

"our blue print for survival"

National Water Resource Strategy

FIRST EDITION • SEPTEMBER 2004



water & forestry

Department
Water Affairs & Forestry
REPUBLIC OF SOUTH AFRICA

FOREWORD

The National Water Policy (1997) and the National Water Act (1998) are founded on Government's vision of a transformed society in South Africa, in which every person has the opportunity to lead a dignified and healthy life and to participate in productive economic activity.

The First Edition of the National Water Resource Strategy (NWRS) describes how the water resources of South Africa will be protected, used, developed, conserved, managed and controlled in accordance with the requirements of the policy and law. The central objective of managing water resources is to ensure that water is used to support equitable and sustainable social and economic transformation and development.

Because water is essential for human life the first priority is to ensure that water resources management supports the provision of water services - potable water and safe sanitation - to all people, but especially to the poor and previously disadvantaged.

But water can do much more than that: water can enable people to make a living. The NWRS seeks to identify opportunities where water can be made available for productive livelihoods, and also the support and assistance needed to use the water effectively.

Water is of course central to all economic activity. The NWRS provides a platform for the essential collaboration and co-operation among all departments in all spheres of government involved in economic development. It is an important input to the evolving National Spatial Development Framework, helping to provide a better understanding of the contribution that water can make to development in all departments' areas of activity.

The National Water Act has transformed the way water is controlled, from a system of rights based on land ownership (the riparian system) to a system designed to allocate water equitably in the public interest. The progressive reallocation of water to sectors of society that were previously excluded from access to water can help to bridge the divide between the first and second economies, whilst maintaining existing beneficial water uses and encouraging the greater efficiencies needed in our dry country.

This must be done in a manner that ensures that we achieve an acceptable balance between the use of our water resources and the protection of the integrity and diversity of the aquatic environment. The NWRS therefore emphasises water conservation and measures to promote greater efficiency in water use, and outlines the support and assistance that will be provided to implement them. Whilst the pricing of water use is an important instrument to promote conservation, social needs must be addressed, and the NWRS includes provisions for subsidising previously disadvantaged users.

A vital element of the NWRS is the progressive decentralisation of the responsibility and authority for water resources management to catchment management agencies and, at a local level, water user associations. These institutions, representative of water users and other stakeholders, will facilitate effective participation in the management of water resources in their areas. It will also enable the Department of Water Affairs and Forestry to move from its present multiple roles as operator, developer and regulator to become the sector leader, policy maker, regulator and monitor. The Department will lead the creation of the new institutions, which will take a number of years, and support and guide them in the execution of their tasks.

It will continue to be necessary to build new infrastructure such as dams, pumping stations and pipelines to meet increasing demands for water to improve standards of living as well as to contribute to increased economic activity. New dams and related infrastructure will further improve security against water shortages during drought periods and, with careful operation, can also provide some safeguards in downstream areas against the effects of floods. In line with government's commitment to promote investment in economic infrastructure, an indicative

programme of capital development is outlined, much of which will be funded by the users themselves. Social investment by national government will, however, still be needed, especially in rural areas to overcome the legacy of decades of deprivation. The direct economic benefits, together with the savings in social expenditures that will result from the transformation of the lives of impoverished communities, clearly justify such investments.

A proposal is mooted to establish a national agency to develop and manage nationally-important or multi-sector infrastructure, leaving the development of local infrastructure to local institutions.

The NWRS must provide an enduring framework for water resources management, but it is not a rigid master plan. Five yearly reviews provide the opportunity to re-evaluate developments in the social and economic environments and to adapt approaches to water resources management to suit changing circumstances and needs.

The development of the NWRS brings South Africa into full compliance with one of the first targets of the Johannesburg Plan of Action, adopted at the 2002 World Summit on Sustainable Development, namely to develop national water resource management plans.

Many challenges face water resource managers in ensuring that water supports the transformation of society and the economy, and neither the resources nor the time required to address them should be underestimated. However, building on the outstanding legal foundation provided by the National Water Act, the NWRS will guide the achievement of the common vision of an equitable and sustainable society.

AN OVERVIEW OF THE NATIONAL WATER RESOURCE STRATEGY

Introduction to the National Water Resource Strategy by the Minister of Water Affairs and Forestry

In the introduction the Minister highlights, among other things, the importance of water for equitable and sustainable social and economic development, and gives a summarised overview of some key aspects of the present state of South Africa's water resources.

Chapter 1 - Water policy, water law and water resources management

The relationships between the Constitution, the National Water Policy and the National Water Act are described in this chapter, together with the purposes of the National Water Resource Strategy as -

- The national framework for managing water resources;
- The framework for the preparation of catchment management strategies;
- Provision of water-related information; and
- Identification of development opportunities and constraints.

