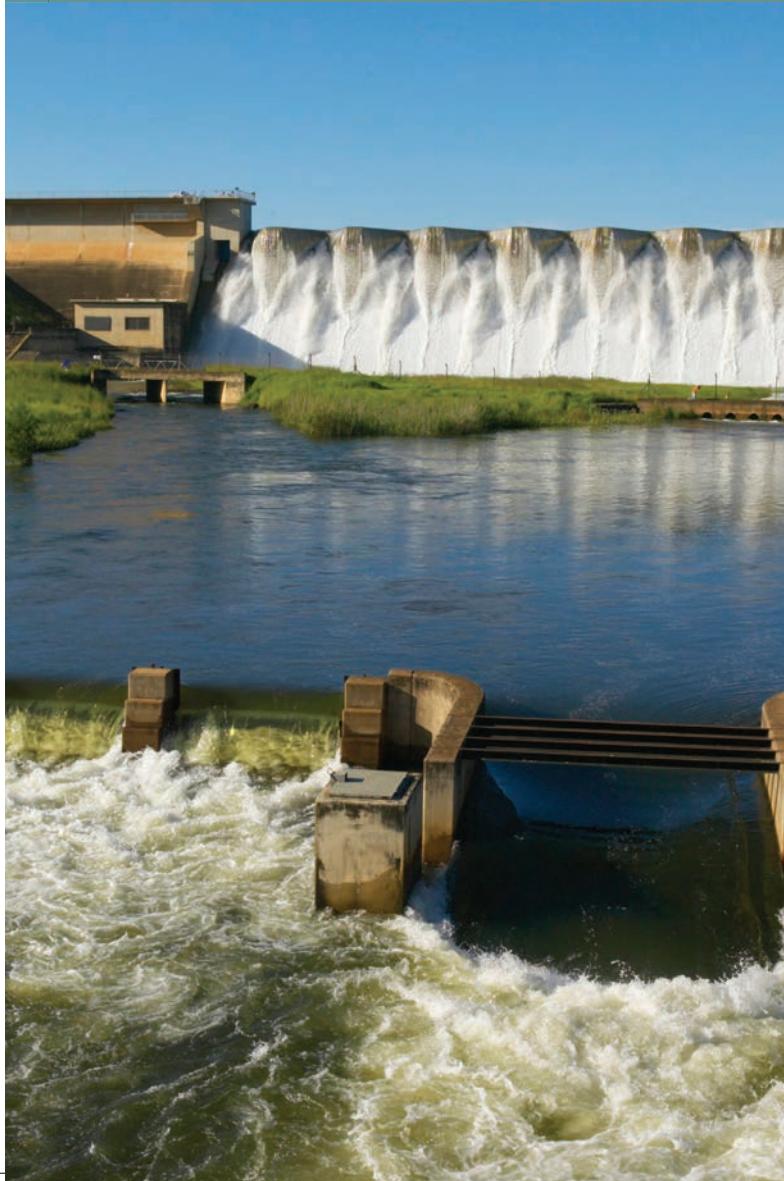




Water affairs



SOUTH
AFRICA
YEARBOOK
2011/12

The Department of Water Affairs is mandated to ensure that South Africa's water resources are protected, managed, used, developed, conserved and controlled in accordance with the requirements of the policies of the department, the Water Services Act, 1997 (Act 108 of 1997), and the National Water Act, 1998 (Act 36 of 1998).

Its core functions are:

- formulating policy
- managing water resources
- developing infrastructure
- capacity-building
- intergovernmental and intra-sectoral co-ordination
- water regulation.

In relation to government's 12 outcomes, the department contributes directly to an efficient, competitive and responsive economic infrastructure network (Outcome 6) through the maintenance and supply availability of the country's bulk water infrastructure (Output 4); and environmental assets and natural resources that are well protected and continually improved (Outcome 10) through enhanced quality and quantity of water resources (Output 1). The department also contributes indirectly to a number of other outcomes.

A departmental or suboutput relating to Outcome 6 is to strengthen the regulation of the water sector, and for Outcome 10 it is to promote equitable and sustainable water-resources management.

Other key priorities include:

- giving effective support to local government to deliver water services
- realigning the institutional arrangement of the water sector
- strengthening the oversight of the water boards and centralising the management of the entire water value chain
- strengthening internal technical capacity to address the massive backlog in the operations and maintenance of the national water infrastructure.

South Africa is a water-scarce country – it has a low rainfall and one of the lowest run-offs in the world. Water resources must be managed well and used judiciously to ensure continued supply. Factors such as climate change and increasing population growth are leading to increased water consumption. Educating the general public on water conservation is imperative. The department has implemented campaigns aimed at raising awareness about saving water and educating

communities on how to combat water wastage. Projects to desalinate ocean water have also been initiated.

Hydrological conditions

South Africa is classified among the driest countries by world standards. It is located in a predominantly semi-arid part of the world.

The country's climate varies from desert and semi-desert in the west to sub-humid along the eastern coastal area, with an average rainfall of about 450 mm per year. This is well below the world average of about 860 mm per year, while evaporation is comparatively high.

South Africa's inland water resources include 22 major rivers, 165 large dams, more than 4 000 medium and small dams on public and private land, and hundreds of small rivers.

The country's water resources are, in global terms, scarce and extremely limited. The total flow of all the rivers in the country amounts to about 49 200 million m³ per year. This is less than half of that of the Zambezi River, the closest large river to South Africa. Groundwater plays a pivotal role, especially in rural water supplies.

However, owing to the predominantly hard-rock nature of South Africa's geology, there are few major groundwater aquifers that can be used on a large scale.

The poor spatial distribution of rainfall means that the natural availability of water across the country is also highly uneven. This is compounded by the strong seasonality of rainfall over virtually the entire country, and the high within-season variability of rainfall, and, consequently, of run-off.

As a result, stream flow in South Africa's rivers is at relatively low levels for most of the time, with sporadic high flows occurring – characteristics which limit the proportion of stream flow that can be relied upon to be available for use, and which also have implications for water-related disasters such as floods and droughts.

