
Department of Water Affairs and Forestry

Chapter 23

Water Affairs and Forestry

South Africa is a water-stressed country where water planners and managers are faced with increasingly complex issues.

The country is largely semi-arid and prone to erratic, unpredictable extremes in the form of droughts and floods. Water is most abundant in the geographically small escarpment areas, which run in a narrow strip from the north-east of the country down the eastern and southern seaboards, remote from the major demand centres in the hinterland. Many large storage dams have been constructed to regulate the natural variable flow of rivers and to facilitate water transfers between catchments.

Rivers are the main source of water in South Africa. Country-wide, the average annual rainfall is about 500 mm, compared to a world average of about 860 mm. On average, only some 9% of rainfall reaches the rivers as run-off. Sixty-five percent of the country receives less than 500 mm, which is generally accepted as the minimum required for successful dry-land farming. Twenty-one percent of the country, mainly in the arid west, receives less than 200 mm a year.

The Orange River Basin is the largest river basin in South Africa with a total catchment area of 1 million km^2, almost 600 000 km^2 of which is inside South Africa, the remainder being in Lesotho, Botswana and Namibia.

On average, South African rivers receive about 50 billion m^3 of water per annum with a further 6 billion m^3 available from underground aquifers. This translates into 1 400 kilolitres on average per person per annum. Of this 56 billion m^3, 21 billion is utilised. Of this volume, 52% is used for agriculture and irrigation, 4% for forestry, 4% for industry, 10% for domestic use, with 19% allocated to ensure a sustainable environment.

Apart from erratic rainfall and the low ratio of run-off, which affects the reliability and variability of river flow, the average annual potential evaporation is higher than the rainfall in all but a few isolated areas where rainfall exceeds 1 400 mm per year. Only about 32 000 million kilolitres of the annual run-off can be economically exploited using current methods. Usable run-off is further reduced by land uses such as commercial afforestation and sugar cane, and by high evaporative losses from the numerous storage dams throughout the country.

◀ By July 2002, 24 local municipalities had implemented the Free Basic Water Policy, ensuring that three million people gained access to free basic water, bringing the total of people with access to this service to 27 million.

Farm dams, of which there are a large number, can seriously reduce the flow of rivers and streams during the dry season and also delay the run-off water at the onset of the rainy periods.

Furthermore, rainfall, and to a greater extent run-off, is poorly distributed in relation to the areas of greatest economic activity. Accordingly, water is transported over great distances from areas of relative abundance to areas of increasing demand. For instance, water supplies in the populous and economically important industrial hub in Gauteng are supplemented by transfers from the better-watered east.

The aim of the Department of Water Affairs and Forestry is to ensure the availability and supply of water on a national level and to promote forestry development.

Major dams of South Africa

	Full Supply Capacity ($10^6 m^3$)	River
Gariep	5 340	Orange
Vanderkloof	3 171	Orange
Sterkfontein	2 616	Nuwejaarspruit
Vaal	2 603	Vaal
Pongolapoort	2 445	Phongolo
Bloemhof	1 240	Vaal
Theewaterskloof	480	Sonderend
Heyshope	451	Assegaai
Woodstock	380	Tugela
Loskop	361	Olifants
Grootdraai	354	Vaal
Kalkfontein	318	Riet
Goedertrouw	304	Mhlatuze
Albert Falls	288	Mgeni
Brandvlei	284	Brandvlei
Spioenkop	277	Tugela
Umtata	253	Mtata
Driekoppies	250	Lomati
Inanda	241	Mgeni
Hartbeespoort	212	Crocodile
Erfenis	207	Groot Vet
Rhenosterkop	204	Elands
Molatedi	200	Groot Marico
Ntshingwayo	198	Ngagane
Zaaihoek	192	Slang
Midmar	175	Mgeni

Source: Department of Water Affairs and Forestry

The past few years have seen a number of achievements in the management of water resources in South Africa, and the implementation of the internationally acclaimed National Water Act, 1998 (Act 36 of 1998).
Other key achievements include:

- developing conservation and demand management strategies for the industrial, agricultural and domestic sectors
- environmental awareness, learning, communication and networking through the school-based approach and broader public programmes
- promoting water conservation and integrated water resource management
- developing resource learning and support material
- continued collaboration with the Department of Education at all levels, specifically on the National Environmental Education Programme
- launching the Women in Water Awards
- integrating water-related issues in the outcomes-based curriculum
- a formal networking, consultation and communication strategy
- the pilot cholera education project
- links with national and international partners and role-players
- reaching 5 517 schools through an integrated approach to environmental learning
- continued participation in the United Nations Habitat Co-ordinated Water for African Cities project at various levels
- registering significant abstract uses of raw water for the proper management of scarce water resources, and for the implementation of the national pricing strategy as promulgated in 1999
- developing the licensing system for all Section 21 water uses
- introducing the new raw-water pricing strategy on government water schemes and developing a pricing strategy for waste discharges
- developing strategies to deal with the impact on water quality of mining and industrial developments, and dense settlements and an environmental assessment tool

- creating 20 000 work opportunities through the Working for Water Programme and developing strategies to provide general and financial support to small-scale and emerging farmers.

Water for all

According to the Constitution of South Africa, 1996 (Act 108 of 1996), it is every person's right to have access to clean water.

Implementing Sustainable Water Services Institutions Programme (ISWIP)

The ISWIP is a selection of pilot projects to investigate various institutional arrangements for the provision of water services, specifically in rural areas. Projects are under way in KwaZulu-Natal, Eastern Cape, Limpopo (formerly the Northern Province) and Mpumalanga. Valuable lessons learnt are being used as input for designing the institutional development parts of the *Masibambane* Programme.

