to exist between management and the Union for the greater part of the year. Differences were discussed and amicably resolved. The process of establishing a Workplace Forum was started during 1996. All stakeholders elected representatives to serve on the interim committee. Discussions are ongoing during 1997.

HUMAN RESOURCES PLANNING

A multi-divisional working group was established during the year to study a competency-based human resources system and its impact on Umgeni Water. A series of presentations were made throughout the organisation informing staff about this new concept and the Regional Job Evaluation Committee which was put in place has wide representation.

TRAINING

Training of staff on specific skills required for their jobs continued to be our main focus. The Umgeni Water Training Centre at Durban Heights continues to form a nucleus in our training delivery.

The Centre is continually being equipped to deal with an ever-increasing demand for training which over the past twelve months saw about 6 500 training man-days completed. This figure is inclusive of external trainees. Training courses range from operator training to management trainees.

Our Training Department also conducted a voter education programme which contributed to the success of our local government election. This voter education programme was presented at 38 venues throughout our area of operation. Pre-retirement seminars were held to assist employees plan for their retirement.

HUMAN RESOURCES SERVICES

Our employees are our most important asset, and their welfare is of paramount importance. Employees

Our supply area
has attracted
manufacturers such
as South African
Breweries, whose
products require
the high
quality of water
which we supply
on an everyday
basis to all our
customers



with various kinds of problems are helped through the Employee Assistance Programme (EAP). Our fully trained EAP Co-ordinators spend time counselling employees with various problems. Employees are also assisted to purchase their own homes. Counselling is given to prospective buyers to ensure that decisions are taken on an informed basis.

PLANNING: RESOURCES FOR THE FUTURE

A Water Resources Planning Department was created during the reporting period when the Corporate Planning Department was restructured.

The main purpose of the department is to plan the development and operation of water resources in a holistic manner through the use of a multi-disciplinary team providing hydrological, geohydrological, engineering, environmental and GIS services.

These disciplines are designed to assist in correct decision-making, while also providing a service to other departments. In September 1996 the White Paper for the Mooli/Mgeni Transfer was approved in Parliament and efforts have been directed at resolving the financial and institutional issues for implementation.

NORTH COAST

A feasibility study for the construction of a dam on the Mvoti River was completed with recommendations that a dam be built at iSithundu. The proposed dam will be multi-purpose as it will secure supplies for urban and rural domestic requirements of the North Coast, from Ballito to Nkwazi (including Stanger) as well as supporting the irrigation and industrial requirements in the lower Mvoti.

SOUTH COAST

Studies were conducted into the feasibility of an off-channel storage dam on the Mkomazi which would serve the needs of the Sappi/Saaicor pulp mill as well as domestic water customers living on the Middle South Coast (from Mtwalume to Umkomaas). A number of options are being investigated from environmental, social and cost-effective viewpoints.

GROUNDWATER RESOURCES PLANNING

A new initiative was launched to plan for the development of groundwater resources in the rural areas where large populations live without potable supplies. As many of these areas cannot be served by existing bulk infrastructure (due to their remoteness), groundwater is being viewed as the most cost-effective and timely solution. The programme is being conducted in seven rural areas, many of which were formerly under the control of the KwaZulu Government.

NATIONAL WATER CONSERVATION CAMPAIGN

Spearheaded by Prof. Kader Asmal, the Minister of Water Affairs and Forestry, this campaign gained momentum last year with Umgeni fully supporting initiatives in the area. In recognition of the scarcity of water at national level Umgeni has embarked upon several initiatives which promote the efficient use of water and which address the need for conserving water. A pilot test is under way in selected private dwellings in Pietermaritzburg where water-saving devices have been installed and are water consumption monitored.

ADDING VALUE

Through the management of water resources within its 24 000 km² area, Umgeni Water adds value to all people living in the Durban and Pietermaritzburg Metropolitan Regions through the provision of water and sanitation services.

The effective management of water resources within this region ensures the continued growth of the industrial and agricultural sectors, adding value to the economic and social well-being of the province of KwaZulu-Natal.

In the past seven years Umgeni has added value to the lives of close on 800 000 rural people who have received water supplies and sanitation services through the organisation's commitment to "Water for All". At Umgeni we are proud of the value we bring to the lives of the people of KwaZulu-Natal.

The entrance to
Umgeni is graced
by the presence of
two bronze otters
symbolising our
commitment to
Integrated
Catchment
Management and
the preservation of
our natural water
sources for all
creatures



COMMUNICATING: INFORMING AND EMPOWERING PEOPLE

The Public Affairs Department had another busy year implementing various campaigns and programmes in support of organisational strategies and business. During the year, the Department was responsible for organising presentations to all our major investors throughout the country. These were very well received and the open and transparent opportunity to discuss our business was welcomed by the investment community.

"More Than Just a Water Authority" was used as the theme to communicate Umgeni's many diverse services at major conferences and exhibitions. Umgeni was responsible for organising a major international conference in Johannesburg during the year, entitled "Institutional options and private sector participation in urban water supply and sanitation". As a joint sponsor with the Water Utility Partnership of the World Bank and the Economic Development Institute of the Union of African Water Suppliers, this conference was attended by over 220 government ministers and senior representatives from 33 different African countries over a five-day period.

Our 1 300 staff members are kept continually updated on corporate issues through our two main internal publications and a biannual video newsletter, all of which are translated into Zulu.

The External Education Services Unit has grown in stature and reputation, which was borne out by the Unit receiving the M-Net Green Trust Award for the most effective Water Conservation project in South Africa. A water classroom was initiated at our Durban Heights Waterworks in May 1996. This initiative is a first in the country, and since its inception has received over 4 000 schoolchildren and visitors.

WATER QUALITY: PROTECTING OUR PRODUCT AND CUSTOMERS

Our Scientific Services Division provided counselling and specialised services to a number of customers both within and outside the organisation. This was largely focused on operational expertise provided by Process Services as well as water quality and catchment information supplied by the Water Quality Department.

Development of both new technologies and processes was pursued vigorously during the period. New technologies related to both bulk water treatment as part of our core business and that applicable to small rural schemes in which we are becoming increasingly involved.

The commercial arm generated a 45 % increase in revenue, billing some R385 000 to outside customers. This was from the analysis of over 3 000 samples, training programmes and consultancy services. Our services were used by consultancy companies, major industries, governmental and municipal authorities, private individuals and foreign countries.

The laboratories participated in monthly inter-laboratory calibration exercises conducted by the South African Bureau of Standards (SABS) and a certificate of competency was awarded for their results. With several new instruments having been purchased and new methods developed, Umgeni remains at the cutting edge of scientific know-how and is considered a leader in this field in South Africa.

The Microbiology and Public Health Section has continued to monitor raw water supplies for a number of pathogenic bacteria including those responsible for cholera, salmonella and, more recently, shigella dysentery. This service is invaluable as an early warning of health hazards in the raw water supply to all users and also provides information on epidemics like the shigella dysentaria epidemic currently in the region.