A brief description is given of the need to manage water resources in an integrated way, and in co-operation with all relevant government institutions, the private sector, water users and other interested and affected persons, and of the contribution that integrated water resources management can make to eradicating poverty and addressing gender issues.

Chapter 2 – South Africa's water situation

This chapter provides aggregated estimates of the present availability of and requirements for water in each of the water management areas, indicates how water availability and water requirements may be expected to change in the future, and describes possible strategies and interventions for achieving a balance between water availability and requirements. Some basic concepts relating to water resources management are explained. See also Appendix D - *Additional Information and Strategic Perspectives with respect to Water Management Areas*, which presents a more detailed analysis of South Africa's water situation by providing present

and future water balance information and possible reconciliation interventions for subdivisions of the 19 water management areas.

Chapter 3 – Strategies for water resources management

The strategies, objectives, plans, guidelines and procedures required to implement the provisions of the National Water Act are described in this chapter. Brief explanations of the requirements of the Act are given to put the strategies, etc, into context. Successive parts of the chapter give information about strategies for the protection of water resources, water use, water conservation and water demand management, water pricing, water management institutions, monitoring and information systems for water resources, and disaster management. The last two parts of the chapter present an indicative programme for the major implementation activities, and the broad financial implications of implementation.

Chapter 4 – Complementary strategies

The chapter includes a broad overview of the ways in which water management capacity can be built among practitioners in the South African water sector, describes the Department's approach to creating awareness and understanding of water issues among water users and other stakeholders, and outlines the Water Research Commission's plans for water research.

Chapter 5 – National planning and co-ordination, and international co-operation in water management

The principal relationships between water resources management strategies and other relevant policies and laws are described in this chapter. The necessity for co-operation among all spheres of government to achieve national development goals is emphasised. The final section of the chapter discusses international co-operation in water matters.

TABLE OF CONTENTS

	Page
INTRODUCTION TO THE NATIONAL WATER RESOURCE STRATEGY	
Ms Buyelwa Sonjica, MP, Minister of Water Affairs and Forestry	1
CHAPTER 1 WATER POLICY, WATER LAW AND WATER RESOURCES	
MANAGEMENT	7
1.1 THE NATIONAL WATER POLICY	7
1.2 THE NATIONAL WATER ACT	7
1.3 THE NATIONAL WATER RESOURCE STRATEGY	8
1.3.1 The purposes of the National Water Resource Strategy	9
The national framework for managing water resources	9
The framework for the preparation of catchment management strategies	9
Provision of information	9
Identification of development opportunities and constraints	9
1.4 INTEGRATED WATER RESOURCES MANAGEMENT	10
The dimensions of integrated water resources management	10
Co-operative planning and management of water resources	11
Integrated water resources management, poverty and gender	11
Notes to Chapter 1	12
CHAPTER 2 SOUTH AFRICA'S WATER SITUATION AND STRATEGIES TO	
BALANCE SUPPLY AND DEMAND	15
2.1 INTRODUCTION	15
2.2 A BROAD PERSPECTIVE ON THE WATER SITUATION	19
2.3 WATER RESOURCES	20
2.4 WATER REQUIREMENTS	28
2.4.1 Current water requirements	28
2.4.2 Future water requirements	33
2.5 STRATEGIES TO BALANCE SUPPLY AND DEMAND	
(RECONCILIATION)	35
2.5.1 Current situation	35
2.5.2 Future perspective	38
2.5.3 Development opportunities	42
2.5.4 Reconciliation interventions	42
2.6 OTHER FACTORS INFLUENCING WATER AVAILABILITY AND	
WATER REQUIREMENTS	50
2.6.1 Land use	50
2.6.2 Climate change	50
2.7 WATER RESOURCES UNDER THE DIRECT CONTROL OF THE	
MINISTER	52
2.7.1 The Reserve	52
2.7.2 Water required for international rights and obligations	52
2.7.3 Water use of strategic importance	52
2.7.4 Contingency to meet projected future growth	52
2.7.5 Reservations for transfer between water management areas	53
Notes to Chapter 2	53