Late in November 2000, the European Union (EU) committed about 75 million Euros (by May 2002, roughly R750 million) for water and sanitation projects in three provinces in South Africa. Close to 2,4 million people from Limpopo, the Eastern Cape and KwaZulu-Natal stood to benefit. The donation would be added to government funds and bring the amount allocated for supplying water and sanitation over the next three years to R2,2 billion. The project, dubbed *Masibambane* (a Zulu word meaning 'let us work together') started on 1 April 2001. The contribution was intended for infrastructural and policy development as well as institutional support to various levels of government. The first phase was valued at around R301 million, and the remainder would be subject to a positive review of the first phase. A sanitation strategy has been developed to fast-track sustainable sanitation service delivery in the country based on a study carried out in these three provinces.

Information

In March 2002, the Community Water Supply and Sanitation Programme of the Department of Water Affairs and Forestry was presented with first prize in the prestigious Water Globe Awards for 2002 in Linz, Austria. The Award included a cash prize of 10 000 Euro (R100 000) and a trophy.

More than 90 countries took part in the competition.

The Water Globe Award recognises and aims to promote innovation and intelligence in water projects that embody equitable access, sustainable development and efficiency. The South African Programme delivered water and sanitation to millions of South Africans and over 430 000 employment opportunities have been created. Over half of these have gone to women.

Community Water Supply and Sanitation (CWSS) Programme

The Department of Water Affairs and Forestry's CWSS Programme was initiated in 1994 to achieve the constitutional objective of ensuring that all South Africans have access to sufficient water and a healthy living environment, with the focus on rural areas.

One aim of the CWSS Programme is to capacitate local government and promote the sustainability of water-services projects.

The Department of Water Affairs and Forestry has provided access to clean safe water to approximately 7,068 million people in rural areas at a cost of R4,5 billion.

In 2002, 90% of rural projects had been identified and prioritised in the Integrated Development Planning process.

By the end of 2002, over one million people who previously had no access to safe clean water benefited from the CWSS.

Expenditure on the basic need of water supply and sanitation reached an all-time high of R1,215 billion in 2002/03. This included a contribution of R197 million from the international donor community. A further R137 million has been earmarked for institutional development at local government level.

This money will be used to provide a further one million people with access to basic water infrastructure and build toilets for approximately 150 000 households and the eradication of the 'bucket system' in some 21 980 households.

At the current rate of spending, the infrastructure backlog for basic water supply will be wiped out by 2008 and the backlog for sanitation by 2010.

Information

Since 1994, more than seven million people have been provided with a basic supply of water, at an average once-off cost of about R642 per person. Based on the current trend, more than eight million people will receive water services before April 2003.

Construction has been completed on 354 water-supply projects creating 414 000 temporary jobs. Sixty water schemes have been transferred to local governments or communities.

Health and hygiene education benefited 420 000 people and between 1997 and 2002, 24 pilot projects provided a total of 52 300 toilets. Cabinet has approved a 10-year programme for the elimination of the sanitation backlog.

Information

In November 2000, the Minister of Water Affairs and Forestry, Mr Ronnie Kasrils, signed a partnership agreement with Roundabout Outdoor and the United States' Kaiser Family Foundation for the installation of 100 merry-go-rounds, which use the energy of children at play to pump water to rural communities.

Water tanks are installed a few metres away from the play pumps sporting HIV/AIDS prevention messages aimed specifically at young women who frequently collect water for their households. In addition to HIV/AIDS messages, the tanks carry paid advertising by companies such as Unilever, ColgatePalmolive and Telkom, which covers the cost of maintaining the play pumps.

In 2001, play pumps were installed in 40 rural villages throughout South Africa. The Kaiser Family Foundation donated $250 000 in 2001 to install an additional 60 play pumps country-wide.

Tapping the energy of children at play, the pumps can generate some 1,400 litres of water per hour, saving young women time and energy they would otherwise have spent walking to and from more remote water resources.

The play pumps also help prevent diseases such as cholera that can stem from open-water supplies.

Free basic water

The Free Basic Water Policy was launced in July 2001. By July 2002, 24 local municipalities had implemented the Free Basic Water policy. This ensured that three million people gained access to free basic water, bringing the total of people with access to this service to 27 million.

The outstanding 70 municipalities have been targeted and provided with support to ensure that they implement the Policy as soon as possible.

The number of residents in provinces with access to water infrastructure are as follows:

- Eastern Cape (45%)
- Free State (87%)
- Gauteng (92%)
- KwaZulu-Natal (90%)
- Limpopo (40%).
- Mpumalanga (59%)
- Northern Cape (54%)
- North West (66%)
- Western Cape (100%).

An intensive communication drive to make the general public aware of the roll-out of the Policy, and to provide optimum support to local government to implement the policy was implemented in 2001. A total of 120 local government workshops were conducted and approximately 2 500 people attended.

Water policy

South Africa is developing a multidisciplinary approach to managing the country's scarce water-resources, based not only on technical considerations, but also on economic, social, political and environmental considerations. This new approach to integrated water-resources management is enshrined in the National Water Resources Strategy, which was released in August 2002 for public comment.

The Strategy outlines the framework for water resources management as required by the National Water Act, 1998 and describes, among other things, how the government intends to implement water-resources protec-

tion measures. These measures are already being implemented and refined in the operational environment, and include the determination of ecological flow requirements – the Reserve – for aquatic eco-systems and basic human needs, as a standard prerequisite before authorising any other water use.

The Strategy describes provisions for water-resource protection, water use and how it will be authorised, water conservation and demand management, water pricing, the institutional arrangements for water-resource management, infrastructure development, monitoring and information systems and public safety in water matters.

Information

National Water Week 2002 was celebrated from 18 – 24 March under the banner *Our Water Feeds the Nation's Needs*.

The campaign aimed to highlight and bring into sharp focus the various problems and needs South Africa faces in terms of water as well as global concerns.

The theme emphasised the key areas of:

- water for food
- access to water supply and sanitation
- water, sanitation and hygiene awareness
- water conservation.