In anticipation of the demands for tests for the presence of legionnaires' disease in cooling water, work has commenced on the optimisation of methods for detection and bacteria culturing. The organism, which grows in cooling tower water (such as air conditioners), has the potential to cause lethal pneumonia in susceptible individuals.

THE ENVIRONMENT: PROTECTING THE LIFE IN AND AROUND THE SOURCES

The Hydrobiology Section concluded an investigation into the adverse effects of discharging sewage effluents into the rivers even when these effluents have complied with all the legal requirements. Their findings will be

The new
treasury office at
Umgeni Water's
Head Office trading
the UG 50 and
UG 55 megastocks
creates capital
capacity
for new
infrastructure
developments such
as the Mearns Dam
which is to be
built on this site



used to assist with the setting of revised regulations as part of the new Water Law Review. This section has also been active in assisting with investigations into the environmental impacts of the proposed capex projects on the Mooi, Mvoti and Mkomazi Rivers

During the year the Pollution Prevention staff responded to over 238 pollution incidents which is a significant increase over the past two years (1994: 140 and 1995: 180). This was largely attributable to the active involvement of the staff in pollution detection, and raised public awareness and reporting of incidents. Of the incidents, 26 resulted from the transportation of hazardous material and several posed very serious pollution threats requiring immediate response from the 24-hour "Hazmat" team.

This section also continued to monitor trade effluent from the 'wet industries' in Pietermaritzburg and Hammarsdale areas and has placed additional emphasis on waste minimisation and pollution prevention rather than the traditional "end-of-pipe" solutions. Co-operation from industry has not always been forthcoming and prosecution-based sampling was conducted on 17 occasions. Most problems centred, once again, around the edible oil industries discharging illegally to sewers and to surface water.

Integrated Catchment Management remains an important objective and extensive reconnaissance of catchments in the new operational area was conducted. The first phase of the Mgeni Catchment Management Plan culminated in a preliminary plan for addressing major water quality and quantity problems in the catchment. Key issues in each sub-catchment of the Mgeni were identified and strategies set to achieve prescribed objectives. The implementation began in earnest in the latter half of the year.

The separate Environmental Report carries details of audits of the water and wastewater works and the status of the rivers and impoundments. The Geographic Information Systems (GIS) technology continued to assist with effective resources management and the coverage was extended to include the proposed operational areas and the rest of KwaZulu-Natal. Recent projects include the assessment of the impacts of afforestation on water resources, the establishment of wetland

inventories, mapping of alien invasives in the riparian zone, data collection in the Mvoti, Mlazi, Midmar and North Coast catchments and the establishment of a groundwater database.

CONTRIBUTING TO THE GREATER ISSUES

Considerable efforts are being made to develop an ISO 9002 Quality Management System in the laboratories after registration for the standard was successfully achieved in 1997. This system puts checks and balances into place to ensure reliable routine monitoring. Our commitment to adhering to the Environmental Policy was reiterated through the establishment of an Environmental Committee under my chairmanship. Manco now also enjoys an unprecedented level of staff support for this initiative.

The organisation participated actively in the Water Law Review and the Consultative National Environmental Policy Process conveying the view that self-regulation and Integrated Catchment Management should be entrenched in the new natural resources management laws.

TECHNOLOGY IN THE WORKPLACE

The past year saw the wide area network extended with desktop connectivity enjoyed at all the major sites in the organisation allowing staff to communicate via E-mail. In addition, Internet services have been connected allowing for communication with other water experts on the World Wide Web.

The Information Services Department were involved in a number of projects. The first phase of a system to improve our billing (the Custima system) was implemented, the decentralisation of financial transaction processing came nearer to reality with the provision of PCs and relevant training to a large number of new users throughout the organisation, and a new integrated Human Resources/payroll system was selected with the implementation process starting early in 1997.

The Geographic Information Systems reached a milestone early in 1997 when the GIS database containing the water supply network (both bulk and reticulation), according to existing records, was loaded. The pipework

infrastructure can now be viewed against a backdrop showing topographic features such as roads, rivers, towns, and the various political boundaries held by regional councils, etc. This database will enable the Operations Division to continuously update the information as they carry out field maintenance and extensions to the water supply infrastructure, thereby contributing to making the management of the water assets easier than before.

STRATEGIC PLANNING

The strategic planning process this year involved many levels of employees, thus allowing them to have a say in the future direction of the organisation. Through a series of workshops from the lower levels of staff through all levels of management, a large number of employees were consulted to develop a new vision, mission statement and corporate goals. There has been a significant buy-in from all divisions through the development of strategies and action plans, all of which are aligned to the corporate strategy.

Discussions were held with some of the local authorities on the form of proposals to take over water supply, wastewater and reticulation infrastructure. It is possible that within the next year additional local authorities outside Umgeni's current supply system could become new customers. The Darvill planning study to evaluate the options for the long-term treatment of sewage in Pietermaritzburg is under way, involving representatives from the Pietermaritzburg-Umsinduzi TLC to ensure that the effect on the city as a whole is addressed.

HEALTH AND SAFETY

However large or small a company is, people will always be the company's greatest asset. Without the experience, knowledge, devotion, and motivational drive of its employees, Umgeni Water would exist in name only.

During 1996 our commitment towards health and safety was greatly enhanced by management's initiative to establish a corporate Safety Services section whose aim would be to assist management in achieving the company's Health and Safety objectives.

During the year the health and safety needs of the organisation were assessed with a view to establishing

goals and objectives for management. This assessment entailed conducting structured and comprehensible internal audits of the current risks within the working environments, and of the existing health and safety management systems in place at these workplaces. These audits helped to determine the needs and priorities required by management to ensure that their systems are effectively and efficiently managing the identified risks in accordance with current Health and Safety legislation. The audits identified areas of non-conformance and each of these areas was prioritized and an action plan implemented. The accompanying Environmental Report contains details of those which impacted on the environment.

ACCIDENT AND INCIDENT STATISTICS

There were 39 disabling injuries during the year, with 462 days being lost due to these injuries, and 46 minor injuries were reported which required first aid only. These accident and injury statistics show a 60% decrease from 1995 statistics. Although there were less accidents in 1996 than 1995, 1996 saw an increase in the number of days lost due to injuries (9% increase).

COURSES/TRAINING

In order for Umgeni to achieve its Health and Safety Objectives, a major education drive was initiated by Safety Services and the Training Department. During the year almost 50% of employees underwent some form of health and safety training.

LEGAL COMPLIANCE WITH THE OHS ACT

Important amendments to the South African Health and Safety legislation were published in 1996 and existing Health and Safety Standards had to be amended and disseminated throughout the organisation.