CHAPTER 3	STRATEGIES FOR WATER RESOURCES MANAGEMENT	55
PART 1	PROTECTION OF WATER RESOURCES	56
3.1.1	INTRODUCTION	56
3.1.2	RESOURCE-DIRECTED MEASURES	57
3.1.2.1	A national water resources classification system.....	57
3.1.2.2	Biodiversity conservation	59
3.1.2.3	Classification of water resources, determination of the Reserve and resource quality objectives	59
3.1.3	SOURCE DIRECTED CONTROLS	60
3.1.4	PROTECTION OF GROUNDWATER RESOURCES	60
3.1.4.1	Classification of groundwater resources	61
3.1.4.2	The groundwater Reserve	61
3.1.4.3	Resource quality objectives for groundwater resources	61
3.1.5	WETLANDS	61
Notes to Chapter 3, Part 1		62
PART 2	WATER USE	63
3.2.1	INTRODUCTION	63
3.2.2	WATER USE	63
3.2.3	AUTHORISING WATER USE	64
3.2.3.1	Types of authorisations	64
3.2.3.2	Water use licences	65
3.2.3.3	Water use and the Reserve	66
3.2.3.4	Applications for licences	67
3.2.3.5	Compulsory licensing	67
3.2.3.6	Evaluation of licence applications	68
3.2.3.7	Requirements for licences and licence conditions	69
3.2.3.8	Compliance with conditions of water use	70
3.2.3.9	Review and amendment of licences	70
3.2.3.10	Registration of use	70
3.2.3.11	Verification of existing water use	71
3.2.3.12	Transfer of water use authorisations	71
3.2.3.13	Water use of strategic importance	72
3.2.3.14	Using water for recreational purposes	72
3.2.3.15	Regulations on water use	73
3.2.4	WATER QUALITY	74
3.2.4.1	Implementing source-directed controls	74
Preventing pollution		75
Minimising pollution		75
Remediation		75
Notes to Chapter 3, Part 2		76
PART 3	WATER CONSERVATION AND WATER DEMAND MANAGEMENT	78
3.3.1	INTRODUCTION	78
3.3.2	THE NATIONAL WATER CONSERVATION AND WATER DEMAND MANAGEMENT STRATEGY	78
3.3.3	THE PRINCIPLES OF WATER CONSERVATION AND WATER DEMAND MANAGEMENT	79
3.3.4	SECTORAL STRATEGIES	79
3.3.4.1	Water services	79
3.3.4.2	Agriculture	80
3.3.4.3	Industry, mining and power generation	80
3.3.4.4	Communication, community awareness, education and marketing	81
3.3.5	CONTROL OF INVASIVE ALIEN VEGETATION	81
Notes to Chapter 3, Part 3		82

CHAPTER 3 continued

PART 4	WATER PRICING AND FINANCIAL ASSISTANCE	83
3.4.1	WATER PRICING	83
3.4.1.1	Introduction	83
3.4.1.2	The pricing strategy for water use charges	83
3.4.1.3	Pricing strategy for abstracting and storing water, and stream flow reduction activities	84
3.4.1.4	Charges for waste discharge	84
3.4.1.5	Other components of the pricing strategy	85
3.4.2	WATER USE CHARGES	85
3.4.2.1	Water user sectors	85
3.4.2.2	Setting charges, collecting and disbursing revenue	85
3.4.2.3	Charges for funding water resource management	86
3.4.2.4	Application of water resource management charges	86
3.4.2.5	Charges for funding water resource development and the use of waterworks	87
3.4.2.6	Application of water resource development and use of waterworks charges	88
3.4.2.7	Charges for achieving the equitable and efficient allocation of water ..	89
3.4.2.8	Application of charges for achieving the equitable and efficient allocation of water	89
3.4.3	FINANCIAL ASSISTANCE	89
3.4.3.1	Via the pricing strategy	89
3.4.3.2	Via section 61 of the Act	89
	Notes to Chapter 3, Part 4	90
PART 5	WATER MANAGEMENT INSTITUTIONS	91
3.5.1	INTRODUCTION	91
3.5.2	THE INSTITUTIONAL FRAMEWORK FOR WATER MANAGEMENT	91
3.5.2.1	The Minister of Water Affairs and Forestry	91
3.5.2.2	The Department of Water Affairs and Forestry	92
3.5.2.3	Water management institutions and responsible authorities	93
3.5.2.4	Water management areas	93
3.5.2.5	Catchment management agencies	94
3.5.2.6	Water user associations	96
3.5.2.7	Advisory committees	97
3.5.2.8	Forums	97
3.5.2.9	Institutions for infrastructure development and management	98
3.5.2.10	Institutions for international water management	99
3.5.2.11	Monitoring institutional performance	100
3.5.2.12	The Water Tribunal	100
3.5.3	RELATIONSHIPS AMONG WATER MANAGEMENT INSTITUTIONS	101
	Notes to Chapter 3, Part 5	102
PART 6	MONITORING AND INFORMATION	103
3.6.1	INTRODUCTION	103
3.6.2	MONITORING SYSTEMS	103
3.6.2.1	Surface water - flow monitoring	104
3.6.2.2	Surface water - water quality monitoring	105
3.6.2.3	Groundwater monitoring	105
3.6.2.4	Resource requirements for monitoring	106
3.6.3	INFORMATION SYSTEMS	106
3.6.3.1	Surface water hydrology	106
3.6.3.2	Water quality	107
3.6.3.3	Groundwater	107
3.6.3.4	Water use registration and authorisation	107
	Note to Chapter 3, Part 6	108