To aggravate the situation, most urban and industrial development, as well as some dense rural settlements, have been established in remote locations away from large watercourses. As a result, the requirements for water already

Important dates:
 World Wetlands Day: 2 February
 National Water Week: 19 to 25 March
 World Water Day: 22 March

far exceed its natural availability in several river basins. Widespread and often large-scale transfers of water across catchments have, therefore, been implemented in South Africa.

Measures will also be introduced to ensure the most beneficial and efficient use of water in the country from a social and economic perspective.

Provided that South Africa's water resources are judiciously managed and wisely allocated and used, sufficient water of appropriate quality will be available to sustain a strong economy, high social standards and healthy aquatic ecosystems for many generations.

South Africa depends mainly on surface-water resources for urban, industrial and irrigation water supplies in the country. In general, surface-water resources are highly developed over most of South Africa.

Groundwater is also extensively used, particularly in the rural and more arid areas, contributing to some 60% of newly serviced households since 1994.

In the northern parts of the country, both surface and groundwater resources are nearly fully developed and used. Some overexploitation occurs in localised areas, with little undeveloped resource potential remaining. The reverse applies to the well-watered south-eastern region of the country where there are still significant undeveloped and little-used resources.

The total mean annual run-off of water in South Africa under natural (undeveloped) conditions is estimated at a little over 49 200 million m³ per year, including about 4 800 million m³ per year of water originating from Lesotho, and about 700 million m³ per year originating from Swaziland, which naturally drain into South Africa. Agricultural irrigation represents close to 60% of the country's total water requirements, while urban requirements constitute about 25% as the

second-largest user sector. The remaining 15% is shared by the other sectors (all standardised to 98% assurance of supply).

The total net abstraction of water from surface-water resources amounts to about 10 200 million m³ per year for the whole of South Africa, after allowing for the reuse of return flows. This represents about 20% of the total mean annual run-off of 49 200 million m³ per year (all standardised to 98% assurance of supply). A further 8% is estimated to be lost through evaporation from storage and conveyance along rivers, and 6% through land-use activities. As a national average, about 66% of the natural river flow (mean annual run-off) therefore still remains in the country's rivers.

Water-resource management and development

To ensure compliance with minimum water-quality norms and standards, the department started the annual Blue Drop and Green Drop assessments to guarantee that water and waste-water systems are managed according to set norms and standards.

The department has set a target of 99% compliance with drinking-water quality standards and 80% compliance with waste-water effluent standards.

The department is also seeking to establish an independent economic regulator that will ensure efficient pricing in the water value chain and that inefficiencies in the water-supply sector are not passed on to users. The current pricing strategy will also be reviewed. Various models of independent regulators, including multisector or bi-sector (such as water and energy) options, will be investigated.

To resolve these apparent conflicts and to avoid the traditional fragmented approach (handling one aspect of water management to the exclusion of others), the department adopted the Integrated Water Resources Management (IWRM) approach, which provides a more holistic approach to water management.

The IWRM requires intensive planning to ensure efficient, equitable and sustainable management of water resources and for coping with conflicting demands. The department developed two key strategic frameworks to guide it, namely the National Water Resource Strategy (NWRS) of 2004, and the Water for Growth and Development Framework of 2008. The strategy seeks to

South Africa's first *Atlas of Freshwater Ecosystem Priority Areas* was launched in Pretoria in November 2011. The atlas provides the first comprehensive assessment of the freshwater ecosystem priority areas – those areas of the country that are most important for sustaining the health and continued functioning of freshwater ecosystems.

Maps were developed for each of the water management areas in South Africa. The maps facilitate informed choices and trade-offs that can be made based on a clear understanding of where valuable freshwater ecosystems are located.

achieve reconciliation between available water resources with growing requirements.

The Water for Growth and Development Framework guides actions and decisions that will ensure water security in terms of quantity and quality to support South Africa's requirements for economic growth and social development.

To facilitate the management of water resources, the country will be divided into nine catchment-management agencies.

Over the years, water-resource development and management in South Africa have continuously evolved to meet the needs of a growing population and a vibrant economy, within the constraints imposed by nature. These developments have largely been made possible by recognising water as a national asset, thereby allowing its transportation from where it is available to where the greatest overall benefits for the nation can be achieved.

Sufficient water resources have been developed and are available to ensure that all current requirements for water can reasonably be met, without impairing the socio-economic development of the country.

Where feasible, special management techniques may be applied to improve water quality to appropriate standards for particular uses. The quality of groundwater varies according to hydrogeological conditions and anthropogenic impact. However, most major aquifer systems contain potable-quality water.

To underscore its commitment to the pursuit of universal access to water, the department is investing in new infrastructure and maintaining and rehabilitating dysfunctional systems to ensure operational efficiency.

This commitment is particularly relevant with respect to developing water infrastructure to meet the specific needs of different rural communities. Closely related to rural development is the need to mainstream support to local government to sustain the infrastructure underpinning efficient service delivery to communities.

The Department of Water Affairs recognises that a sustainable reconciliation of supply and demand for water as well as for quality and quantity requires a robust focus on regulation. Regulation in certain priority areas such as drinking-water quality and access to services has started; and the department has also initiated an electronic Drinking Water Quality Management Sys-

tem, which provides the first national overview on the status of municipal drinking-water quality and performance of waste-water treatment works (WWTWs).

As issues of water security (quality and quantity) and regulation have emerged as major concerns in the water sector, the need for the department to become visible as sector leader regulator has been emphasised. The department aims to embark on a targeted skills- and development programme for the sector.

This will entail skills-gap analysis, integration of already existing interventions, and enhancement of partnerships with the Department of Higher Education and Training, the department's public entities and institutions of higher learning.

Major dams of South Africa

Dam	Full supply capacity (10^6 m^3)	River
Gariep	5 341	Orange
Vanderkloof	3 171	Orange
Sterkfontein	2 616	Nuwejaarspruit
Vaal	2 603	Vaal
Pongolapoort	2 445	Pongola
Bloemhof	1 264	Vaal
Theewaterskloof	480	Sonderend
Heyshope	451	Assegai
Woodstock	380	Tugela
Loskop	361	Olifants
Grootdraai	354	Vaal
Kalkfontein	318	Riet
Goedertrouw	304	Mhlautze
Albert Falls	288	Mgeni
Brandvlei	284	Brandvlei
Spionekop	277	Tugela
Mthatha	253	Mthatha
Driekoppies	250	Lomati
Inanda	241	Mgeni
Hartbeespoort	212	Crocodile
Erfenis	207	Groot Vet
Rhenosterkop	204	Elands
Molatedi	22	Groot Marico
Ntshingwayo	198	Ngagane
Zaaihoek	192	Slang
Midmar	175	Mgeni

Source: Department of Water Affairs

The department also aims to build internal capacity required to regulate the technical, economic, environmental and social aspects involved in providing water services.