The key events during the week were:

- National Water Week was launched in Ladysmith on 18 March. The launch was part of a wider cholera awareness campaign that targeted cholera-affected areas during the Week. The campaign involved 56 road shows.
- The Ladysmith event marked the start of the WASH (Water, Sanitation and Hygiene for All) campaign in South Africa. South Africa joined the United Nations Water Supply and Sanitation Collaborative Council in a global alliance to make safe water, sanitation and hygiene a reality for all people on earth. The campaign focuses on the simple act of washing hands after going to the toilet, before handling food or eating. Just washing hands has been shown to reduce illness and death from water-borne disease by as much as 40%. The campaign will involve the distribution of soap, educational material and industrial theatre.
- The Women in Water Awards were also launched during Water Week 2002. The Awards, which are to be an annual event, are aimed at acknowledging the contributions of women in the fields of research, policy management and community development in the water sector.
- Minister Kasrils officially opened the Inyaka Dam near Bushbuckridge on 22 March. It will assure water supply to about 500 000 people in the Bushbuckridge area who were left without water supply when the rivers dried up during the 1992 drought. Water will be provided for the irrigation of some 2000 hectares of land, which were taken out of production due to water shortages, thereby stimulating economic development and job creation. The Dam will also meet the environmental needs in downstream Kruger National Park as well as South Africa's water commitments to Mozambique.
- On 19 March, the Minister launched the Dense Settlements Programme Report. The Report contains, among other things, case studies and lessons learnt from a three-year programme that was aimed at improving waste management systems and implementing sustainable pollution management.

Policy Review Process Leading to a Revised White Paper

The new local government and municipal financial arrangements, together with lessons learnt during the past seven years, have called for the need to revise the 1994 *White Paper on Water Supply and Sanitation*. A discussion paper has been developed to initiate discussion and debate on key policy issues and policy proposals for consideration. This document, called *Towards a Water Services White Paper – Issues and Options Discussion Paper,* was published for public comment in 2002. As part of the consultation process, regional workshops and bilateral meetings with key stakeholders were run to solicit comments, ideas and views on issues to be included in the new *White Paper on Water Services*. The Department of Water Affairs and Forestry tabled the *Draft White Paper on Water Services* in October 2002.

Water Services Act, 1997 (Act 108 of 1997)

The Water Services Act, 1997 aims, among other things, to

- ensure and define the rights of access to basic water supply and basic sanitation services
- set out the rights and duties of consumers and those who are responsible for providing services

- allow the Minister of Water Affairs and Forestry to set national standards (including norms and standards for tariffs) to ensure sufficient, continuous, affordable and fair water services
- promote the effective and sustainable use of financial and natural resources
- regulate contracts for the provision of water services to promote their fair and transparent provision
- create effective and financially viable statutory institutions to assist local government to fulfil its obligations under the Act.

The following sets of regulations have been developed, and are awaiting approval of the Minister prior to promulgation:

- Regulations under Section 9(1) of the Act, dealing with compulsory national standards
- Regulations under Section 10(1) of the Act, dealing with norms and standards for tariffs
- Regulations under Section 19(5) of the Act, dealing with contracts for water-services providers.

National Water Act, 1998

The National Water Act, 1998, provides for

- integrated management of surface water and groundwater
- sustainable use of groundwater within the average annual replenishment rates
- sustainable use of surface and groundwater
- devolution of surface and groundwater to catchment and local level
- government to play a support role through functions such as awareness, information provision and capacity-building.

The Act does not differentiate between surface water and groundwater with respect to allocation, protection and conservation. The Act aims to control the use of water resources, protect them from being abused and polluted, and ensure that every person has equitable access to water resources.

On 1 October 1999, the Department of Water Affairs and Forestry started a registration drive for users of large amounts of untreated raw water.

The new measures will not apply to users of borehole water for domestic purposes, those who use it to grow food for subsistence, or those who use it to water a few head of cattle. It will affect those who draw water from a dam, stream or underground aquifer and use it for irrigation, mining, industrial use and feedlots.

Water users had to register before 30 June 2001 or face paying a late registration penalty of the greater of R300 or 10% of outstanding water charges. The registration of users of raw water will for the first time provide the knowledge base needed to manage the country's water resources more effectively. From 1 April 2002, the process also saw management charges levied on commercial users of water.

By May 2002, 46 000 water users had been registered, accounting for about 90% of the country's water use.

New water use is now subject to licensing and already 689 new licences have been issued in terms of the National Water Act, 1998. Before a license can be issued, an assessment of the environmental requirements of rivers and streams concerned must be done. In this regard, more than 350 preliminary determinations of the reserve have been carried out covering almost 25% of the subcatchments in the country.

Water-resources management

Water-resources management in South Africa has undergone major revision along with the reform of water policy and legislation. The National Water Act, 1998 provides the principles for water-resources management. The objective of this policy is to manage water resources in an integrated manner that will ensure a healthy, stable water-resource base to meet the current and future needs of South Africa.

The definition of water quality has been extended from the classical microbiological

and physico-chemical status to encompass a more comprehensive consideration of water-resources as dynamic aquatic ecosystems, including indicators such as biotic diversity and the status of riverbank habitat. Water-resource quality provides an indication of the status of water resources and the ability of the resources to provide sustained access for use. Recognising that protection and conservation are not goals in themselves, the policy reflects the reality that effects are associated with equitable water use.

Water-resources management provides a protective framework that is intended to safeguard water-resource quality against unsustainable practices, through a system of pollution source controls and resource-protection measures. Source-directed measures include a range of regulatory controls aimed at the sources of impacts on water resources, such as:

- limitations on abstractions
- limitations on the volumes and minimum quality standards for water containing waste being discharged.

Resource-directed measures focus on ecosystems because ecosystems provide people with goods and services such as: water supply, waste transport, processing and dilution, natural products (e.g. reeds, fish and plants), nature and biodiversity conservation, flood control, recreation, a 'sense of place', and places for religious rituals or spiritual needs. Resource-directed measures are therefore designed to protect the resource to ensure that adequate ecosystems continue to supply people with these goods and services.

A classification system will provide the basis for setting appropriate resource quality objectives and pollution source controls for the management of the resource. Water use is allocated according to the resource class, including the use of certain water resources for disposal of waste discharges. Water resources classified as particularly sensitive or environmentally important will be stringently controlled, with water-use allocations limited to minimise detrimental effects.