An audit was carried out into contractors' compliance with Umgeni Water's Health and Safety Rules and the validity of these rules against existing legislation. Our rules were revised with the co-operation of all concerned and changes implemented to ensure that contractors were supervised according to the rules.

SAFETY ACHIEVEMENTS/AWARDS IN 1996

DV Harris Waterworks was the first Umgeni workplace to obtain a five-star grading award from NOSA for its Health and Safety Management Workplace Programme, and then proceeded to win the local authorities category of NOSA's 1996 Annual Safety Awards for the KwaZulu-Natal coastal region

Albert Falls Dam also achieved a three-star grading for its Health and Safety Management Programme. This is the first accredited health and safety grading for a dam in South Africa and Africa as a whole

Nevertheless our accident rate is still above the national average for our industry category and we therefore have an objective to reduce our accident rate to below this average during 1997.

CONCLUSION

In terms of achieving our objectives for the year I firmly believe we have accomplished much. Through a structured communications drive the loss of investors early in the reporting period has been reversed and our stocks are now fully subscribed. This remains an ongoing challenge as more and more opportunities present themselves to investors with deregulation and the relaxation of exchange controls on foreign investments

We remain confident, however, that the organisation is well placed to meet its growing commitments to the people living in our area of supply. The massive infrastructure projects which are critical to ensuring adequate resources for the near and distant future are well planned and provided for in our budgets

Our commitment to achieving full compliance with the requirements of the King Report on Corporate Governance has been largely successful. We can report that we have in place systems and structures which fully meet with the requirements.

In addition, plans are well advanced to begin instituting a Customer Service Programme throughout the organisation in line with our vision to become a world-class organisation which provides water services to improve the quality of life.

I should like to extend the entire organisation's congratulations to Minister Kader Asmal for the incredible work he has done in elevating water to its rightful position as a strategic national resource. In the past it has been treated as a commodity and viewed as a right and not a privilege. Many staff members have worked with great dedication to provide research data and extensive papers to the Department and have spent many hours in consulting on the proposed Water Act. We are therefore looking forward to 1997 and the challenges it holds

At Umgeni we are proud to be able to deliver on the ambitious Water for All goal set in the Reconstruction and Development Programme. To date our own Rural Areas Water and Sanitation Plan which we started almost ten years ago has seen over 800 000 people receive safe water. With the Department of Water Affairs and Forestry's ongoing support we are sure that our ultimate goal of providing all people living in our area of supply will be achieved

On behalf of the members of Manco I should like to thank our staff for contributing to Umgeni's successful year

To the members of the Board and, particularly to the outgoing members, I extend my thanks for their advice in providing management with the vision and perspectives on all the issues discussed during the year



Brian Walford
Chief Executive

The Board of Umgeni Water comprises 15 non-executive members who are representative of a wide range of stakeholders and are appointed by the Minister of Water Affairs and Forestry. A new Board is due to be appointed with effect from 1 May 1997.

The Board accepts final responsibility for the integrity, objectivity and reliability of the Financial Statements and meets monthly to ensure that delegated responsibilities are properly executed by management and to consider and authorise important issues.

The Management Committee comprises a chief executive and six executives, effectively fulfilling the role of directors who accept the principles of transparency in financial reporting. The responsibility for preparation and presentation of the Financial Statements belongs to the Management Committee.

The Board also accepts final responsibility for the existence of internal control systems. Management ensures that effective management by objectives exists, that the relevant legislation and regulations are adhered to and that adequate internal financial control systems are developed to provide reasonable certainty in respect of

- the completeness and accuracy of the accounting records;
- the integrity and reliability of the Annual Financial Statements, and,
- the safeguarding of the assets.

There are three active sub-committees of the Board: The Audit Committee, the Treasury Strategy Committee and the Remuneration Committee. The Audit Committee, consisting of non-executive Board members and including the attendance of the external auditor, the Manager Internal Audit, the Chief Executive and the Director of Finance and Administration, meets regularly in order to evaluate matters regarding accounting practices, internal control systems, auditing, financial reporting and management of critical risk areas. The Audit Committee has a clear mandate and reports to the Board. The internal and external auditors have unrestricted access to the Audit Committee and to the Chairman of the Board.

The Treasury Strategy Committee which meets monthly consists of a majority of non-executive Board members together with the Chief Executive and the Director of Finance and Administration. This Committee, established as a direct outcome of the independent audit of Umgeni's treasury activities, is mandated to overview the activities and strategies of the Treasury Department with respect to investments, loans and risks related to Umgeni's Treasury activities and as included in the Treasury Policy and Procedure Control Manual. The Committee has been very effective in ensuring that the levels of risk, systems and policies of the treasury operation have been managed effectively.

The Remuneration Committee, consisting of non-executive Board members with the Chief Executive and Director of Finance and Administration in attendance, meets as and when required to address the issues of executive remuneration in keeping with the guidelines provided by the Minister of Water Affairs and Forestry.

STATEMENT

The Audit Committee has confirmed that adequate internal controls are maintained. There were no serious breakdowns in the functioning of the internal control systems during the period under review. The Board is satisfied that the Annual Financial Statements fairly present the financial position and the results of operations in accordance with the stated accounting policies and the requirements of the Water Act No. 54 of 1956 as amended.

The Board is of the opinion that Umgeni Water is financially sound and operates as a going concern. The Annual Financial Statements have accordingly been prepared on this basis.

CODE OF CORPORATE PRACTICES AND CONDUCT

The Board members endorse, and during the period under review, have applied the Code of Corporate Practices and Conduct as set out in the King Report. By supporting the Code the Board members have recognised the need to conduct the enterprise with integrity and in accordance with generally accepted corporate practices.



Avison Carlisle
Director of Finance and
Administration

INTRODUCTION

The Financial Statements present the financial position of Umgeni Water and the results of its operations in line with the requirements of the Water Act No. 54 of 1956.

Furthermore the Financial Statements have been prepared with the following specific objectives

- To present the Financial Statements in a form which is consistent with and properly reflects Umgeni Water's financial strategies;
- To promote public understanding and awareness of the financial management and other requirements of the organisation;
- To satisfy the duties of public accountability and stewardship imposed by the public nature of the organisation and recognising its many stakeholders

Umgeni Water has two distinct areas of financial responsibility:

- 1 The financing of, and the provision of the infrastructure which comprises the investment in physical assets required to provide services,
- 2 The management and operation of the capital structure involving annual costs incurred in
 - the delivery of services to customers,
 - the maintenance and servicing of fixed capital,
 - the collection of customer revenues.

The Financial Statements have been prepared to present fairly these areas of responsibility and consist of

- a Balance Sheet which reflects the financial position,
- an Income Statement which shows the costs of the operation of water and wastewater services and the revenues from which these were financed;
- a Cash Flow Statement which records the movement of gross cash flows during the financial year to arrive at the net movements in cash for the year

These statements should be read in conjunction with the Accounting Policies which appear on pages 23 and 24 and which have been adopted by the Board of Umgeni Water, and with the Financial Statements which contain relevant explanations and analyses of key areas. Where necessary, figures for the previous year have been reclassified to facilitate comparison with the presentation of the current year.