Water-quality management

The Blue Drop and Green Drop certification programmes are flagship innovations of the Department of Water Affairs. Introduced in 2008, this incentive-based regulation system aims to improve municipal drinking-water quality and waste-water management.

South Africa's drinking-water quality matches best international practice and follows the guidelines set out by the World Health Organisation. As it involves a benchmark score of 95%, the Blue Drop certification is the recognition of exceptional performance, and should not be equated to a pass mark. It simply credits exceptional drinking-water quality.

In 2011, the Blue Drop Certification Programme verified the status of drinking-water quality and the management of the supply systems of 162 municipalities. Teams from the department assessed 914 water systems, compared to the 787 systems assessed in 2009.

In 2010/11, 66 water supply systems were awarded Blue Drop certificates, an increase of 74% from the 38 systems in 2009/10.

The top 10 municipal performers were:

- City of Johannesburg
- City of Cape Town
- Ekurhuleni Metro
- Witzenburg Local Municipality
- West Coast District Municipality
- Tlokwe Local Municipality
- George Local Municipality
- Mogale City Local Municipality
- Bitou Local Municipality
- Emfuleni Local Municipality.

The number of water supply systems that obtained Blue Drop scores of more than 50% increased to 539 compared to 370 in 2009/10. In the three years that the certification system has been in use, an improvement in water-quality management has been seen.

The Green Drop certification measures the performance of waste-water treatment works. The 2010/11 assessment was done by a team of 70 assessors, and 821 systems were assessed, compared to 449 in the previous term. Forty systems received Green Drop certification, up from 33 in 2009/10.

The top 10 Green Drop performers were:

- Tlokwe Local Municipality
- Bitou Local Municipality
- eThekweni Metro
- George Local Municipality
- City of Johannesburg
- Witzenburg Local Municipality
- Beaufort West Local Municipality
- Mossel Bay Local Municipality
- Overstrand Local Municipality
- City of Cape Town.

Water and sanitation

Between April and December 2011, 449 082 people received basic water supply. This means that South Africa has surpassed the millennium development goal (MDG) of halving the proportion of people without sustainable water and is likely to achieve the 2014 goal of universal access to potable water, despite the challenge of an ever-increasing number of households.

Government is deploying the municipal drinking-water management system in all water-services authorities (WSAs) to ensure that the water is of good quality across municipalities.

Government has moved closer to attaining its objective of eradicating the bucket system in formally established settlements. The target date for universal access to sanitation is 2014.

The Water Services Regional Bulk Infrastructure Grant (RBIG) is a target support programme for WSAs to supplement financing for the development of regional bulk water infrastructure, regional bulk sanitation collection as well as regional water-treatment works and WWTWs.

The RBIG remains a strategic area to facilitate connecting water resources to the distribution and reticulation systems for consumption and industrial purposes.

The department approved the Regional Bulk Infrastructure Implementation Framework to facilitate its contribution to Output 4 of Outcome 6, which states that, among other things, a total of nine regional bulk schemes were completed for basic water supply. These are:

- Mthatha Bulk Water Intervention in the Eastern Cape
- Malangeni Waterborne Sanitation in KwaZulu-Natal
- Greytown Regional Bulk Scheme Phase One in KwaZulu-Natal
- Groblersdal Lukau Bulk Water Supply in Limpopo

- Olifantspoort Water Treatment Works in Limpopo
- Speccon Bulk Water Supply in Limpopo
- Mbombela 2010 Water and Sanitation in Mpumalanga
- Hoxane Bulk Water Supply in Mpumalanga
- Kenhardt Bulk Water Supply in the Northern Cape.

Two of these are WWTWs, three are water treatment works and four are bulk water supply schemes.

The RBIG created 1 313 job opportunities against a planned 1 185 job opportunities. Its budget allocation was R893 million and actual expenditure R869,5 million, which reflected 97,4% expenditure for 2010/11.

Freshwater Programme

The Freshwater Programme aims to expand and consolidate the freshwater activities within the South African National Biodiversity Institute (Sanbi).

This includes the management of the Working for Wetlands Programme on behalf of the departments of water affairs; environmental affairs; and agriculture, forestry and fisheries. Working for Wetlands champions the protection, rehabilitation and sustainable use of South Africa's wetlands through cooperative governance and partnerships.

Recognising the value and threatened status of South Africa's freshwater biodiversity, and the need to build competence and leadership in this area, Sanbi has established a programme focusing on freshwater biodiversity.

The Freshwater Programme focuses on supporting collaborative freshwater initiatives. These include Working for Wetlands, the National Wetland Inventory, National Freshwater Ecosystems Priority Areas Project, a wetlands mitigation banking scheme with the Grasslands Programme and coal-mining industry, and water-related payments for ecosystem services pilot projects. Key to the programme's operation will be further development of strategic relationships with other organisations with shared objectives, especially the Department of Water Affairs.

Monitoring water resources

River flow is monitored at 1 200 flow-gauging stations and some 260 major reservoirs are monitored. The evaporation and rainfall station network comprises 360 stations.

In 2011, the War on Leaks Project was launched in Mogale City in Gauteng. It is aimed at educating water users about the importance of repairing water leaks. The project educates the community on how to fix leaking taps and toilets, while creating job opportunities and enhancing skills development. By the end of 2011, 146 job opportunities had been created nationwide.

The oldest flow-gauging station still in operation in South Africa is on the Mooi River near Potchefstroom in North West.

There are 21 operational rainfall stations in the mountains of the Western Cape and five in the Mpumalanga escarpment. Observations are relayed through the cellular short-message system. The data is updated daily on the department's website at www.dwa.gov.za.