CHAPTER 3 continued

PART 7	DISASTER MANAGEMENT	109
3.7.1	INTRODUCTION	109
3.7.1.1	Water-related disasters	109
3.7.2	NATIONAL DISASTER MANAGEMENT POLICY AND LEGISLATION ...	110
3.7.2.1	The White Paper on Disaster Management	110
3.7.2.2	The National Disaster Management Act	110
3.7.3	THE DEPARTMENT'S ROLE IN DISASTER MANAGEMENT	111
3.7.3.1	Disaster management planning	111
3.7.3.2	Floods	111
3.7.3.3	Dam safety	112
3.7.3.4	Droughts	113
3.7.3.5	Pollution of water resources	113
3.7.3.6	Information for disaster management	114
3.7.3.7	Departmental disaster management structures	115
	Notes to Chapter 3, Part 7	115
PART 8	ANTICIPATED PROGRAMME OF IMPLEMENTATION ACTIVITIES	117
3.8.1	INTRODUCTION	117
3.8.2	OPERATIONAL ACTIVITIES	117
3.8.2.1	Routine operational activities	117
3.8.2.2	Commissioning / establishment activities	117
	Compulsory licensing	118
	Establishment of catchment management agencies	119
	Delegation of functions and transferring infrastructure to water management institutions	120
	Establishment of new water user associations	122
	Expansion of monitoring networks	122
	Development of information systems	122
3.8.3	INTERNATIONAL WATER-SHARING AGREEMENTS	123
3.8.4	DEVELOPMENT OF PHYSICAL INFRASTRUCTURE	123
3.8.4.1	Major government waterworks	123
	Schemes intended primarily for irrigation purposes	124
	Schemes intended primarily for domestic, urban, industrial or mining purposes	124
PART 9	FINANCIAL IMPLICATIONS	129
3.9.1	INTRODUCTION	129
3.9.2	OPERATING COSTS	129
3.9.2.1	Routine operational activities	129
3.9.2.2	Commissioning / establishment activities	129
3.9.2.3	Total operating costs	130
3.9.3	CAPITAL COSTS	130
3.9.3.1	New government waterworks	130
3.9.3.2	Expansion of national monitoring networks	132
3.9.3.3	Other capital expenditure	132
3.9.3.4	Total capital costs	132
3.9.4	EXISTING FUNDING	132
3.9.4.1	Revenues from water use charges - the Water Trading Account	132
3.9.4.2	Donor funding	133
3.9.5	FUTURE FUNDING ARRANGEMENTS	133
3.9.5.1	Operational activities	133
3.9.5.2	Infrastructure development	133
3.9.6	CONCLUSION	134
	Note to Chapter 3, Part 9	135

CHAPTER 4	COMPLEMENTARY STRATEGIES	136
4.1	INTRODUCTION	136
4.2	CAPACITY BUILDING IN THE WATER SECTOR	136
4.3	PUBLIC CONSULTATION, EDUCATION AND AWARENESS CREATION	137
4.3.1	Public consultation	137
4.3.2	The Water Education Programme	138
4.3.3	Communication	138
4.4	WATER RESEARCH	138
	Note to Chapter 4	140
CHAPTER 5	NATIONAL PLANNING AND CO-ORDINATION, AND INTERNATIONAL CO-OPERATION IN WATER MANAGEMENT ..	141
5.1	INTRODUCTION	141
5.2	THE FRAMEWORK OF EXISTING RELEVANT GOVERNMENT POLICY	141
5.3	SPECIFIC REQUIREMENTS OF OTHER NATIONAL LEGISLATION	142
5.3.1	The Water Services Act, 1997	142
5.3.1.1	Alignment of water resources management and water services provision activities	142
5.3.1.2	Water services development plans	142
5.3.1.3	Regulations under the Water Services Act	143
5.3.1.4	Water services tariffs	143
5.3.2	Environmental legislation	143
5.3.2.1	Consolidated environmental implementation and management plan ..	144
5.3.2.2	Integrated environmental management framework	144
5.3.2.3	Environmental reporting	144
5.3.2.4	Management of waste disposed onto land	145
5.3.3	National disaster management legislation	145
5.3.4	Public Finance Management Act, 1999	145
5.3.5	Promotion of Access to Information Act, 2000	146
5.3.6	Promotion of Administrative Justice Act, 2000	146
5.4	INTER-GOVERNMENTAL PLANNING	146
5.5	NATIONAL PROGRAMMES	147
5.5.1	The Integrated Rural Development Programme	147
5.5.2	The Urban Renewal Strategy	148
5.6	INTERNATIONAL CO-OPERATION IN WATER MATTERS	148
5.6.1	Water sharing arrangements with neighbouring states	148
5.6.2	Co-operation in the Southern African Region	149
5.6.3	Other international relationships and interactions	150
5.6.4	International donor co-operation	150
	Notes to Chapter 5	150
FIGURES		
Figure 2.1	Rainfall and evaporation	16
Figure 2.2	Location of water management areas and inter-water management area transfers	17
Figure 2.3	Comparison of the mean annual runoff (MAR), population and economic activity (GDP) per water management area	19
Figure 2.4	Sectoral contributions to the GDP (1997)	32
Figure 2.5	Formal employment per sector (1994)	32
Figure 2.6	Diagrammatic presentation of anticipated population growth (RSA total)	34
Figure 3.5.1	Water management areas	94
Figure 3.8.1	Indicative programme for compulsory licensing	119
Figure 3.8.2	Indicative programme for establishing catchment management agencies	120
Figure 3.8.3	Indicative programme for delegating operation and maintenance functions to water user associations	121
Figure 5.1	Water-related planning in the national planning framework	147