Although there is no bearing on the current year figures and accounting policies, with effect from 1 April 1997 Umgeni Water has been declared a Public Entity in terms of the Public Entity Act No. 93 of 1992

RESULTS FOR 1996/1997

WATER SALES

Water sales amounted to R 393,1 million (1995/96. R346,2 million), operating expenditure was R188,0 million (R192,1 million) and interest and finance charges were R157,7 million (R101,6 million), leaving a surplus of R9,6 million (R1,6 million)

Accumulated reserves stood at R85,2 million at the end of the financial year (R75,6 million).

Net capital expenditure was R496,1 million at the end of the financial year (R456,7 million). This amount was used to finance the bulk water supply infrastructure, the largest of which is the Midmar Waterworks, and some 52 projects in our Rural Areas Water and Sanitation Plan which aims to bring water to areas not previously supplied. The effect of this capital expenditure is reflected in the increased long-term liabilities of R722,9 million as well as contributions to capital expenditure of R75,5 million. At the end of February 1997 Umgeni Water's total gross borrowings amounted to R3 453,5 million

FUNDING PLAN

Umgeni Water's funding requirements over the next four years are projected to be in the order of R2 464,2 million of which R150,8 million has been committed and the balance authorised and in the process of being committed. It is anticipated that these funds will primarily be raised in the domestic capital market. The

Minister of Water Affairs and Forestry is fully aware of all market-making activities and an application for the approval of these activities has been lodged with the Minister, and his approval is awaited. Other opportunities to reduce the cost and increase the duration of finance will be considered where available and appropriate.

FINANCIAL RISK MANAGEMENT

In order to meet Umgeni's business objectives it is necessary to engage in finance activities which give rise to a number of financial exposures. These exposures are managed by the Treasury Department which operates under risk exposure guidelines set by the Treasury Strategy Committee. The Treasury Strategy Committee is in turn mandated by the Board to set and approve parameters and policies for financial risk management. Due to the nature of Umgeni as a water utility the Treasury Strategy Committee adopts a high cost/low risk approach to ensure that its stakeholders will not be compromised by the uncertainty that prevails in financial markets.

A well-equipped treasury operation is in place and new and existing employees are gaining full access to training in all aspects of financial risk management and control.

Umgeni Water's activities in the secondary market continued to assist in containing the cost of funding and resulted in an average rate of interest and finance charges during the year of 14,93%. In order to maintain the competitive borrowing rates, Umgeni Water continues to support the secondary market which has developed in its stocks. The stocks are well dispersed between the institutions and private individuals.

In terms of the Water Act, Umgeni Water is obliged to create a sinking fund for the redemption of loans. Furthermore, it is contemplated that loans will be raised with a maturity equal to that of the useful life of the assets being financed. Market conditions necessitate that Umgeni Water is only able to raise finance for periods often considerably shorter than the useful life of the relevant assets. Under these circumstances the Board of Umgeni Water believes that it would be prejudicial to its consumers to provide for full redemption of loans with short-dated maturities. The Board has therefore taken

the view that in such circumstances the relevant loan can be refinanced up to a period consistent with the estimated life of the asset. Umgeni Water therefore treats the loan on a rollover basis and provides for the redemption of the loan over the estimated useful life of the assets. The Board believes that the liquidity risk arising from the need to refinance the loan until a maturity equal to the estimated useful life of the asset is minimal and can be managed through the prevailing liquidity risk policies.

Investments representing other reserves and provisions have been managed as a single pool, which is detached from the market-making activities.

RESPONSIBILITY ACCOUNTING

In addition to the normal accounting for primary service activities, Umgeni Water has adopted "responsibility accounting" whereby all relevant costs are identified, accumulated and reported to managers on the basis of their areas of responsibility and control. This method of reporting is undertaken for the purpose of efficient internal management and accountability.

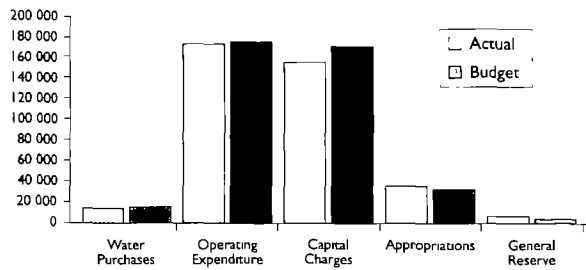
VALUE CREATED

The Value-added Statements set out below reflect the sources of value created and how this value is distributed, both to meet obligations and to reward those responsible for Umgeni Water's achievements.

CHANGES IN TOTAL AND FACTOR PRODUCTIVITY

	1997	% of value	1996	% of value
	R000	added	R000	added
Sales revenue	393 163		346 235	
Less: total input costs	345 710		293 755	
VALUE RETAINED	47 453	20,0	52 480	29,0
Add back:				
Direct labour costs	32 084	13,5	27 056	14,9
Capital charges	157 675	66,5	101 606	56,1
VALUE ADDED	237 212	100,0	181 142	100

Distribution of Water Revenue: Actual Compared with Budgeted (R000)



There was a 1,9% savings (R3,3 million) in operating expenses over the budget.


The commercial approach to our business continues to ensure the effective financial and commercial management of Umgeni Water by a dedicated and competent staff. The excellent results are a tribute to their skills, concentration and hard work.

TARIFF CHART

% Annual Charge	1991	1992	1993	1994	1995	1996	1997
Tariff	7,6	7,3	8,0	9,6	6,8	10,8	12,6
CPI	14,7	14,4	15,3	13,9	9,7	10,0	7,9

Umgeni Water's commitment to its programme of extending safe water supplies to all the people in the region is detailed elsewhere in this report. This is an ambitious plan which requires extensive capital investment and is dependent on the ability of the organisation to subsidise costs related to water supply in rural areas. The progress which has been made in this respect is reflected in the number of metered consumers, which has increased from 2 782 in February 1994 to 12 350 in February 1997. The number of connections currently being added per month is 760 and the average cost of water per rural household is R16,60 per month.

The Annual Financial Statements which appear on pages 25 to 35 were approved by the Board of Umgeni Water on 30 April, 1997 and were signed on its behalf by



B WALLETT
(CHAIRMAN)



B WALFORD
(CHIEF EXECUTIVE)

REPORT OF THE INDEPENDENT AUDITORS

To the Members of the Board of Umgeni Water

We have audited the Annual Financial Statements set out on pages 25 to 35, which have been prepared on the bases of accounting policies set out on pages 23 to 24. These Financial Statements are the responsibility of the Directors of Umgeni Water. Our responsibility is to report on these Financial Statements.