Water levels are monitored at some 1 000 observation boreholes across South Africa. Particular attention is given to monitoring in dolomitic areas. In addition, a small network of rain gauges is in operation to monitor rainwater quality.

The importance of qualitative information on South Africa's water resources has led to an increasing drive towards creating a national water-quality monitoring network.

The formal protection, restoration and rehabilitation of wetlands need to be strengthened through improvements in land-use planning, land-and development-management policies as well as operational and regulatory means at various scales (national, provincial and local levels).

The adoption of ecosystem-based approaches and aggressive implementation of the open-space planning and management programmes will add impetus to the protection of these systems and associated services, especially at local government level. Such implementation will require integrated approaches and the involvement of multiple sectors, particularly those dealing with human settlements, development and planning.

The *River Health Report* will be used for assessing the pattern of water quality. Generally, water quality is good in the upland regions and deteriorates downstream, particularly in areas affected by mining and urban development. Because of the longitudinal nature of rivers, poor water quality may extend far downstream of the source of pollutants.

The River Health Programme (RHP) was implemented in all nine provinces, comprising 48 projects. During the 2010/11 National Water



Week in March, the Adopt-A-River Programme facilitated the adoption of the following:

- Wilge River in the Free State
- Buffalo River in the Eastern Cape
- Shixini River in the Eastern Cape
- Umkomaas River in the Eastern Cape
- Mutale River in Limpopo
- Ngwenani River in Limpopo
- Livuvhu River in Limpopo
- Moreleta Spruit in Gauteng
- Kraal Spruit in Gauteng
- Bergylam River in Mpumalanga
- Gradespruit River in Mpumalanga
- Kanyamazane River in Mpumalanga
- Isipingo River in KwaZulu-Natal
- Eerste River in the Western Cape
- Khayalethu River in the Western Cape.

The implementation of resource-directed measures (that is, ecological water requirements/reserve, the classification of water resources and the setting of resource quality objectives as part of water-use authorisations) also indicated a need for the massification of natural-resource management programmes such as Working for Water (WfW), Working for Wetlands, Working on Fire, Working for Woodlands and Working for Energy, as these are key components of the management of water quantity and quality in South Africa.

Compliance monitoring and enforcement is expected to improve through the use of legislation, incentives, disincentives, advocacy and research. Other specific interventions include:

- implementing the ecological water requirements/reserves
- empowering water managers to understand the water balance for water-use licence applications
- streamlining and synchronising procedures for reserve determinations, to facilitate the provision of ecological water requirements and RHP information at numerous nodes within a catchment area
- investing in capacity and data that will enable sufficiently considered decisions to be taken
- making the necessary investments in at least two catchments/subcatchments, where resource-directed measures, environmental planning and implementation are undertaken to demonstrate the value of water for growth and development and securing these across the country.

Construction work on the Spring Grove Dam and its water transfer system is expected to begin in 2012, with the completion date set for 2014.

The Department of Water Affairs aims to spend more than R2 billion on the dam, which is expected to provide water to more than two million people in KwaZulu-Natal.

Most of the funds will come in the form of long-term loans sourced from the European Investment Bank and the Development Bank of Southern Africa, which will provide about £195 million and R250 million respectively.

National Aquatic Ecosystem Health Monitoring Programme (NAEHMP)

The NAEHMP is responsible for managing aquatic ecosystems.

It focuses on the biological attributes of a river that serve as indicators of its ecological health. The rationale for initiating a biomonitoring programme is that the classic approach of monitoring only physical and chemical water-quality attributes was inadequate for generating information on the overall health of an aquatic ecosystem. Monitoring chemical attributes alone was found to be insufficient to detect, for example, the cumulative effects on aquatic ecosystems of extended exposure to multiple stressors.

Such stressors include habitat alteration, barriers that alter stream flow, water abstraction and alien species being introduced. Aquatic communities (for example, fish, riparian vegetation and aquatic invertebrate fauna), however, are adapted to live within a certain range of environmental conditions.

These organisms' biological communities integrate, respond to and reflect the effects of chemical and physical disturbances that occur in aquatic ecosystems over extended periods and provide a direct, holistic and integrated measure of the ecological integrity of a river.

If healthy and diverse biological communities inhabit a watercourse, the watercourse as a whole is considered to be ecologically resilient and healthy. However, from a RHP point of view, a healthy water resource does not guarantee the fitness of that resource for domestic, recreational, industrial and agricultural use.

The NAEHMP's main objectives are to:

- generate a national perspective of the health of aquatic ecosystems in South Africa
- develop the capacity and information base required to enable the department and other role players to report on the status of and



trends in the ecological health of South Africa's river systems, in an objective and scientifically sound manner

- generate information products and audit-management strategies that could assist in distinguishing between aquatic ecosystems exposed to sustainable use and those experiencing ecological deterioration.

Products of the RHP have attracted wide attention and recognition, and provide strategic water-resource management information and training material for use in schools and universities, as well as in awareness creation.

The National Chemical Monitoring Programme assesses and reports on the chemical status of water resources in South Africa. Based on a report produced in 2002, the main water quality challenges for domestic water users are high levels of dissolved salts and, in some places, high fluoride concentration. The other challenges facing irrigated agriculture are the high sodium-absorption ratio, high electrical conductivity, high pH and high levels of chloride.

Another global challenge affecting South Africa is eutrophication or excessive plant (including algae) growth in dams. This is due to high levels of nutrient input from point sources of pollution and diffuse sources of pollution from catchments. Annual reports indicate that 50% of dams in South Africa are seriously affected (hypertrophic), while the rest range in quality from good (oligotrophic) to poor (mesotrophic).

Another problem is the sporadic outbreak of cholera and other water-borne diseases, mainly due to poor sanitation and hygiene at household level. The Eastern Cape and KwaZulu-Natal are especially prone to cholera outbreaks.

The Department of Water Affairs is designing water-resource monitoring programmes to assess and report on the radiological (radioactivity) and toxicological quality status of South African water resources. The National Toxicity Monitoring Programme also reports on the status of DDT (dichloro-diphenyl-trichloroethane) and other persistent organic pollutants. This information is reported internationally to the Stockholm Convention through the Department of Environmental Affairs.

The department has introduced the electronic Water-Quality Management System to WSAs.