While recognising that water resources cannot be protected from all detrimental effects on quality, it is not realistic to seek to prevent all effects on economically important water resources. Controlled effects will be permitted and managed within a system of waste minimisation technologies, pollution prevention, recycling and re-use of water. A system of economic incentives will form part of the management approach, through the introduction of waste discharge in a phased manner intended to foster use of low-waste or zero-waste technology.

Voluntary as well as mandatory measures for water conservation are intended to ensure that water is used efficiently, as are demanding management strategies, which increasingly form part of water supply, management and development decision-making. The establishment of formal structures for integrated management of water resources at catchment and local level will bring a new dimension to the management of water-resource quality. Stronger user representation of all interest groups will ensure equitable allocations among the user groups, as both the costs and benefits of utilising water resources are realised by the stakeholders. Decision-making will be devolved to the appropriate level, allowing those most affected by the decisions to provide primary input through catchment agency structures.

Water-management institutions

The National Water Act, 1998 sets out the framework for the management of water resources in South Africa. This framework provides for the establishment of water management institutions, which include Catchment Management Agencies (CMAs) and Water-user Associations (WUAs). The core purpose of CMAs is to ensure the sustainable use of water resources in line with the purpose of the Act, which is underpinned by the principles of equity, efficiency, sustainability and representivity.

The country has been divided into 19 Water-management Areas which will each be

managed by a CMA. The Inkomati CMA will be the first to be established in the country closely followed by an additional three CMAs in the following two years. In an effort to support emerging farmers in forming empowered WUAs, the Department has formed an inter-departmental co-ordinating committee with the departments of Agriculture and of Land Affairs to provide general and financial support to these new developmental institutions.

Numerous Catchment Management Forums have been established nationally to ensure active participation in the management of local water resources so as to acquire optimal social and economic benefits.

The Country Water Partnership for South Africa affiliated to the Global Water Partnership has been established, representing numerous stakeholders promoting interaction and poverty-alleviation efforts in the water sector.

A fruitful collaboration has been initiated with the International Water Management Institute's regional office for cross-referencing with international practices and capacity-building of the Department's personnel.

The year 2001/02 has seen a number of achievements in the management of water resources in South Africa and the implementation of the National Water Act, 1998.

In 2001/02, one proposal for the establishment of a CMA was made to the Department, and 20 WUA constitutions were approved and a further 10 processed. More than 20 applications for the establishment of new WUAs have been received, and, out of a total of 297 irrigation boards, 291 are transforming into WUAs. The other six are being disestablished as they are no longer in operation.

Working for Water Programme

The Working for Water Programme is a labour-intensive initiative to clear invasive alien plants. These introduced species have a negative impact on South Africa's water security, biological diversity, the ecological functioning of natural systems, the productive use of land, and the intensities of fires and floods.

Estimates are that over 10 million ha – bigger than the size of KwaZulu-Natal – is already invaded by alien plants, and that these invaders are spreading and growing at a rapid rate. They are estimated to be using about 7% of the country's mean annual run-off of water. In terms of fires, it has been reported that every house that burnt down in the January 2000 fires along Table Mountain – giving birth to the Santam/Cape *Argus Ukuvuka*: Operation Firestop Campaign – was surrounded by invasive alien plants.

The Programme has a marked influence on employment opportunities, training and capacity-building, community empowerment, social development and the creation of secondary industries. It focuses on the most marginalised – the poor, rural communities, women, the disabled, and those living with HIV/AIDS.

The Working for Water Programme is a multidepartmental initiative led by the departments of Water Affairs and Forestry, Environmental Affairs and Tourism, and Agriculture. It started in 1995 with a budget of R25 million and has grown into one of government's key poverty-relief fund initiatives. Its direct budget through government funding for 2000/01 was R230 million from the Poverty-relief Fund, R87 million from the Department of Water Affairs and Forestry, and R6,5 million from the Department of Social Development. Indications are that up to 90% of the budget was spent in almost 300 projects across the country, employing some 20 000 people. These figures exclude the contributions being made through partnership programmes, such as those being run through Rand Water, the Ukuvuka Campaign and the Commercial Forestry Industry.

About 250 000 ha was cleared of invasive alien plants during 2000/01.

Flood and drought management

In terms of the South African Disaster Management Policy, there is a major move in focus from reactive to preventive disaster

management. This will inevitably move the South African flood-management focus from structural to non-structural, such as attaching special value to floodplain zoning and flood warnings.

Dams and water schemes

A number of new projects were and are being undertaken by the Department of Water Affairs and Forestry. It is departmental policy to ensure that water-demand management programmes are implemented before embarking on new infrastructure development.

The Inyaka Dam near Bushbuckridge was opened in March 2002. The Dam will augment the water supply to the rural communities of Mapulaneng, Mhala and Nzikazi North, and its capacity will be sufficient to supply domestic water to the area for the next 15 to 20 years.

In April 2002, Deputy President Jacob Zuma attended the opening ceremony of the Maguga Dam near Piggs Peak in Swaziland. The Maguga Dam is part of the Komati Development Project that was implemented in accordance with the Treaty on the Development and Utilisation of the Water Resources of the Komati River Basin between South Africa and the Kingdom of Swaziland.

One of the most ambitious binational water projects ever to be undertaken is the Lesotho Highlands Water Project between South Africa and Lesotho. The completion of the first phase was celebrated in January 1998. The first phase of the project is composed of 1A and 1B. The main components of 1A are dams at Katse and Muela, an 82-km water-transfer tunnel, and a hydroelectric plant at Muela. Phase 1B includes the construction of the Mohale Dam and tunnel and the Matsoku tunnel and weir. The latter was inaugurated in October 2001. The Mohale Dam will be completed in 2003.

Planning studies and an environmental impact assessment have been compiled regarding the proposed Skuifraam Dam on the Berg River near Franschhoek. The Dam was also reviewed against the World Commission on Dams' Guidelines with satisfactory results.