We conducted our audit in accordance with generally accepted auditing standards. These standards require that we plan and perform the audit to obtain reasonable assurance that, in all material respects, fair presentation is achieved in the Financial Statements. The audit included an evaluation of the appropriateness of the accounting policies, an examination, on a test basis, of evidence that supports the amounts and disclosures included in the Financial Statements, an assessment of the reasonableness of significant estimates and a consideration of the appropriateness of the overall Financial Statement presentation. We consider that our auditing procedures were appropriate in the circumstances to enable us to express our opinion below.

In our opinion the Annual Financial Statements fairly present, in the manner required by the Water Act

No. 54 of 1956 as amended, the financial position of Umgeni Water at 28 February 1997 and the results of its operations and cash flow information for the year then ended, in conformity with the stated accounting policies



KPMG
Chartered Accountants (SA)
Registered Accountants and Auditors

Pietermaritzburg
21 May 1997

BASIS OF PREPARATION

The Financial Statements are prepared in accordance with the Water Act using the historical cost basis, except for liabilities incurred and investments held for market-making purposes which are stated at market value. The following principal accounting policies are consistent with those of the previous year, except where noted

EQUITY FUNDS

Equity funds consist of

- interest-free, non-refundable contributions received for the specific purpose of funding bulk water and rural water supply schemes;
- transfers to or from Stabilisation of Future Years' Water Tariff Fund,
- that portion of revenue transferred to the Loan Redemption Fund over the imputed life of certain immovable assets now considered fully financed

REGISTERED LOAN STOCK

Loan stock and other loans utilised to finance water supply and other related infrastructure are stated at nominal value. Loan stock issued and not so utilised is available to support market-making activities and is stated at market value.

REDEMPTION OF LOANS**WATER SUPPLY AND INFRASTRUCTURE****Loan Redemption Fund**

The Loan Redemption Fund is used to provide for redemption of loans. Loans are partially redeemed through transfers from revenue, together with interest earned on the investment of transfers from revenue and from the proceeds arising from the issue of new loan stock.

Annual transfers from revenue to the Loan Redemption Fund are made over the average period to maturity of loan stock or over the life of immovable assets, whichever is greater but not exceeding 25 years.

LOAN DISCOUNTS

Provision is made for the amortization of loan discounts arising as a result of the initial issue by transfers from

revenue to the Loan Redemption Fund, which together with interest earned will be sufficient for the repayment of the shortfall between the consideration received and the actual liability of loans on maturity.

FIXED ASSETS**IMMOVABLE ASSETS**

Immovable assets in commission and work under construction are reflected at historical cost. No provision is made for depreciation. The transfers from revenue to the Loan Redemption Fund takes the place of depreciation.

MOVABLE PLANT AND EQUIPMENT

Equipment, vehicles and furniture are reflected at net book value. Depreciation is provided on a straight line basis at rates considered appropriate to reduce the original cost to estimated residual value.

LEASED ASSETS

Assets subject to finance lease agreements are capitalised at their cash cost equivalent and the corresponding liabilities recognised. The leased assets are included in immovable fixed assets in commission and accordingly are not depreciated. The effective interest rate method is used to determine the finance cost to be charged to income.

INVESTMENTS

Investments not yet utilised to finance water supply are stated at market value and unrealised profits or losses are credited or debited to deferred market-making costs. Investments representing the Loan Redemption Fund are stated at cost.

**DEFERRED EXPENDITURE :
MARKET-MAKING COSTS**

Market-making activities are entered into with the objective of reducing the long-term cost of borrowing as well as improving the overall marketability of loan stock and access to funds.

Profits and losses, including administration costs, associated with this activity are deferred and amortised over

the period to redemption of the loan of the related bond in issue. In previous years costs were deferred and amortised over the longest dated stock. This change in accounting policy has no impact on the amounts reflected.

No transfers are made to the Loan Redemption Fund in respect of loan stock issued to support market-making activities for which investments are held.

STABILISATION OF FUTURE YEARS' WATER TARIFF

In order to reduce the impact on tariffs as a result of future extensions to the water supply infrastructure, a stabilisation fund has been created.

OVERHEAD COSTS

The allocation of overhead costs between capital and revenue is reviewed on an annual basis to take account of the capital development in each year. Head Office overhead allocations are based on the proportion of the individual cost centres' expenses to the total expenses incurred. The current policy is to capitalise 30% of the Head Office overhead costs (1996 -25%)

CAPITALISATION OF BORROWING COSTS

Borrowing costs incurred in respect of assets which require a substantial period to prepare for intended use are generally capitalised to the date of commissioning of the asset, limited to a period not exceeding three years after commissioning

INVENTORIES

Inventories are valued at the lower of the weighted average cost and net realisable value. Inventories comprise mainly pipe stocks, maintenance spares and chemicals

Obsolete, redundant and slow-moving inventories are identified and written down to their estimated net realisable value

TURNOVER

Turnover comprises net invoiced water sales to customers, revenue from waterworks and treatment plants, excluding VAT

RETIREMENT BENEFITS

Benefits are provided to all eligible employees. Current contributions to the Retirement Fund or the Provident Fund operated for employees are charged against income as incurred. The costs of any improved pension fund benefits or deficits arising from time to time on the funds will be charged against income as and when funded.

HUMAN RESOURCES DEVELOPMENT FUND

The fund is available to assist with the development and training of employees. This includes supernumary trainees as well as adult basic education and assisted education programmes. Appropriations to this fund are made at the discretion of the Board

POST-RETIREMENT BENEFITS OTHER THAN PENSIONS

The cost of post-retirement benefits other than pensions, such as medical aid contributions are charged to income as the costs are incurred.

BALANCE SHEET

as at 28 February 1997

CAPITAL EMPLOYED

	Notes	1997 R000	1996 R000
EQUITY FUNDS	1	414 654	291 851
GENERAL RESERVE FUNDS	2	85 219 360 664	75 567 350 888
LONG-TERM LIABILITIES	3	2 706 176	1 983 337
		<u>3 566 713</u>	<u>2 701 643</u>

EMPLOYMENT OF CAPITAL

FIXED ASSETS	4	2 296 519	1 800 351
INVESTMENTS	5	1 265 539	868 694
CURRENT ASSETS			
Inventories	6	7 740	5 961
Accounts receivable	7	104 106	119 042
Bank and cash balances		134 341	87 103
		246 187	212 106
CURRENT LIABILITIES			
Accounts payable		241 532	179 508
NET CURRENT ASSETS		4 655	32 598
		<u>3 566 713</u>	<u>2 701 643</u>