TABLES

Table 2.1	Natural mean annual runoff and the ecological Reserve (million m ³ /a).....	23
Table 2.2	Available yield in year 2000 (million m ³ /a)	25
Table 2.3	Water requirements for the year 2000 (million m ³ /a)	29
Table 2.4	Reconciliation of requirements for and availability of water for year 2000 (million m ³ /a)	36
Table 2.5	Reconciliation of requirements for and availability of water for year 2025 base scenario (million m ³ /a)	39
Table 2.6	Reconciliation of requirements for and availability of water for year 2025 high scenario (million m ³ /a)	40
Table 3.8.1	Indicative programme for international water sharing agreements	123
Table 3.8.2	Possible future large scale water resource developments, primarily for irrigation purposes	126
Table 3.8.3	Possible future large scale water resource developments, primarily for domestic, urban, industrial or mining purposes	127
Table 3.9.1	Indicative costs of major government water schemes	131

BOXES

Box 2.1	Yield, reliability and available water and assurance of supply	21
Box 2.2	Water quality	26
Box 2.3	Groundwater	27
Box 2.4	Reconciliation of information given in the NWRS with information published previously	31
Box 2.5	Volumetric considerations in transferring water between catchments	37
Box 2.6	Planning interventions to balance supply and demand	43
Box 2.7	Priorities for allocating water	46
Box 2.8	Water for food security	47
Box 2.9	Inter-catchment transfer of water	48
Box 2.10	Climate change	51
Box 3.1.1	Determinations and preliminary determinations of the Reserve	60
Box 3.2.1	Water for productive livelihoods	66
Box 3.2.2	Development of solutions to balance water requirements and water availability	68
Box 3.4.1	Water use charges and Inter-catchment transfers of water	87

APPENDICES

A	FUNDAMENTAL PRINCIPLES AND OBJECTIVES FOR A NEW WATER LAW FOR SOUTH AFRICA	A.1
B	National Water Act: Chapter 1 - Interpretation and Fundamental Principles (Section 2 - Purpose of the Act; Section 3 - Public trusteeship of nation's water resources)	B.1
C	National Water Act: Chapter 2 - Water Management Strategies; Part 1 - National Water Resource Strategy (sections 5-7)	C.1

APPENDICES continued

D ADDITIONAL INFORMATION AND STRATEGIC PERSPECTIVES WITH RESPECT TO WATER MANAGEMENT AREAS

The rationale behind Appendix D	D.1
Water Management Area 1: Limpopo	D1.1
Water Management Area 2: Luvuvhu/Letaba	D2.1
Water Management Area 3: Crocodile West and Marico	D3.1
Water Management Area 4: Olifants	D4.1
Water Management Area 5: Inkomati	D5.1
Water Management Area 6: Usutu to Mhlathuze	D6.1
Water Management Area 7: Thukela	D7.1
Water Management Area 8: Upper Vaal	D8.1
Water Management Area 9: Middle Vaal	D9.1
Water Management Area 10: Lower Vaal	D10.1
Water Management Area 11: Mvoti to Umzimkulu	D11.1
Water Management Area 12: Mzimvubu to Keiskamma	D12.1
Water Management Area 13: Upper Orange	D13.1
Water Management Area 14: Lower Orange	D14.1
Water Management Area 15: Fish to Tsitsikamma	D15.1
Water Management Area 16: Gouritz	D16.1
Water Management Area 17: Olifants/Doring	D17.1
Water Management Area 18: Breede	D18.1
Water Management Area 19: Berg	D19.1
E Water Management Areas	E.1
F Public Consultation	F.1
G Document List (in preparation)	G.1

INTRODUCTION TO THE NATIONAL WATER RESOURCE STRATEGY

Ms Buyelwa Sonjica, MP
Minister of Water Affairs and Forestry

Background

As it flows through the landscape water brings a variety of benefits to a range of users. It sustains us and our families; it waters the wide fields of commercial farmers; it nurtures the crops and stock of rural communities; it provides recreation for our children; it supports power generation and our mines and industry; and it nourishes the plants and animals that make up our ecosystems.