The Levuvhu Water Scheme will provide nine million people in Limpopo with drinking water. Construction of the Nandoni Dam started in May 1998, and it was expected to store water from January 2003. The total cost of the project will amount to R750 million. The Scheme will also stabilise the water supply for irrigation, and alleviate water shortages in the Kruger National Park. It will be run by the Department of Water Affairs and Forestry's CWSS Programme while municipalities gain the experience and capacity needed to handle the provision of services.

Progress is being made on the implementation of a Commission in the Orange-Senqu Basin between Lesotho, Namibia and South Africa. The country is also engaged in a number of collaborative projects with Mozambique and Swaziland. It is working with these neighbours to establish an interim water-sharing agreement as a first step towards the implementation of full basin management arrangements as provided for in the Southern African Development Community (SADC) Protocol on Shared Rivers.

South Africa is also giving specific support to Swaziland to promote the Lower Usutu Irrigation Scheme, which is part of the Lubombo Regional Spatial Development Initiative (SDI).

Drainage and hydrology

World-wide, 31% of all rainfall returns as run-off to the sea through rivers. In South Africa, with its abundant sunshine and high evaporation rate, the figure is a mere 9%.

The average annual run-off of all South African rivers amounts to approximately 50 billion m^3. This is only half the run-off of the Zambezi River and roughly equal to that of the Nile River at Aswan in Egypt or the Rhine River at Rotterdam in the Netherlands. South Africa lies in a drought belt. Rainfall is seasonal and is influenced by topography. The slopes of the eastern plateau, which cover

13% of the surface area of South Africa, account for nearly 43% of the total run-off. The Orange River System, which drains almost the entire plateau – 48% of the total surface area of the country – accounts for only 24% (about 12 060 million m^3) of the total average annual run-off to the sea.

Truly perennial rivers (those that flow all year round) are only found over one quarter of South Africa's surface area – mainly in the southern and south-western Cape and on the eastern plateau slopes.

Rivers that flow only during the rainy season are found over a further quarter of the surface area. Rivers in the western interior are episodic, that is, they flow only sporadically after infrequent storms, while their beds are dry for the rest of the year.

Research on river ecosystems is funded by the Water Research Commission (WRC) and the National Research Foundation. (See chapter: *Science and Technology*.)

A key objective of the River Health Programme (RHP) is to 'package' and disseminate information on river health in such a way as to serve ecologically sound management of rivers in South Africa, and inform and educate the people of South Africa regarding the health of rivers.

During the past two years, and in collaboration with the Department of Environmental Affairs and Tourism, WRC and the Council for Scientific and Industrial Research's (CSIR) Environmentek, a new and sophisticated template has been developed for river-health reporting. This template was designed to complement the protection measures under the National Water Act, 1998, as well as the specifications for national state-of-the-environment reporting. Specific objectives of this reporting format are to:

- provide information to government and agencies for improved decision-making in river management
- compare environmental performances of different areas
- increase public awareness of environmental and development issues
- empower people and organisations to improve their environment and quality of life for themselves and future generations.

The reporting template essentially makes use of a 'Pressure-State-Response' framework. For each ecological region of the mentioned rivers, the pressures on the rivers, the present state and trends in river conditions, and the policies and management actions in place to manage the rivers, are described.

The RHP intends to initiate studies on key rivers in every province with a view to publishing a State-of-Rivers report within the next few years. This will also build upon the good relations already established with all provincial administrations, and create the opportunity for further capacity-building at local level.

Lakes and pans

Except for Lake Fundudzi, which was formed by a huge landslide in the Soutpansberg in Limpopo, there are no true inland lakes in the country. Coastal 'lakes' are found at Wilderness on the Cape south coast, and at St Lucia, Sibaya and Kosi Bay on the KwaZulu-Natal coast. Although they are seldom without water, lakes Chrissie and Banagher near Ermelo in Mpumalanga differ little from the innumerable 'pans' to be found in a wide belt from the Northern Cape through the western Free State to the North West.

Groundwater resources

Groundwater, despite its relatively small contribution to bulk water supply (13%), represents an important and strategic water resource in South Africa.

Owing to the lack of perennial streams in the semi-desert to desert parts, two-thirds of South Africa's surface area are largely dependent on groundwater. Although irrigation is the largest user, the supply to more than 300 towns and smaller settlements is also extremely important. Through government's commitment to meet the basic water needs of communities, groundwater has also

become a strategic resource for village water supply in the wetter parts of the country, because of its cost-effectiveness in a widely scattered small-scale user situation.

Underground water sources also contribute to river flow. This will require reserving a significant part of groundwater resources for the protection of aquatic ecosystems in terms of the National Water Act, 1998. The maximum quantity of groundwater that can be developed economically is estimated at about 6 000 million m^3 a year.

A national groundwater mapping programme and the development of a national groundwater information system form part of the new strategy. A number of important secondary maps such as national exploitation potential, groundwater importance, classification, and groundwater pollution-vulnerability maps have also been produced.

Forestry

Indigenous forests are indispensable to the country's heritage, beauty, wildlife and environment, while commercial forests provide jobs and economic opportunities for many people in the rural areas. Forestry represents a massive investment in the country and plays an important role in the rural development strategy.

South Africa has developed one of the largest cultivated forestry resources in the world. Production from these plantations was 16,7 million m^3, valued at almost R2,6 billion in 2000. Together with the processed products, the total industry turnover was approximately R12,8 billion in 2000, including R9,1 billion worth of products made from wood-pulp. More than 9,5 million t (pulpwood, mining timber, matchwood and charcoal) and 5,2 million m^3 (sawlogs, veneer and poles) were sold in this period.

Collectively, the forestry sector employs about 100 000 people. An equivalent of about 60 000 full-time staff is employed in the primary sector (growing and harvesting) while the balance is employed in the processing industries (sawmilling, pulp and paper, mining timber and poles, and board products).

About half of the 1 100 indigenous tree species found in South Africa grow along the south and east coasts and on the southern and south-eastern slopes of inland mountains. The other half is spread over the interior plateaux.