Through the department's efforts alongside the Institute of Municipal Engineers and with the sup-

port of the South African Local Government Association, a challenging two-year project to monitor all 169 WSAs on their drinking-water quality was successfully put in place.

The result was an overall improvement in the quality of drinking water and the creation of an enabling environment to ensure the effective management of drinking water. Of those municipalities on the system, close on 95% reported that their drinking-water quality complied with the national drinking-water standard.

Another international obligation is to report on chemical water quality through the Global Environmental Monitoring System's Water Programme. The department started bringing in the aspect of voluntary monitoring in the form of the Adopt-a-River initiative.

Policy and legislation

South Africa's Constitution and Bill of Rights enshrine the basic human right to have access to sufficient water and a safe and healthy environment. The two Acts that enable government to fulfil these rights through the Department of Water Affairs are the:

- Water Services Act, 1997, which created a regulatory framework within which water services could be provided. Schedule Four of the Constitution vests the responsibility for water and sanitation services in local government. National government, however, is responsible for the regulatory function.
- National Water Act, 1998, which aims to ensure that water resources are protected, used, developed, conserved, managed and controlled in a sustainable manner, for the benefit of everyone in South Africa.

In August 2011, the Department of Water Affairs embarked on a review of the National Water Act, 1998; the Water Services Act, 1997; the National Water Resources Strategy; and the Water Research Act, 1971 (Act 34 of 1971). Parallel to this is the Institutional Reform and Realignment Project, aimed at realigning all water institutions in the country to ensure that they are able to effectively implement their respective mandates.

National Water Act, 1998

The Act provides for:

- integrated management and sustainable use of surface water and groundwater

In July 2011, the Department of Water Affairs embarked on a drive to prioritise the eradication of the Water Use Licence Applications backlog, which had piled up since 1998. To tackle this challenge, the department established the Letsema Project to strengthen water-resource management in South Africa.

A person is only entitled to use water if the water-use licence is permissible under the National Water Act, 1998 (Act 36 of 1998), and must apply for water-use authorisations at the department.

This venture fulfils the regulatory function in the water sector on water allocation. It also allows the transition from older repealed acts to the National Water Act, 1998.

- devolution of surface and groundwater to catchment and local level
- government to play a support role through functions such as promoting awareness, providing information and building capacity.

The Act aims to control the use of water resources, protect them from being impacted on or exploited and polluted, and ensure that every person has equitable access to them.

The Act gives the Department of Water Affairs the tools to gather the information it needs to optimally manage the country's water resources. The registration of water use is one of these tools.

All water users instructed to register have the statutory obligation to do so. There are strict penalties, prescribed in the Act, for those who do not comply.

All water users who do not receive their water from a service-provider, local authority, water board, irrigation board, government water scheme or other bulk supplier, and who use water for irrigation, mining purposes, industrial use, feedlots or in terms of a general authorisation, must register. This includes the use of surface and groundwater.

Other uses of water that must be registered include:

- diversion of rivers and streams
- discharge of waste or water containing waste
- storage, which includes any person or body storing water for any purpose (including irrigation, domestic supply, industrial use, mining, aquaculture, fishing, water sports, aesthetic value, gardening, landscaping, golfing, etc.) from surface run-off, groundwater or fountain flow in excess of 10 000 m³, or where the water area at full supply level exceeds one hectare (ha) in total on land owned or occupied by that

person or body, and who is not in possession of a permit or permission

- local authorities and other bulk suppliers with their own water sources and purification works
- controlled activities such as irrigating with waste, power generation with water, atmospheric modification or recharging of aquifers.

An assessment of the environmental requirements of the rivers and streams concerned is conducted before a licence can be issued.

The implementation of the National Pricing Strategy for Raw Water began in 2002 to ensure that, as far as possible, the costs of the management of water resources and water-supply infrastructure are borne by water users.

The majority of water users pay the water-resource charge or cost for which they are billed. However, underrecovery of costs remains considerable.

Action has been taken against a number of illegal water users across South Africa in response to growing concern about an apparent increase in the rate of illegal water use in some catchment areas.

Water Services Act, 1997

The Act aims to:

- set out the rights of consumers, and the rights and duties of those responsible for providing water services
- provide for the right of access to basic water supply, and the right to basic sanitation necessary to secure sufficient water and an environment not harmful to human health or well-being
- allow the Minister of Water and Environmental Affairs to set national standards (including norms and standards for tariffs) to ensure efficient, equitable and sustainable water services
- promote the effective and sustainable use of financial and natural resources
- establish effective and financially viable statutory institutions to assist local government to fulfil its obligations
- ensure the production by WSAs of water-services development plans (WSDPs) required by municipal legislation within the framework of integrated development plans
- provide a comprehensive framework for the oversight and regulation of water boards under the authority of the Minister of Water and Environmental Affairs

- provide a framework for the collection and publication of information about water services.

National Water Resource Strategy

The NWRS is an assessment of the supply-demand ratio in relation to water resources, which was initiated in 2004. The assessment is conducted on a five-yearly basis in each of South Africa's water-management areas (WMAs).

The strategy also proposes options for increasing the supply of water in each WMA. The NWRS determines how water resources will be protected, used, managed and conserved.

Elevating the status of water as a scarce and vulnerable resource requires the department to strengthen its regulatory role, provide support and guidance to relevant stakeholders, and influence the behaviour of economic sectors. In ensuring that water supply is of the appropriate quality for consumption and productive use, the department is finalising the water-classification system and regulations.

The Department of Water Affairs has a dedicated team of specialists developing a comprehensive response strategy for the water sector. The development of the strategy is necessitated by a strong call for the sector to adapt to potential effects of climate change.

Proposals from the strategy will be integrated into the revision of the NWRS and will form part of a plan to ensure that water resources are protected, developed and conserved to meet future needs. Among other things, the strategy will look at developing:

- tools for data modelling to track emerging hydrological patterns and the impact on water resources; providing the information to plan confidently
- mechanisms for early-warning systems, including predicting floods and responding to potential risks
- adaptation initiatives that target those catchments that are most vulnerable to climate risks based on predictions
- reconciliation strategies to manage demand in urban centres, where increased urbanisation and industrial development are putting pressure on water resources
- investment strategies to expand the necessary infrastructure for water storage and flood management

- new technologies for water treatment to respond to chemical changes caused by high temperatures
- water-conservation and -demand strategies to ensure efficient water use
- measures to assess carbon footprints from the infrastructure and propose ways of reducing these.