INCOME STATEMENT

for the year ended 28 February 1997

	Notes	1997 KZ 000	1996 KZ 000
Treated Water Volume Sold		315 182	296 106
		R000	R000
Turnover		393 163	346 235
Cost of Sales	8	<u>68 820</u>	<u>83 933</u>
Gross Profit		324 343	262 302
Operating and Administration Expenses	9	<u>119 215</u>	<u>108 216</u>
Operating Income		205 128	154 086
Interest Received		18 916	36 330
Finance costs	10	<u>176 591</u>	<u>137 936</u>
Net Income before appropriation to Funds		47 453	52 480
Human Resources Development Fund		4 500	4 000
Loan Redemption Fund		12 000	11 819
Stabilisation of Future Years' Water Tariff Fund		<u>21 301</u>	<u>35 065</u>
General Reserve – for the year		9 652	1 596
– at beginning of year		<u>75 567</u>	<u>73 971</u>
– at end of year		<u>85 219</u>	<u>75 567</u>

CASH FLOW STATEMENT

for the year ended 28 February 1997

	Notes	1997 R000	1996 R000
CASH RETAINED FROM /(UTILISED BY) OPERATING ACTIVITIES			
Funds generated by operations	15.1	256 146	196 892
Investment Income		18 916	36 330
Released from/(utilised by) working capital	15.2	75 181	(13 355)
Cash generated by operating activities		350 243	219 867
Cash movement on funds	15.3	19 268	12 471
Outside capital charges		(321 835)	(235 805)
		47 676	(3 467)
 CASH UTILISED TO EXPAND ACTIVITIES			
Capital expenditure	15.4	(401 942)	(401 681)
Contributions to capital expenditure		75 510	66 911
		(326 432)	(334 770)
		<u>(278 756)</u>	<u>(338 237)</u>
 CASH EFFECTS OF FINANCING ACTIVITIES			
Increase/(Decrease) in outside borrowings		932 269	(847 769)
(Increase)/Decrease in investments		(606 275)	1 127 162
(Increase)/Decrease in cash on hand and deposits		(47 238)	58 844
		<u>278 756</u>	<u>338 237</u>

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

as at 28 February 1997

I EQUITY FUNDS

	1997 R000	1996 R000
Opening balance	291 851	86 201
Capital contributions	75 510	66 700
Transfer from Stabilisation of Future Years' Water Tariff Fund	47 236	129 417
Transfer from Loan Redemption Fund	57	9 533
	<u>414 654</u>	<u>291 851</u>

2 FUNDS

2.1 Loan Redemption Fund

Opening Balance	253 979	213 588
Transfer from Revenue	12 000	11 819
Interest	32 530	24 605
Transfer from Stabilisation of Future Years' Water Tariff Fund	-	13 500
Transfer to Equity Funds	(57)	(9 533)
	298 452	253 979

2.2 Stabilisation of Future Years' Water Tariff Fund

Opening Balance	93 986	210 240
Transfer from Revenue	21 301	35 065
Interest	12 242	12 598
Transfer to Equity Funds	(47 236)	(129 417)
Transfer to Loan Redemption Fund	-	(13 500)
Payments to Department of Water Affairs and Forestry	(22 183)	(21 000)
	58 110	93 986

2.3 Human Resources Development Fund

Opening Balance	2 923	2 444
Transfer from Revenue	4 500	4 000
Interest	315	339
Payments for staff development and superannuation positions	(3 636)	(3 860)
	<u>4 102</u>	<u>2 923</u>
	<u>360 664</u>	<u>350 888</u>

	1997 R000	1996 R000
3 LONG-TERM LIABILITIES		
3 1 UTILISED TO FINANCE WATER SUPPLY – AT NOMINAL VALUE		
Registered Loan Stock		
– Nominal value	2 831 453	2 067 102
– Loan discount	(221 179)	(176 971)
	2 610 274	1 890 131
Finance leases		
– Finance lease obligations bearing varying interest rates per annum repayable over 7 years commencing 1 March 1996	95 902	93 206
	<u>2 706 176</u>	<u>1 983 337</u>
3 2 NOT YET UTILISED TO FINANCE WATER SUPPLY – AT MARKET VALUE		
Registered Loan Stock (refer note 3 4 1)	585 534	376 104
Deferred market-making costs		
Opening balance	(125 389)	(123 881)
– Net finance costs	11 639	(44 998)
– Valuation (deficit)/surplus	(5 458)	31 827
– Option premiums	–	(905)
– Treasury costs	(4 648)	(3 840)
– Professional Fees	(497)	(1 319)
– Sundry Income	6 570	5 188
	(117 783)	(137 928)
Amortisation of deferred market- making costs	11 778	12 539
Closing balance	(106 005)	(125 389)
Investments	(479 529)	(250 715)
	Nil	Nil
	<u>2 706 176</u>	<u>1 983 337</u>

PROFILE OF REGISTERED LOAN STOCK

	1997 R000	1996 R000
3.3 Maturity structure of long-term liabilities at nominal value is as follows:		
After 1 year within 5 years	290 833	764 090
After 5 years within 10 years	2 676 318	1 714 658
After 10 years	15 069	15 163
Short term	471 300	606
	<u>3 453 520</u>	<u>2 494 517</u>
3.4 OTHER INFORMATION		
3.4.1 Registered loan stock at market value has a nominal value of R 526 165 946 (1996 · R334 209 220)		
3.4.2 The capital portion of long-term liabilities repayable during the next 12 months is R471 300 000 (1996 · R606 257).		
3.4.3 Individual registered loan details are listed in Annexure 1.		
3.4.4 Reconciliation of Registered Loan Stock stated at Nominal Value as per Annexure 1		
As per note 3.1 utilised to finance water supply		
Registered loan stock	2 831 453	2 067 102
Finance leases	95 902	93 206
As per note 3.2 not yet utilised to finance water supply		
Registered loan stock	<u>526 165</u>	<u>334 209</u>
	<u>3 453 520</u>	<u>2 494 517</u>

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

as at 28 February 1997

cont

	1997 R000	1996 R000
4 FIXED ASSETS		
Treated Waterworks Operating Systems		
Capitalised leased assets	84 653	84 795
Land, buildings, treatment plants and aqueducts	1 428 903	967 653
Wastewater works operating systems	105 848	104 708
Works under construction	545 071	536 201
	2 164 475	1 693 357
Other land and buildings		
Coastal Regional Office	18 491	11 858
Head Office	47 598	43 488
Inland Regional Office	9 778	8 678
	75 867	64 024
	2 240 342	1 757 381
Vehicles, Furniture and Equipment		
At cost	93 302	74 164
Accumulated Depreciation	(37 125)	(31 194)
Net Book Value	<u>56 177</u>	<u>42 970</u>
	<u>2 296 519</u>	<u>1 800 351</u>

4.1 Details of properties owned are available on request from registers kept at Umgeni Water's Head Office

WATER SUPPLY OPERATING SYSTEMS

	OPERATING PLANT	ADMINISTRATION LAND AND BUILDINGS	VEHICLES, FURNITURE AND EQUIPMENT	TOTAL
Net Book Value				
Opening Balance	1 693 357	64 024	42 970	1 800 351
Additions	373 417	9 387	20 087	402 891
Disposals	-	-	(949)	(949)
Depreciation	-	-	(5 931)	(5 931)
Capitalised Borrowing Cost	97 701	2 456	-	100 157
Closing Balance	2 164 475	75 867	56 177	2 296 519