The yellowwood tree (*Podacarpus* species) is South Africa's national tree. Yellowwood trees can grow to a height of more than 40 m with a girth of eight metres, and can live up to 800 years. The Big Tree near the Storms River Bridge (46 m), the King Edward VII in the Knysna forest (46 m) and the Eastern Monarch in the Amatola Mountains (44 m) are the best-known giants.

Two different Trees of the Year are nominated annually: a common variety and a scarcer, possibly endangered, species. The 2002 Trees of the Year were the cheesewood and the Natal flame bush.

National Arbor Week is celebrated at the beginning of September every year to encourage the greening of South Africa.

In 2002, Arbor Week was celebrated with the theme *Trees are Life – Mehlare ke Bophelo.*

The theme embraced three areas in which trees enhance lives, including among other things, providing homes to wildlife and a place worth visiting to humans, and providing jobs and economic opportunities.

The launch of the 2000 Arbor Week included the Remembrance Campaign, which entailed the planting of trees to remember fallen heroes. This was followed by the establishment of a remembrance register which includes the names of people commemorated through tree-planting events.

Managing the forests

The Department of Water Affairs and Forestry is pursuing a reform programme in the forestry sector which will eventually see the government leasing State-owned forest land to private-sector operators.

The Department will move from the management of plantations towards promoting, regulating and developing the forest industry. The forestry policy of the Department focuses on several elements:

- overall policy on the place of forestry in the management of land, water and other natural resources
- industrial forestry
- community forestry
- the conservation of natural forests and woodlands
- South Africa's response to global concerns about forests
- research, education and training
- South Africa's relationship with SADC members and bilateral relations with countries beyond the SADC.

The policy has been applied, tested and developed in accordance with the following principles:

- sustainable forest development
- forests and forest resources are to be treated as national assets
- democratisation
- gender equity
- people-driven development
- recognition of the scarcity of water resources
- a competitive and value-adding forest sector
- decent employment conditions.

The overall goal of the Government is to promote a thriving forestry sector, to be utilised for the lasting benefit of the nation and developed and managed to protect the environment. Forestry is moving away from being an operational function of the Department towards policy and regulation, with the establishment of policy and regulatory divisions. Significant progress has been made in the restructuring of State forest assets through the leasing of land to private companies. In addition, a pilot project on the transfer of small plantations to communities is nearing completion. Progress has also been made in improving the management of indigenous forests with the active involvement of local communities.

In September 2000, the Ministers of Public Enterprises and of Water Affairs and Forestry announced substantial progress in the restructuring of the State's forest assets. Some of the announcements have been implemented while others are in the process of implementation.

- Forestry will be phased out on 12 000 ha on the eastern and western shores of Lake St Lucia. Of the area to be phased out, the South African Forestry Company Limited (SAFCOL) will clear-fell about 6 600 ha over the next five years. The land will be transferred to the Greater St Lucia Wetland Authority, and will be incorporated into the conservation area falling under the World Heritage Site. Forest plantations will be phased out within five years, after which the land will be incorporated into the Greater St Lucia Wetland Park. This reflects the Government's commitment to the environment, and will encourage tourism investment through the Lubombo SDI.
- Late in 2001, the remaining 22 800 ha of forest plantation in the KwaZulu-Natal package was sold to the Siyaqhubeka Consortium comprising Mondi Limited and Imbokodvo Lemabalabala, a black empowerment company representing communities living near the forest plantations. This area was sold for R100 million in addition to the lease rentals, which were valued at R48 million. The bidders agreed to take over all operational staff and undertook not to retrench any staff for a minimum period of three years.
- Late in 2001, the Eastern Cape North package was sold for a total of R45 million to Singisi Forest Products, which is a consortium involving Hans Merensky Holdings and community groups living in the areas adjacent to the forest. The involvement of the communities has been facilitated by the Eastern Cape Development Corporation. The bidders agreed to take over all staff and undertook not to retrench any staff for a minimum period of three years.
- A preferred bidder has been announced for the Mpumalanga/Limpopo area, which has

been consolidated into a single package called Komatiland Forests. In March 2002, it was announced that the final preferred bidder was Zama Resources Limited (previously called African Forest Consortium of South Africa). The bid price was R335 million.

- The Eastern Cape South package has been offered for sale but only one bid was received for approximately 15 000 ha of forest. Negotiations are under way.
- An in-principle agreement has been reached between South African National Parks and the management of SAFCOL that the Tokai and Cecilia plantations situated within the Table Mountain area will be incorporated into the Cape Peninsula National Park. The areas will, however, continue to operate as commercial timber plantations, and SAFCOL will manage these on an agency basis. Tourism facilities will operate under National Parks, and the plantations will continue to serve as important public recreational areas. The parties will work on a detailed agreement, which will involve the Department of Water Affairs and Forestry, the Department of Environmental Affairs and Tourism, SAFCOL and the Cape Peninsula National Park.
- Forestry will be phased out of 15 000 ha in the Boland area of the Western Cape and 30 000 ha in the southern Cape currently managed by SAFCOL. These plantations are not commercially viable, and timber no longer represents the best land-use option in these areas. This will open opportunities for other land uses including agriculture (particularly fruit and grapes), tourism and conservation. The process of conversion will be carefully managed over a period of 10 to 15 years. Various studies are under way to examine the best mechanisms for making this land available. The remaining forestry areas (3 000 ha in the Western Cape and 30 000 ha in the southern Cape) will be managed by SAFCOL and may be re-offered in coming years.

The Department still controls 92 000 ha of forest, which had not been put up for sale, while 97 700 ha remains with SAFCOL. The Department is in the process of transferring all its land into SAFCOL's name. This process will take some time but will result in the lease deals being in SAFCOL's name.

South African Forestry Company Limited

The main objective of the State-owned enterprise SAFCOL is the development of the South African forestry industry and optimising its assets and land value according to accepted commercial management practice and conservation principles. The main functions of the Company are:

- timber growing and harvesting as well as the growing and harvesting of other forestry-related products
- sawmilling and timber processing, including the manufacture of timber and timber-derived products
- marketing of raw and processed timber in all its forms, both locally and internationally.