Accelerated Community Infrastructure Programme

Growing demand for water for both domestic and economic use is having a serious impact on water resources. In the Water for Growth and Development Strategy, key priority programmes that will help achieve water security in the country have been identified.

It is in this context that the Department of Water Affairs initiated the Accelerated Community Infrastructure Programme, which was allocated R83 million in the Cape Town, eThekuni and Nelson Mandela metros. This programme is a rapid intervention that seeks to focus on four key areas:

- community water and sanitation infrastructure
- water-conservation and -demand management
- waste-water infrastructure refurbishment
- drought intervention.

This programme has selectively targeted provinces where there were serious challenges relating to drought, cholera, water supply, ageing infrastructure and general shortages of water. Under this programme, the department has identified four priority areas for water conservation and demand-management activities, namely the Vaal River System and the metropolitan areas of Johannesburg; eThekuni; Nelson Mandela Bay; and Cape Town.

The upper Vaal River System has been identified as the most appropriate area to address "illegal" use of water for irrigation purposes. The department is implementing measures to curb this unlawful use of water and to speed up monitoring and enforcement efforts.

The programme also provides for investment in the refurbishment of 20 WWTWs. This intervention is meant to address areas where there is potential risk of cholera, treatment plants exceeding the effluent quality units and exceeding hydraulic capacity, and treatment plants that suffer from mechanical failures or treatment plants that are in areas prone to spillages.

Water-management institutions

The National Water Act, 1998 sets the framework for the management of South Africa's water resources. This framework provides for the establishment of water-management institutions, which include catchment-management agencies (CMAs) and water-user associations (WUAs).

Catchment-management agencies

Chapter 7 of the National Water Act, 1998 provides for the progressive establishment of CMAs, of which there were three in the country by the end of 2011, namely the Breede-Overberg CMA, the Inkomati CMA and the Komati River Basin Water Authority. The purpose of the CMAs is to delegate water-resources management to regional catchment level and to involve local communities in decision-making processes.

The intention is for water-resource management to meet the basic human needs of present and future generations, promote equitable access to water, redress the results of past racial and gender discrimination and facilitate social and economic development.

The initial role of a CMA is communicated in the National Water Act, 1998 as managing water resources in a WMA; coordinating the functions of other institutions involved in water-related matters; and involving local communities in water-resource management. In essence, CMAs are service-delivery agencies and are listed in the Public Finance Management Act, 1999 (Act 1 of 1999).

Water boards

Water boards are established in terms of the Water Services Act, 1997 as government organs. Their primary aim is to provide water services to other water institutions within their respective service areas. Water boards submit annual business plans and policy statements a month before the end of the financial year. The Minister of Water Affairs may direct water boards to change these to meet the requirements of the Water Services Act, 1997.

Thirteen water boards have been set up as financially independent institutions, in terms of the Water Services Act, 1997 and must aim to be financially viable. These are:

- Overberg Water
- Amatola Water
- Lepelle Northern Water
- Pelladrift Water

- Bloem Water
- Magalies Water
- Rand Water
- Botshelo Water
- Mhlathuze Water
- Sedibeng Water
- Bushbuckridge Water
- Namakwa Water
- Umgeni Water.

Water-user associations

According to the National Water Act, 1998, all irrigation boards formed under the Water Act, 1956 must be transformed into WUAs to provide a vehicle for localised users to manage the use of the resource in a more integrated manner.

The membership of the irrigation boards previously consisted of commercial farmers and was based on water allocation which was connected to title deeds on land, with previously disadvantaged groups not having access. The current arrangement requires that the previously marginalised sectors be represented in the WUAs, including domestic water users receiving water through the WUAs' infrastructure, local government institutions, historically disadvantaged farmers, aspiring farmers and environmental concerns.

Smallholder WUAs are mainly existing smallholder irrigation schemes that existed in the former homeland areas, where raw water supply and agricultural activities were managed by government or state-owned development organisations. Smallholder farmers farm mostly on communal land, which belongs to government. Land allocation is administered by the tribal authority through the issuing of Permission-to-Occupy certificates, which, in modern terms, are not regarded as valid security for production loans at financial institutions, since there is no basis upon which banks can repossess and sell land to recover losses on bad debt.

Multisectoral WUAs are cooperative associations of water users established in terms of the National Water Act, 1998. Their role is to undertake water-related activities for the mutual benefit of all members and also manage local water infrastructure, for example, irrigation water-supply schemes. WUAs play an important role in the implementation of poverty alleviation and food-security programmes. There are 13 WUAs, namely:

- Tulbagh
- Kabous River

- Northern Sandveld
- Krom Antonies
- Wolsel
- Onrus
- Duivenhoks
- Kweekvallei
- Oukloof
- Sekhukhune
- Tubatse
- Ilanga
- Tshiping.

Water-related research

Being a water-stressed country, South Africa progressively needs to find innovative ways of managing water resources to ensure that the basic needs of its citizens are met, that social and economic development is not restricted by a lack of or poor quality of water, and that sustainability of water resources and water-dependent ecosystems is achieved.

As reflected in the Water Research Commission's (WRC) mission and its various undertakings, the WRC functions as a "hub" for water-centred knowledge.

It is a networking organisation linking the nation and working through partnerships. The organisation continuously provides novel and practical ways of packaging and transferring knowledge into technology-based products for the water sector and the local and international community.

The WRC continues to play the leading role in building a sustainable water-related knowledge base in South Africa by:

- investing in water research and development
- building sustainable and appropriate capacity
- developing skills for the water sector
- being adept at forming strategic partnerships to achieve objectives more effectively while making optimal use of the latest global information and knowledge and other technologies available.

The Water Research Act, 1971 (Act 34 of 1971), provides for the establishment of the Water Research Fund, which derives income primarily from levies on water consumption.

In supporting the creation, dissemination and application of knowledge, the WRC focuses on five key strategic areas:

- water-resource management
- water-linked ecosystems
- water use and waste management

- water in agriculture
- water-centred knowledge.