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

as at 28 February 1997

cont

	1997 R000	1996 R000
5 INVESTMENTS		
Local Registered Stock stated at cost and cash on deposit	<u>1 265 539</u>	<u>868 694</u>
6 INVENTORIES		
Pipe inventories	1 160	978
Maintenance spares	5 354	4 104
Chemicals	967	837
Miscellaneous	<u>259</u>	<u>42</u>
	<u>7 740</u>	<u>5 961</u>
7 ACCOUNTS RECEIVABLE		
Trade Debtors	89 322	70 016
Debtors for Capital Contributions	1 515	9 930
Sundry Debtors	<u>13 269</u>	<u>39 096</u>
	<u>104 106</u>	<u>119 042</u>
Receipts totalling R36,8 million were received within seven days of the closing of the financial year-end, resulting in debtors days of 48,8 (1996 73,8).		
8 COST OF SALES		
Water Purchases	15 540	29 014
Electricity	10 232	17 945
Purification	10 964	9 918
Direct Salaries and Wages	<u>32 084</u>	<u>27 056</u>
	<u>68 820</u>	<u>83 933</u>
9 OPERATING AND ADMINISTRATION EXPENSES		
Administration & Technical Services	4 530	10 263
Amortisation of Deferred Market-making costs	11 778	12 539
Auditors' Remuneration – Audit Fees	350	350
Increase in Bad Debt Provision	385	1665
Bad Debts written off	1 900	2
Directors' Emoluments	1 399	1 751
Depreciation of movable assets	3 353	3 095
Indirect Salaries and Wages	26 258	23 809
Maintenance	46 803	39 277
Remuneration Other than to Employees	1 627	1 664
– Managerial Services	286	185
– Technical Services	553	566
– Secretarial & Administrative Services	788	913
Renewal Expenditure	11 028	5 979
Transport Costs	<u>9 804</u>	<u>7 822</u>
	<u>119 215</u>	<u>108 216</u>

NOTES TO THE ANNUAL FINANCIAL STATEMENTS

as at 28 February 1997

cont

10 FINANCE COSTS

Total Finance Charges
 Charged to Administration and Technical Services
 Charged to Maintenance
 Capitalised to Fixed Assets

1997	1996
R000	R000
267 741	192 854
7 762	5 087
1 245	533
(100 157)	(60 538)
<u>176 591</u>	<u>137 936</u>

The average rate of interest and finance charges during the year in respect of long-term liabilities utilised to finance water supply amounted to 14,93% per annum (1996: 14,72% per annum)

11 CAPITAL COMMITMENTS

Authorised
 – contracted for
 – not contracted for

150 797	249 000
2 313 377	1 135 040
<u>2 464 174</u>	<u>1 384 040</u>

The proposed capital expenditure on fixed assets to be incurred, will be financed by long-term external loans raised in the market (Note 3)

12 FORWARD RATE AGREEMENT

Further committed expenditure contracted for is covered by forward exchange contracts
 Forward cover for 5 790 763 French Francs has been taken out based on the anticipated future cash flows

13 CONTINGENT LIABILITIES

Umgeni Water has given collateral security to certain financial institutions in respect of mortgage loans advanced to employees under its home ownership scheme

3 488	3 423
-------	-------

At the year-end there were four outstanding claims, on different capital projects, under negotiation or arbitration
 The payment of any of these claims will have no impact on the Income Statement as these costs, if paid, will be capitalised to the respective projects

5 375	–
<u>8 863</u>	<u>3 423</u>

There are no contingent liabilities or commitments regarding derivative financial instruments at year-end.

14 RETIREMENT BENEFIT INFORMATION

The policy of Umgeni Water is to provide retirement benefits for its permanent employees. All eligible employees are members of the defined contribution schemes, either the Retirement Fund or the Provident Fund, which are subject to the Pension Funds Act, 1956 as amended. The Funds are actuarially valued every three years on the projected contributory basis. The funds were valued in March 1996. The independent consulting actuaries were of the opinion that the funds were in a sound financial position.

The next valuation will be performed in 1999

CURRENT YEAR'S CONTRIBUTIONS

**1997
R000**

**1996
R000**

10 704

10 059

15 CASH FLOW STATEMENT

15.1 FUNDS GENERATED BY OPERATIONS

Net Income	9 652	1 596
Adjusted for :		
Interest transferred to Reserves	45 087	37 331
Interest and finance charges	176 591	137 936
Redemption	17 931	17 294
Investment Income	(18 916)	(36 330)
Transfer to Stabilisation of Future Years' Water Tariff Fund	21 301	35 065
Transfer to Human Resources Development Fund	4 500	4 000
	256 146	196 892

15.2 RELEASED FROM/(UTILISED BY) WORKING CAPITAL

Increase in stores	(1 779)	(459)
Decrease/(Increase) in debtors	14 936	(49 921)
Increase in creditors and provisions	62 024	37 025
	75 181	(13 355)

15.3 CASH MOVEMENT ON FUNDS

Stabilisation of Future Years' Water Tariff Fund – payment to DWAF	(22 183)	(21 000)
Human Resources Development Fund	(3 636)	(3 860)
Other – Interest Received	45 087	37 331
	19 268	12 471

15.4 CAPITAL EXPENDITURE

Balance at end of year	2 296 519	1 800 351
Balance at beginning of year	(1 800 351)	(1 343 608)
Net additions/disposals	496 168	456 743
Less Interest capitalised	(100 157)	(60 538)
Add Depreciation	5 931	5 476
	401 942	401 681

ANNEXURE I

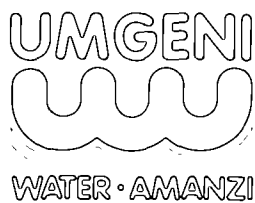
BORROWINGS

Loan	Authorised Nominal Value		Repayment Dates	Issued Nominal Value	
	1997 R000	%		1997 R000	1996 R000
1	7 209	6,95	1991/2005	4 966	5 354
4	2 000	10,00	1999	150	150
5	3 500	9,70	1999	150	150
6	4 000	9,65	2000	50	50
8	1 716	11,63	1991/2000	877	1 041
10	9 250	13,70	2001	5	5
14	22 550	12,50	2002	135	135
19	22 027	11,20	1991/2025	6 461	6 422
24	13 500	18,10	2000	450	450
28	4 000	16,70	2001	4 000	4 000
30	5 214	17,10	1991/2013	4 971	5 025
37	4 006	17,40	1991/2009	3 637	3 716
42	15 222	5,00	2001	15 222	15 222
43	48 630	Varying	1993/2002	48 630	48 114
44	200 000	Varying	2002	144 470	158 656
45	47 272	Varying	1992/2002	47 272	45 092
47	29 422	10,00	1998/2018	29 422	-
49	13 615	Varying	2005	30 930	13 615
50	500 000	15,00	1997	471 300	743 022
55	2 500 000	15,00	2005	2 230 422	1 034 298
60	500 000	8,00	2003	96 000	96 000
61	214 000	6,00	2003	214 000	214 000
62	100 000	15,00	2003	100 000	100 000
	<u>4 267 133</u>			<u>3 453 520</u>	<u>2 494 517</u>