SAFCOL's annual production of 3,3 million m^3 of logs for sawmilling, pole-treating and pulp comprises almost 20% of South Africa's forestry production. The Company's share in its core business, namely softwood saw-log production, comprises more than a third of the country's total output.

In 2001, SAFCOL's five sawmills processed 300 000 m^3 of round logs. This is almost 9% of South Africa's annual round wood intake for the production of sawn timber.

Industry and exports

The industry was a net exporter to the value of over R5,4 billion in 2001, over 55% of which was in the form of converted value-added products. The forest products industry currently ranks among the top exporting industries in the country, contributing 4,29% to the total exports in 2001, and 1,86% of total imports.

Exports are dominated by the pulp – R2,614 billion in 2001 – and value-added solid-wood sector – R1,628 in 2001 (74% of all timber industry exports), the balance

being made up of exports of sawn lumber, paper, wood chips, wattle extract and a variety of other products. The total value of exports of forest products in 2001 was R9,5 billion.

Capital investment in the industry amounted to some R16,3 billion in 2001 and R9,7 billion in 1999, having grown at an annual real rate of close to 5% since 1980. The turnover of the industry amounted to an annualised R12,8 billion in 2001.

Stringent environmental codes of practice are implemented in all plantation and processing activities. The Chief Directorate: Forestry of the Department of Water Affairs and Forestry promotes optimal development of forestry and arboriculture in South Africa.

The National Forests Advisory Council (NFAC) was established in terms of the National Forests Act, 1998 (Act 84 of 1998). It advises the Minister of Water Affairs and Forestry on all aspects of forestry in the country. The NFAC is actively involved in, among other things, developing local criteria, indicators and standards for Sustainable Forest Management (SFM), and how public access to State-owned forests can be improved.

Sustainable Forest Management (SFM)

The commercial forestry industry in South Africa is committed to practising SFM and is a world leader in forest certification. This is demonstrated by the fact that over 1 million ha, or over three-quarters of the entire area of commercial forestry plantations in South Africa, are currently certified by the Forest Stewardship Council (FSC) and the ISO 14001 certification schemes as being sustainably managed.

South Africa now has one of the largest areas of FSC-certified plantations of any country in the world. This is a remarkable achievement considering that there were no certified plantations in 1996. Although not all these forests are owned by the large forestry companies, the rapid expansion in this certified area has been facilitated by the fact that all these large companies have their own specialist environmental departments which ensure, among other things, that their land is managed according to their own stringent environmental codes of practice. To promote transparency, members of the public are invited to join company staff when these regular audits are done. The commercial forestry industry is also actively involved in the NFAC's Committee for SFM, whose primary job it is to develop criteria, indicators and standards for SFM, suitable to South African conditions.

Despite this, the industry has developed a set of environmental guidelines for the sustainable management of commercial timber plantations in South Africa. The first edition of these guidelines was published in 1995 and is widely used. The second edition was expected to be published in 2002.

Legislation

The restructuring of the forestry sector is supported by two pieces of legislation, namely the National Forests Act, 1998, and the National Veld and Forest Fire Act, 1998 (Act 101 of 1998).

The National Forests Act, 1998 provides a framework for the development of principles, criteria, indicators and standards for SFM. Once these are in place, they will become requirements for the management of both commercial and indigenous forests. The Act will also ensure that the public has reasonable access to State forest land for recreational, cultural, spiritual and educational purposes. In addition, provision is made for the protection of indigenous forests as well as support for community forestry.

The National Veld and Forest Fire Act, 1998 bans open-air fires when the risk of veld blazes in an area is high. It also introduces the concept of voluntary fire-protection associations formed by landowners. It furthermore obliges the Minister of Water Affairs and Forestry to operate a national fire-rating system in consultation with the South African Weather Service and fire associations. The Act also allows the Minister to impose minimum fire-fighting requirements on landowners.

Indigenous high canopy forest

High forest covers only about 360 000 ha of the country's surface. The Department is responsible for the management of between 180 000 ha and 200 000 ha of these forests, which occur mainly on the eastern and southern slopes of mountain ranges from the Cape Peninsula in the Western Cape to the Soutpansberg in Limpopo.

High forest is normally found in isolated pockets, varying in size from only a few hectares to several thousands hectares.

The largest area of high forest (36 000 ha) lies within a strip some 220 km long and 26 km wide between the Outeniqua and Tsitsikamma mountain ranges and the sea, extending from Mossel Bay in the Western Cape through Knysna to the Humansdorp district in the Eastern Cape. High forest has virtually disappeared from the mountain ranges from Mossel Bay westwards, and occurs only in patches in mountain kloofs. In the Eastern Cape, indigenous forests occur along the coast and on the Amatola and Transkei mountain ranges.

Forests in KwaZulu-Natal and the former Transkei area of the Eastern Cape are generally small, and those that are easily accessible have been heavily exploited in the past.

Although similar in composition to those of the Keiskamma area, these forests also include some of the tropical tree species from the northern parts of South Africa.

In Mpumalanga and Limpopo, high forest occurs in patches in the mountain ranges along the eastern edge of the Highveld plateau, while the largest areas are in the Woodbush and Soutpansberg ranges.

The single largest part of the indigenous high forest (about 15%) is managed by the Chief Directorate: Forestry according to certain multiple-use objectives.

Systematic timber harvesting occurs in areas of the production management class. Harvesting is concentrated on overmature trees, with logs being sold by tender and/or on public auction. On average, 3 750 m^3 of round logs are harvested annually (150 m^3 of stink-wood, 750 m^3 of yellowwood, 2 500 m^3 of Australian blackwood and 350 m^3 of other species). Timber harvesting in Knysna amounts to 2 600 m^3. Another valuable product of the indigenous forests of South Africa is the seven-week fern (*Rumohra adiantiformis*), which is harvested in the Knysna and Tsitsikamma forests.