The WRC also calls for specific mechanisms to address key strategic issues of national importance. These are dealt with in four cross-cutting domains:

- water and society
- water and the economy
- water and the environment
- water and health.

To ensure that research results are relevant to the broader objectives of water-resource management, the applicability of research in each key strategic area is maximised by addressing

Natural mean annual run-off and ecological reserve (million m³ per annum)

Water management	Natural mean annual run-off ⁽¹⁾	Ecological reserve ^(1,2)
Limpopo	985	156
Luvuvhu/Letaba	1 185	224
Crocodile West and Marico	855	165
Olfants	2 042	460
Inkomati ⁽³⁾	3 539	1 008
Usutu to Mhlatuze ⁽⁴⁾	4 780	1 192
Thukela	3 799	859
Upper Vaal	2 423	299
Middle Vaal	888	109
Lower Vaal	368	48
Mvoti to Umzimkulu	4 798	1 160
Mzimvubu to Keiskamma	7 241	1 122
Upper Orange	6 981	1 349
Lower Orange ⁽⁵⁾	502	69
Fish to Tsitsikamma	2 154	243
Gouritz	1 679	325
Olfants/Doring	1 108	156
Breede	2 472	384
Berg	1 429	217
Total	49 228	9 500

1) Quantities refer to the water-management area under consideration only (water that originates or is required in that water-management area).

2) Total volume given, based on preliminary estimates, impact on yield being a portion of this.

3) Includes Komati catchment in Swaziland (mean annual run-off = 517 million m³/a).

4) Includes Pongola catchment in Swaziland (mean annual run-off = 213 million m³/a).

5) Includes contributions from Senqu and Caledon rivers in Lesotho (mean annual run-off = 4 765 billion m³/a).

Source: Department of Water Affairs

the relationships between water and society, the economy, health and the environment.

The WRC's key objective is to support the development of human resources in the water sector. Research is recognised as an important vehicle for building and developing expertise among water-resource practitioners. Every research project is required to incorporate a strong element of capacity-building, especially among historically disadvantaged individuals.

The Department of Science and Technology and the National Research Foundation are partners with the Department of Water Affairs and the WRC in ensuring that approaches to water research are consistent with South Africa's broad policy on science and innovation.

Working for Water Programme

Invasive alien species cause billions of rands of damage to South Africa's economy every year, and are one of the biggest threats to the country's biological biodiversity.

Invasive alien species are plants, animals and microbes that are introduced into countries, and then out-compete the indigenous species.

Invasive alien plants (IAPs) pose a threat not only to South Africa's biological diversity, but also to water security, the ecological functioning of natural systems and the productive use of land.

They intensify the impact of fires and floods and increase soil erosion. It is estimated that between 6% and 7% of South Africa's annual water run-off is being consumed by IAPs.

Of the estimated 9 000 plants introduced to this country, 198 are classified as invasive. It is estimated that these plants cover about 10% of the country and the problem is growing at an exponential rate.

The fight against IAPs is spearheaded by the WfW Programme. Since its implementation in 1995, more than one million ha of IAPs have been cleared. WfW's aim is to reduce the impact of "water-guzzling" invasive species and protect indigenous biodiversity.

The Department of Water Affairs has joined forces with the Council for Scientific and Industrial Research to make the Vaal Dam the first dam in South Africa to use Internet social media to disseminate information via Facebook and Twitter. Follow @vaal_dam on Twitter or Vaal Dam Levels on Facebook. Updates include information on how full the dam is and other information relating to water affairs.

The project has seen the steady recovery of indigenous biodiversity in cleared areas and wetlands. It has seen the rebirth of flowing streams where riverbeds had been perennially dry.

WfW runs over 300 projects across South Africa. Scientists and fieldworkers use a range of methods to control IAPs. These include:

- mechanical: felling, removing or burning IAPs
- chemical: using environmentally safe herbicides
- biological: using species-specific insects and diseases from the IAPs' country of origin – some 76 biocontrol agents have been released in South Africa against 40 weed species
- integrated: combinations of the above three approaches; an integrated approach is usually required to prevent enormous impacts.

The core business of the programme is to contribute to the sustainable prevention and control of IAPs, thereby optimising conservation and the use of natural resources. In doing so, it addresses poverty relief and promotes economic empowerment and transformation within a public-works framework.

WfW is recognised internationally as one of the most effective programmes for addressing the problem of IAPs, combining environmental issues with social-development objectives.

WfW considers the development of people as an essential element of environmental conservation. It has provided jobs and training to approximately 20 000 people, of whom 52% are women.

Creating an enabling environment for skills training, it is investing in the development of communities wherever it works. Implementing HIV and AIDS projects and other socio-development initiatives are important objectives.

Flood and drought management

The floods experienced by South Africa in the beginning of 2011 as well as breakdowns of infrastructure in municipalities, which then affected the quality of water in rivers, prompted the department to develop a model for the establishment of a rapid response unit to respond to water-related crises and emergencies within a short period of time.

The department's approach to governance and management of the unit has been informed by the substantial intelligence on the vulnerability of municipalities gathered over the last few years, as well as lessons learnt from the emergency response facility.

The scope of the rapid response unit can be summarised as follows:

- responding to crises that result from water and waste-water infrastructure challenges, e.g. cholera outbreaks and sewerage spillages
- augmenting the Department of Water Affairs' capacity to respond to disasters, i.e. floods, droughts and water pollution
- designing and implementing proactive interventions aimed at pre-empting crises before they occur
- implementing small-capital and refurbishment projects
- capacity within the entities reporting to the Minister will also be used for intervention activities.

Dams and water schemes

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.

Dams and water schemes form an integral component of the strategy to meet these objectives. The NWRS provides details on possible major water schemes to be developed in the next 25 years, amounting to about R21 billion at 2004 price levels.

The Department of Water Affairs follows an integrated approach to managing South Africa's water resources. Proposed new water schemes need to comply with the NWRS, requiring that water-demand management programmes be implemented before embarking on new infrastructure development.

Strict environmental-impact assessments must also be performed in accordance with laws and regulations administered by the Department of Environmental Affairs. The guidelines issued by the World Commission on Dams must be followed.