There are no outstanding interest commitments with regard to the above loans

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For further information please contact. Umgeni Water, PO Box 9, Pietermaritzburg 3200, South Africa
Tel. (0331) 341-1111 Fax: (0331) 341-1084





7. Umgeni Water's : attitudinal survey research sample

UMGENI WATER: ADDITIONAL SURVEY

RESEARCH SAMPLE

BLACK DOMESTIC CONSUMERS (Rural) - x 300

- District 609 - UMGABABA - Bad payment area
- District 304 - HOPEWELL (Thornville area) - Good payment area
- Bulwer - Impendle Non-water area
- Groutville

BLACK DOMESTIC CONSUMER (Urban) - x 50

- Umlazi
- Edendale

COLOURED DOMESTIC CONSUMERS - x 20

- Newlands
- Woodlands

INDIAN DOMESTIC CONSUMERS - x 70

- Reservoir Hills
- Northdale OR Edendale

WHITE DOMESTIC CONSUMERS - x 60

- Middle-class Durban
- Middle-class Pietermaritzburg

100 people from the lists below:

POLITICO'S

DWAF: (012) 2999 111

Mike Muller
Peter Pike
Thys Badenhorst (might have re-located to Durban)

DWAF: (031) 306 1367

James Perkins
Gary Quilling
Lin Gravelet-Blondin

HOUSING

Peter Miller
Dave Dunstan

HEALTH

Zweli Mkhize
Nkosisana Zuma

ENVIRONMENTAL & TOURISM

Peter Mokhabe
Jacob Zuma

EDUCATION

? Bhengu
? Zulu

RDP 'OFFICE' - WATER: (012) 2999 111

Terry Garroway
Kalinga Palpaola

OTHER 'POLITICO'S'

Mike Sutcliffe
Duminsani Makhaye
Phillida Ellis
Mike Ellis

ENVIRONMENTALISTS

Ian Player
George Hughes
Chris Albertyn
Pat Gross

WATER INDUSTRY

Vincent Bath	-	Rand Water	(011) 682 0911
Nick Fenner	-	Magalies Water	(01466) 55 886
Derek Foster	-	Mhlatuze	(0351) 31 341

DURBAN WATER AND WASTE

Neil Macleod - (does not like us at all!)
Alan Davis
Frank Stevens

INDUSTRIALISTS

Mondi Paper
Tongaat Group
SAPPI
CG Smith
SAB
Amalgamated Beverages
Whiteheads
Dyno
Deniem

CHAMBERS etc.

Durban Chamber of commerce and Business
NAFCOC
Black Management Forum
Pietermaritzburg Chamber of Commerce & Industry
Nyanda Chamber of Commerce
Institute of Personnel Management
Institute of Marketing

UNIONS

COSATU
NEHAWU
BLACK ALLIED WORKERS UNION (SAAME)

JSB'S / TLC'S, METRO'S etc.

(Choose 35 from attached list - those marked with . Lists are about six months old, so maybe a little out dated!)

MEDIA - choose one from each newspaper etc.:

John Sherrocks	-	Natal Mercury
Khaba Mkhize	-	Natal Broadcasting
Les Green	-	Natal Broadcasting
Graham Linscott	-	Daily News
Cheryl Goodenough	-	Natal Witness
Vicky Quinlan	-	Natal Witness
John Nichols	-	Natal Witness
Shirley Jones	-	Natal Mercury
Nicola Jenvey	-	Business Day
Herb Payne	-	Financial Mail

Iianga
uMafrika
Post
Leader
Radio Zulu
Radio Pietermaritzburg

Perhaps consider including the small, parochial newspapers as well, e.g.:

Greytown Gazette
South Coast Sun
South Coast Herald
North Coast Bugler ???
La Lucia Lamey ???

SUPERINTENDENTS OF HOSPITALS

King Edward
Addington
McCord
Edendale
Northdale
Greys

(Approximately 102 people - if calculation are correct!!)

8. Rural Water Supply Schemes 1996

UMGENI



WATER • AMANZI

**RURAL
WATER SUPPLY
SCHEMES
1997**



Umgeni Water P O Box 9 Pietermaritzburg 3200
310 burger Street Pietermaritzburg 3201 South Africa
TEL (0331) 3411111 FAX (0331) 3411084

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List of Interviewees:

DWAF:

Mr James Clifford Perkins: Chief Engineer, Durban Office

Ms Dicaledi Moema, Gender Policy Coordinator, Pretoria

Ms Gail Anderson, Human Resources officer, Durban

Scott Wilson and Kirkpatrick

Mr Greg Huggins, SWK

Mr Brian Neale, SWK, Groenekloof Project Manager.

Peter Robinson Projects

Mr Peter Robinson, Vulindlela Project Manager, Peter Robinson Projects

Durban Metro (Water)

Mr Mike Marincowitz, Human Resources Division

Umgeni Water

Ms Mayu Sosisbo, Rural Planning Officer

Mr Vusi Ziqubu, Rural Planning Officer

Mr Rob Burgess, Coordinator, Rural Planning

Mr Wayne Schaffer, Corporate Services

Ms Joanne du Preez, Environmental Co-ordinator, New Works Division

Mr Adrian Wilson, Director Human Resources

Ms Lindi Ncobo, Rural Planning Officer

Ms Janice Donaldson, Corporate Services

Mr Patrick Nlapo, Sanitation Program Manager

Mr Steve Camp, Educational Program Manager

Ms Penny Gumede, Educational Program Officer

Mr Frans du Toit, Human Resources

Ms Sally Frost, Outreach Program

Mr Gordon Willington, RAWSP Project Control Manager

Mr Thulani Duma, Environmental Co-ordinator

Mr Roger Ackerman, Corporate Services

Mr Maxwell Sirenya, Inland Operations

Mr Lynton Rowlands, Human Resources

Mr Cyril Rudling, Financial Manager

Ms Jane Laatz, Debtors co-ordinator

Marion Witte

Bongi Thabede

Wayne Schaffer

Ed Maani

Dave Hamilton

David Boothway

Midlands Partnership Program

Ms Kwazi Mazibuko

Peter Robinson Projects:

Tony Hopkinson

Willcock Reed and Kotze:

Dennis Kotze