Water gives life. The amount and nature of the available water determines the extent and nature of that life and dictates where development can take place. South Africa's water belongs to its people, but it is the task of government to care for this water, to seek its fair distribution and to facilitate its wise use for, among other things, social and economic development and transformation. Such development is crucial to ensure that we can eradicate the scourge of poverty that stalks our land. Under apartheid, development benefited a small white minority while black townships and homelands were under-resourced and underdeveloped – these are the areas where poverty is most intense today.

When the first democratically elected government came to power in our country in 1994 it put forward as its manifesto the Reconstruction and Development Programme. This initiative was based on the fundamental concept that people who are affected by decisions should take part in making them, and it set out five key programmes: meeting basic needs; developing our human resources; democratising the State and society; building the economy; and implementing the Reconstruction and Development Programme. Water is an essential ingredient in each of these programmes.

The Constitution of the Republic of South Africa (1996) contains both our Bill of Rights and the framework for government in South Africa. Two provisions of the Bill of Rights are particularly relevant to the management of water resources. These are sections 27 and 24, which state that-

- Everyone has the right to have access to, among other rights, sufficient food and water, and the State must take reasonable legislative and other measures, within its available resources, to achieve the progressive realisation of these rights.
- Everyone has the right to an environment that is not harmful to their health or wellbeing, and to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation, promote conservation, and secure sustainable development and use of natural resources while promoting justifiable economic and social development.

These two documents – the Reconstruction and Development Programme and the Constitution – provided the impetus for a complete review and revision of the policy and law relating to water, and resulted in the development of the National Water Policy for South Africa (1997) and the National Water Act (1998). The Policy and the Act are founded on the principles of equity, sustainability and efficiency, each of which is important for different reasons.

- **Equity**

South Africa's previous water legislation, the 1956 Water Act, was not in itself racist in the way that the 1913 Land Act was. However, access to water for productive purposes was tied to land. The riparian system enshrined in the former Act gave access to water mainly to those across or alongside whose land it flowed, or under whose land it was found. Since access to land was determined along racial lines under the apartheid system, access to water was thus similarly determined by skin colour.

This has given rise to what is perhaps the most important challenge facing our water managers, which is the need to introduce equity in resource distribution. Too many of our people are poor. The goals of sustainability and efficiency cannot be divorced from this, and neither can the responsibility of all South Africans to share water and to use it well. We are now equipped with the legal mechanisms that allow us to reallocate resources from those who have been favoured by history to those who have been neglected. But at the same time we have to consider the complex linkages that exist between the benefit to society, the state of the environment and the needs of the economy - the lifeblood of the country has to be maintained. Water is one obvious tool for the eradication of poverty, providing a way for the poorest of our people to survive and make a living, a burden that so often rests upon women in society. It is the responsibility of the Department of Water Affairs and Forestry to ensure that South Africans use water resources wisely in the country's search for social justice. At the same time, the competing needs and demands of industry, agriculture, cities and ordinary people all need to be catered for, now and in the future. The National Water Resource Strategy sets us on this path.

South Africa is moving slowly from a patriarchal society to one in which women are encouraged to take their rightful role as equals alongside men. The National Water Act requires the government to address the issues of gender inequity in water as much as it must address inequity arising from race or disability.

- ***Sustainability***

Over the past few decades we have increasingly come to understand the interdependence between humankind and ecosystems, and that our activities often affect the quality and quantity of available water. We have also increasingly recognised our obligation to protect the natural environment, while at the same time promoting development that will meet the needs of not only current generations, but of future generations as well.

- ***Efficiency***

South Africa is a water-scarce country. Our average annual rainfall is a little more than half of the world average, and much of our country is semi-arid. Across most of the country the potential evaporation is higher than the rainfall. Our land is vulnerable to floods and droughts and all of us have shared the horror of floodwaters sweeping away people, houses and roads. We have also shared with our farmers and our rural communities the bitter longing for rains that never seem to come. Our water resources are limited and it is essential that we use them efficiently and in the best interests of all our people.

Integrated water resources management

The three principles of equity, sustainability and efficiency come together in the field of water resources management to achieve integrated water resources management. As enshrined in the National Water Act, integrated water resources management is intended to enable us to meet the needs of our people for water, jobs and economic growth in a manner that also allows us to protect and, where necessary, rehabilitate our aquatic ecosystems. Above all, integrated water resources management will make it possible for us to use our precious water to assist in addressing the overwhelming need to eradicate poverty and remove inequity in South Africa.

The National Water Resource Strategy sets out the ways in which we aim to achieve integrated water resources management in South Africa. It describes the policies, strategies, plans and procedures by which this will be done. It is a remarkable document, the first of its kind in South Africa. It is intended to be a living and interactive document that will continue to grow and change as the needs, capacities and understanding of our people change and grow.