Bulk infrastructure is a critical element of water-services infrastructure and an integrated part of water-services management.

Initiatives to identify and establish new water resources are occurring for both surface and groundwater.

Government has implemented key projects to augment South Africa's water resources:

- The Trans-Caledon Tunnel Authority has procured funding to implement the Mokolo and Crocodile River West Water Augmentation Project's first two phases with a total cost of

about R2 billion, to deliver water to Eskom's new Medupi Power Station and other industries in the area, as well as domestic water to the Lephalale Local Municipality. The first water delivery is expected in 2014.

- In KwaZulu-Natal on the Mooi River, near Rosetta, a R2,2-billion contract was awarded for the construction of the 42 m-high Spring Grove Dam, with a storage capacity of 142 million m³.
- R91,2 million was spent in 2011/12 to raise the Hazelmere Dam, to augment the water supply provided by Umgeni Water to KwaZulu-Natal's north coast.
- Construction of De Hoop Dam to deliver water for domestic and agricultural use in the Greater Sekhukhune, Waterberg and Capricorn district municipalities. The estimated cost of its construction is approximately R3,1 billion. This will deliver water to three million Limpopo residents.
- During 2011/12, the construction of a water conveyance system from the Vaal Dam to Secunda to augment the water supply to Eskom power stations and Sasol was commissioned, comprising abstraction works, a storage reservoir, a high-lift pump station and a 121-km pipeline.

In addition to the infrastructure development currently underway, planning and preparing for the construction of other dams and related infrastructure is also afoot.

These include the completion of the water treatment works and bulk distribution system from Nandoni Dam in Limpopo; the construction of a pipeline from the Flag Boshelo Dam to Mokopane and nearby communities; the completion of feasibility studies and designs for the Umzimvubu and Foxwood dams in the Eastern Cape; the construction of the bulk distribution pipelines and reticulation networks from the Jozini Dam in KwaZulu-Natal and the Groot Letaba Augmentation Project, comprising raising the Tzaneen Dam; and finalising plans for the construction of the N'wamitwa Dam and the associated water-treatment plants and bulk distribution pipelines.

Dam Safety Rehabilitation Programme (DSRP)

The department owns more than 300 dams. In 2004/05, a large number of these were identified as being in need of rehabilitation to bring their condition up to international standards. The DSRP

started in 2005/06. Some R1,35 billion was spent by the end of 2010/11, completing the rehabilitation of 22 dams; R300,8 million was spent in 2010/11 alone.

A number of dams are in various phases of planning and design. The rehabilitation of 13 dams was in progress by the end of 2010/11:

- Molepo, Nsami, Mashashane, Chuniespoort and Rust de Winter in Limpopo
- Klein Maricopoor in the North West
- Elandsdrift, Grassridge, Glen Brock, Mankazana, Laing and Magwa in the Eastern Cape
- Boegoerberg in the Northern Cape.

Groundwater resources

Groundwater, despite its relatively small contribution to bulk water supply (13%), represents an important and strategic water resource in South Africa, since it services between 52% and 82% of community water-supply schemes in the Eastern Cape, Limpopo, Northern Cape, North West and KwaZulu-Natal.

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 meeting the basic water needs of communities, groundwater has 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.

Groundwater also contributes a considerable portion to river flow. This requires reserving a significant share of groundwater resources to protect 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 m³ a year, while some 4 000 million m³ of groundwater (mainly in the dry season) contributes to surface-water flow annually.

Regional and international cooperation and initiatives

South Africa has signed cooperative agreements with a number of countries in the southern African region with which it shares water resources, such as:

- Mozambique and Swaziland on the Inkomati and Maputo rivers

- Botswana, Lesotho and Namibia on the establishment of the Orange Senqu River Commission
- Botswana, Zimbabwe and Mozambique on the establishment of the Limpopo Watercourse Commission
- Lesotho on the Lesotho Highlands Water Project (LHWP)
- Swaziland on the Komati River Development Project.

These cooperative agreements improve South Africa's bilateral and multilateral relations in the African Union (AU). All the countries involved benefit, while sharing development costs.

Strategic bilateral engagements remain critical to advancing peace and security and enhancing water security in the region. In this regard, South Africa has developed strategic relations with neighbouring countries by signing cooperative agreements in water.

In addition to participating in the African Ministers' Council on Water (AMCOW), South Africa is active in watercourse commissions that have been established to manage the rivers it shares with Lesotho, Swaziland, Namibia, Mozambique, Botswana and Zimbabwe.

In August 2011, the Minister of Water and Environmental Affairs, Ms Edna Molewa, signed the agreement for the implementation of Phase Two of the LHWP in Maseru, Lesotho. The implementation of Phase Two will consist of a water delivery system to augment the delivery of water to South Africa and a hydropower generation system. The system comprises the Polihali Reservoir on the Senqu River, a water conveyance tunnel connecting Polihali Reservoir with Katse Reservoir, access roads to the project sites, camps, power transmission lines and administration centres, including social and environmental projects and programmes.

The LHWP supplies about 46 million m³ water a year. The second phase will raise this to 70 million m³.

In March 2011, South Africa hosted a successful World Water Day in Cape Town, which coincided with National Water Week. It was held in partnership with UNHabitat and the AMCOW.

In 2011, strategic talks were held with Egypt, with a view to exchanging knowledge and experience on shared river basins; with Sudan on the feasibility study aimed at identifying areas of collaboration; and with the Democratic Republic of Congo, to negotiate new areas of cooperation

and establish current priorities for the refurbishment of the Katanga Infrastructure Project. Draft agreements were negotiated and signed in 2011.

In pursuit of strategic relations outside Africa, an agreement was signed with Vietnam. Another agreement was reached with China about the renewal of the Memorandum of Understanding on Cooperation in the Field of Water Resources.

Areas of cooperation were agreed to with technical experts from the Netherlands. Funding

opportunities from Germany and Switzerland were explored.

South Africa participated in workshops organised by Mozambique, where social and environmental impact assessments were presented on the completion of the Corumana Dam.

With reference to the multilateral portfolio, a draft position paper on the Department of Water Affairs' engagement with the Organisation for Economic Development was developed.



Acknowledgements

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