Scrub forest and woodlands

This vegetation covers extensive areas in the low-lying, drier areas of Limpopo, KwaZulu-Natal and Mpumalanga. Some areas of savanna and woodlands have been denuded for agriculture and firewood. Most tree species of the scrub forests and woodlands grow slowly and do not reach great heights. The woodlands are, however, a valuable source of fuel, fencing material and other products. They provide protection for the soil, and shelter and fodder for livestock. The tree growth along much of the coast is classified as coastal scrub, with the exception of patches of high forest at Alexandria and along the Eastern Cape Coast.

Exotic plantations

During the 1930s, the government started to establish extensive plantations to make South Africa self-sufficient in its timber requirements and to provide more job opportunities in a diversified economy during the depression years. Commercial plantations of exotic species proved to be a sound investment, and the private sector has established large plantations of pine, eucalyptus and wattle trees. The private sector now owns 1 238 793 ha (or 93%) of the total plantation area of 1 330 943 ha, as well as virtually all the processing plants in the country.

The forestry industry is promoting rural development and economic empowerment through a small-grower afforestation programme. Currently, there are more than 18 000 emerging small black timber growers, the vast majority of whom operate through

schemes run under the auspices of Sappi Forests (Project Grow), Mondi Forests (Khulanathi) and the wattle industry (South African Wattle Growers' Union). Combined, these growers, most of whom are women, cultivate 48 000 ha of plantations.

Plantation yields

Of the 1 330 943 ha of plantations in 2001, 53% were softwood species and 47% hardwood species. Thirty-eight percent of the plantation area was managed mainly for saw-log production, 57% for pulpwood and 7% for mining timber, while the balance of 4% is grown for the production of poles, matchwood (poplar) and other minor products. Plantation yields vary from an average of 16 m^3 per ha per annum for softwood to 21 m^3 per ha per annum for eucalyptus and 10 m^3 per ha per annum for wattle (timber and bark together). Likewise, the rotation ages vary from a maximum of 30 years in the case of pine saw-logs, to six to 10 years in the case of eucalyptus pulp and mining timber. The production from plantations amounted to some 16,7 million m^3 (or 16,5 m tons) in 2000.

Primary wood-processing

South Africa currently has 143 primary wood-processing plants, 137 of which are owned by the private sector. Of these, some 78 are sawmills, 12 mining-timber sawmills, 29 pole-treating plants, 18 pulp, paper and board mills, two match factories and four charcoal plants. The total roundwood intake during the year was 17,1 million m^3. The value of sales of timber totalled R12,858 million. An amount of some R16,347 million was invested in primary roundwood-processing plants (at book value). At market value, this increased to an estimated R22,9 billion.

The two main pulp and paper-manufacturing companies in South Africa, Sappi and Mondi, rank among the largest in the southern hemisphere and own assets in many parts of the world.

Research and training

South Africa has world-class forestry research infrastructures and personnel, with almost 2% of the forestry industry (private and public sectors) turnover devoted to research. The priority fields of research range from tree-breeding through applied silviculture, climate and soils, environmental impact and management solutions, and forest biology to hydrology and forest protection.

Forestry research is undertaken by the Institute for Commercial Forestry Research, Environmentek (CSIR), the Plant Protection Research Institute, the University of Stellenbosch, the Forestry and Agricultural Biotechnology Institute at the University of Pretoria, the University of Natal (Pietermaritzburg) and the Port Elizabeth Technikon (George Campus). All major forestry companies also have well-established, in-house applied research divisions.

Degrees in forestry are offered by the Faculty of Agricultural and Forestry Sciences at the University of Stellenbosch, the University of Natal (Pietermaritzburg) and the University of Venda. Diplomas and limited degree courses in forestry disciplines are also offered at the Port Elizabeth Technikon (George Campus). The Natal Technikon offers a diploma in Pulp and Paper Technology. The Fort Cox College of Agriculture and Forestry offers a diploma in social forestry.

Skills training is provided by a number of industry-sponsored and in-house training centres. Industry-sponsored bursaries are available, as are company-sponsored bursaries for study at these institutions.

Forest Industries Education and Training Authority (FIETA)

On 20 March 2000, FIETA was formally established after two years of negotiations between employer and trade unions involved in the forestry, wood products, furniture, and pulp and paper industries. Its main functions are to perform Education Training Quality Assurance functions, to develop and run leadership programmes and to manage

the disbursement of training grants.

During the 2001/02 financial year, R5,8 billion was paid out in training grants. In addition to this, 22 projects are to be embarked upon to increase skills levels within the four sectors that FIETA serves. Combined, the value of these projects totals some R14,5 million.

Community forestry

According to the *White Paper on Sustainable Forest Development in South Africa*, community forestry is designed and applied to meet local social, household and environmental needs and to favour local economic development. It is implemented by communities or with the participation of communities, and includes tree-centered projects in urban and rural areas, woodlots and woodland management by communities and individuals. The White Paper states that community forestry was neglected in South Africa in the past, when the Government focused only on woodlots for fuel and construction.

Community forestry has gained impetus through more focused core functions particularly in urban greening and forest enterprise development.

Food and Trees for Africa (FTFA)

FTFA is the sub-Saharan African partner of the international Global Releaf greening organisation.

The Minister of Water Affairs and Forestry launched the National Urban Greening Fund by handing over a cheque of R1,2 million to FTFA, formerly Trees for Africa. The Urban Greening Fund will forge links between communities and local governments in their efforts to plant street trees, and develop parks and food gardens. A national Urban Greening Strategy has been prepared by the Department. FTFA's projects have overseen the planting of more than 1,2 million trees, and involved thousands of communities in food gardening and other greening activities.

Eduplant

EduPlant, the national schools programme funded by the Eskom Development Foundation, contributes to the upliftment of schools throughout South Africa by assisting disadvantaged schools to grow their own food and to provide greener environments conducive to learning. It focuses on permaculture and received a R2-million grant from the Department of Water Affairs and Forestry.

Acknowledgements

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Forestry South Africa
SAFCOL
Water Research Commission

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