State of the nation's water resources

Our understanding of our water resources is continually expanding. A wide range of institutions and individuals continue to contribute to this core of knowledge. We will be publishing a report on the state of the nation's water resources when the data has been compiled, but in the

meantime non-availability of this information makes it difficult for South Africans to gauge where the country currently stands. We read in the newspapers about pollution problems in our rivers, about dams overflowing, clean-up campaigns, cholera and conservation issues. We hear about potential water shortages, about invasive alien species drying up our water. And perhaps we wonder what the meaning of all this is.

- ***We have enough water***

Firstly, we have enough water to meet our nation's needs for the foreseeable future. But we need to use that water sparingly, and we must reduce and avoid pollution. We need to be conscious of the fact that we live in a water-scarce country. We must remain conscious of the fact that in situations of water scarcity the poor are generally the ones who feel the pinch hardest. Indeed, even in situations where water is abundant, the poor often experience scarcity through the lack of infrastructure to bring the water to where it is needed. We are not on the point of running out of water, but we have to use our limited water supplies more efficiently and effectively.

Water use in South Africa is dominated by irrigation, which accounts for around 62 per cent of all water used in the country. Domestic and urban use accounts for about 27 per cent, while mining, large industries and power generation account for some 8 per cent. Commercial forestry plantations account for a little less than 3 per cent of total use by reducing runoff into rivers and streams.

South Africa's rivers are small in comparison with those in many other countries. The Orange River carries only about 10 per cent of the volume of water flowing down the Zambezi River and about 1 per cent of the flow in the Congo River. The total average annual surface runoff of a little more than 49 000 million cubic metres of all our rivers combined is less than half of the Zambesi's annual flow. Furthermore, many of our larger rivers, such as the Orange/Senqu and the Limpopo, are shared with other countries.

A recent high-level analysis by my Department showed that in the year 2000, 10 of the 19 water management areas in the country were facing a water deficit. In other words, in these catchments people are using so much water that either the ecosystems have been placed under severe stress or other users cannot rely on getting their fair share. We will have to take action to bring water use in these catchments back to within sustainable availability levels, that is, to balance the demand for water with supply. The main tools for doing so include increased water use efficiency, removal of infestations of invasive alien vegetation (which, like afforestation, also reduce runoff), the development of additional infrastructure such as dams and inter-basin transfer systems to store water and bring it from areas of surplus to areas experiencing shortages, promotion of water trading and the reallocation of water use by compulsory licensing. We will also have to deal with localised areas of water stress in otherwise well-resourced water management areas.

If we look forward to the year 2025, even if we factor in further infrastructure development, we find that several additional water management areas will most likely be in a situation of water deficit. Infrastructure development is an expensive option, and for this reason improvements in the efficient use of currently available water resources must be given priority.

Development needs to be encouraged in those catchments where there is still water available for use. In order to facilitate such development, the Department has published general authorisations that enable water use to take place, under specified conditions, without a licence having to be issued.

- ***Water quality***

Just as planning and management take place to supplement water in areas of scarcity, they are also applied to the improvement of water quality. For example, irrigation water in the fertile valleys of the Eastern Cape used to be too little and too saline to make the most of the area's

agricultural potential. To address this shortcoming, the Department has, since 1976, been transferring water from the Orange River to the Eastern Cape via the Orange-Fish Tunnel. The increased availability of good-quality water and the resultant reduction in salinity has proved to be of tremendous benefit to economic growth and job creation in the area.

In other parts of the country water quality poses considerable problems and cannot be resolved so easily. For instance, although only 2 per cent of water reaching the Vaal Dam comes from the Waterval catchment of the Highveld, an area of intensive mining, industry, power generation and other uses, that small percentage is responsible for 12 per cent of the pollution in the dam. The Vaal Dam provides water for domestic purposes for around 10 million people and, because of the pollution, treatment costs are high.

In a similar manner, on a daily basis across the country, organisations and individuals impact on the water quality in our rivers and streams, our groundwater and our wetlands.

Salinity

Mining and irrigation affect the salinity (the amount of dissolved salts in the water) of our water resources and reduce the quality of water. The Vaal and Harts rivers are affected by agricultural irrigation, but high salinity may also be the natural result of catchment geology, such as in the Fish River in the Eastern Cape, which flows through the saliferous Karoo region, or the Breede River in the Western Cape.

Eutrophication

Water quality is also affected by eutrophication, the enrichment of the water, particularly in dams but also in rivers, by nutrients such as phosphates and nitrates. A high nutrient concentration in combination with light and warm temperatures promotes the growth of algae. One species, the cyanobacteria or blue-green algae, which causes a toxic scum, poses a particular problem. Algae increase the cost of water purification and are a physical threat to treatment plants as they clog filters and pumps, while reducing the carrying capacity of pipelines and canals. The main sources of nutrients are fertilisers used in the agricultural sector and poorly maintained sanitation systems. It can take decades to reverse eutrophication in a dam, since phosphates settle into the sediment and are released back into the water when conditions are right, resulting in renewed algal bloom. The Middle Vaal River and the Hartbeespoort, Inanda, Laing and Bridlesdrift dams are all affected by eutrophication.

Bacteriological contamination

Bacteriological contamination, which arises not only from the absence of or the poor maintenance of sanitation facilities, but also from livestock defecation entering rivers and streams, is widespread in the country. The consumption of untreated water is one of the main sources of disease in South Africa.

Other contamination

Localised pollution also takes place in urbanised and industrialised areas. Pollutants may range from conservative inorganic materials (typically, salts which remain in the water because they are not broken down by natural biological processes) to metal and/or organic compounds (such as pesticides) some of which may be biodegradable.

The challenge that faces us as a country is to promote socio-economic development while maintaining a water quality that is at all times still fit for use, and for the proper ecological functioning of aquatic ecosystems. Another challenge lies in the protection of our aquatic ecosystems.

- ***The ecological state of rivers in South Africa***

The River Health Programme, through its State of Rivers initiative, collects stores and interprets river health data in a systematic and quality-controlled manner. The interpretation of river health information permits different river health categories, such as natural, good, fair or poor, to be

allocated to each section of the river. This system enables the comparison of the health of one river or section of a river with that of another.

If a river is described as “natural” it means that it is relatively unaffected by human activities, and its in-stream and riparian habitats and associated biota show minimal modification. Such natural systems are important for the conservation of biodiversity and for providing a benchmark of what “natural” really looks like. A river in a poor state is usually characterised by high human impacts or direct exploitation. This often results in a decline in habitat diversity with only the most tolerant species still present. Often such species have diseases and their population dynamics have been disrupted - that is, they can no longer breed - or alien species have invaded the ecosystem. Poor river health is regarded as unacceptable from a resource management perspective and requires management intervention to restore flow patterns, river habitats and water quality.

Very few rivers in South Africa qualify as truly natural systems, and many of them are located in protected areas such as national or provincial parks and wilderness areas. However, even the lower reaches of a river that flows through a protected area may be impacted by upstream developments that fall outside the protected area, as is the case for most of the rivers flowing through the Kruger National Park.

By August 2002 six river systems, which represent a reasonable sample of typical South African rivers, had been surveyed in four provinces under the River Health Programme. If the results of these surveys are extrapolated to indicate the overall health of rivers in South Africa, the generalised picture is as follows: 11 per cent of rivers are in a natural state; 26 per cent are in a good state; 32 per cent are in a fair state; and 31 per cent are in a poor state. The distribution of health categories between rivers varies considerably. For example, approximately 50 per cent of the Sabie-Sand river system (Mpumalanga and Limpopo Provinces) is in a natural to good state, whereas only 13 per cent of the Modder River (Free State Province) remains in a natural to good state.

Experience to date has highlighted the following factors as being the most common threats to the health of our rivers -

- *Over-utilisation of riparian zones.* This impairs the ability of riparian buffer zones to filter nutrients and sediment before they enter a river, to provide habitat and migration options for many species, to stabilise river banks and to act as a flood control mechanism.
- *Alien species of fauna and flora.* This includes aquatic species such as trout and terrestrial species such as wattle trees.
- *Regulation of flows and water abstraction.* Dam walls and weirs act as barriers to the natural movement of fish and other aquatic species. Regulated flows that do not mirror natural seasonal variations have an impact on the resilience of river systems. Reduced water levels reduce diversity and the availability of aquatic habitats.

International rivers

Rivers do not respect political boundaries. Many cross national boundaries (trans-boundary rivers) and some form the boundary between countries (contiguous rivers). South Africa shares four major river systems with neighbouring countries:-

- The Orange/Senqu system is shared with Lesotho (trans-boundary) and Namibia (contiguous).
- The Limpopo River is shared with Botswana and Zimbabwe (contiguous) and Mozambique (trans-boundary).
- The Incomati system is shared with Swaziland and Mozambique (trans-boundary)
- The Usutu/Pongola-Maputo system is shared with Mozambique and Swaziland (trans-boundary).

The Revised Protocol on Shared Watercourses in the Southern African Development Community provides the framework for the management of these rivers, whilst the National Water Act gives international requirements a priority that is second only to basic human needs and the ecological Reserve.

Conclusion

The Department of Water Affairs and Forestry is the custodian of the nation's water resources. The challenge before us is to manage these resources in a manner that promotes equity, sustainability and efficiency. In particular, we must harness our water resources in the battle against the inequality, poverty and deprivation that continue to plague our nation. The National Water Resource Strategy sets out our plans to achieve this. It is an ambitious document dealing with an ambitious project. But South Africans have proved time and time again that they can rise to the biggest challenges. This is a challenge that all South Africans must rise to, together.