



SA YEARBOOK 2009/10
WATER AFFAIRS



While striving to ensure that all South Africans gain access to clean water and safe sanitation, the water sector also promotes effective and efficient water-resource management to ensure sustainable economic and social development.

In 2009, following the appointment of a new administration, the former Department of Water Affairs and Forestry became the Department of Water Affairs.

In 2009, South Africa embarked on a number of programmes to conserve and diversify its water sources. These included desalinating sea water in coastal areas and increasing effluent recycling.

The department also adopted a “zero tolerance” stance on environmental and water crimes. The campaign was expected to be strengthened by the commitment to return environmental courts.

Water is not only central to but is also an excellent catalyst for development. It is for this reason that the Water-Allocation Programme plays a pivotal role in supporting government’s priorities in rural development and land reform.

In 2009, the department announced a framework to ensure that South Africa’s water resources are managed sustainably to meet future demands. Within the context of this strategy, the department embarked on programmes to:

- diversify water-mix, ensuring that other sources of supply, for example, desalination of sea water in coastal areas and strengthening effluent reuse are explored
- intensify public awareness about the value of water to instil a culture of responsibility and change of attitude and behaviour to water
- conserve water by curbing water losses by at least 20% in 2014
- act decisively against defaulters and punish wrongdoing
- strengthen the regulatory capacity and assist municipalities.

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 combined amounts to about 49 200 million cubic metres (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 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.

To facilitate the management of water resources, the country has been divided into 19 catchment-based water-management areas. Eleven of these water-management areas share international rivers.

Over the years, water-resource development and management in South Africa have con-

Important dates:

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



tinuously 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.

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 the 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 total water requirements of the country, 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

Government's goal is to ensure that all people in South Africa have access to potable-quality water and basic sanitation facilities by 2014.

By April 2009, the Department of Water Affairs was managing a cross-sectoral approach to water management in South Africa through its Framework on Water for Growth and Development. The framework represents the Government's commitment to water security for the people, the economy and the environment.

The framework placed emphasis on the life-sustaining importance of water as a scarce resource. Unless the continuous judicious use and effective management of South Africa's water resources are taken on board by every stakeholder, water availability could become a constraint on growth and development in the future.

South Africa's water-management policies and legislation provide for participative water govern-

The Department of Water Affairs plans to spend about R30 billion between 2014 and 2017 on the continuing construction and establishment of the 15 mega-water-resource infrastructure projects.

This will increase the capacity of existing water-resource infrastructure to provide water to strategic installations such as the energy sector (Eskom), the industrial sector (Sasol), the mining sector and for domestic purposes.

Additional infrastructure programmes include an accelerated programme for the construction of the De Hoop Dam, the continued partnership with the Government of Lesotho for the implementation of the proposed Phase Two of the Lesotho Highlands Water Project and implementation of the project to augment water supply to Lephalele for use by Eskom and other petrochemical industries.



ance and through the established water-management and water-services institutions, powers and responsibilities are delegated to relevant levels.

The Department of Water Affairs aims to ensure that South African water is protected from pollution, conserved and used efficiently. This requires the careful management of this valuable resource so that the department can ensure universal access to basic water services to every citizen while also meeting the needs of economic growth in a way that does not threaten the environmental integrity of water resources.

The Department of Water Affairs constantly has to balance the increasing and competing demands on the country's limited water resources, mindful of the fact that water for social development, economic growth and environmental sustainability are all equally important for the success and prosperity of the country.

The Framework on Water for Growth and Development, developed in 2008, is the result of two years of consultations with key players in the water sector. It has been considered and approved by Cabinet.

The framework is a ground-breaking initiative that aims to set in motion a course of action to ensure that there is sufficient water, in both qualitative and quantitative terms, to support South Africa's growth trajectory and development. The department has to ensure that there is sufficient water available for South Africa to achieve its economic-growth targets. At the same time, it has to ensure it meets its 2014 target for universal access to water and basic sanitation.

The framework aims to address specific challenges associated with water-resource availability to enable projected economic growth and social service-delivery programmes. The framework ensures water security until 2030.

It looks at a number of aspects of water, including its availability, usage, threats and people's behaviour. It is premised on the 6% economic-growth target, while aiming to ensure that every person in South Africa has access to safe drinking water.

These two goals should be achieved without compromising the environmental sustainability of the resource. The department is undertaking studies on water reconciliation to achieve a balance in supply and demand for both water-scarce areas as well as areas where there are high levels of use.

In 2009, the Department of Water Affairs was exploring the most cost-effective and appropriate options to augment the country's water supply

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
Nuwejaarspruit Vaal	2 603	Vaal
Pongolapoort	2 445	Pongolo
Bloemhof	1 264	Vaal
Theewaterskloof	480	Sonderend
Heyshope	451	Assegai
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
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

as complementary alternatives to the traditional but expensive augmentation schemes such as the construction of dams and inter-basin water transfers.

These alternatives include water-loss control, water conservation and demand management, effluent reuse or effluent recycling, desalination for coastal locations and groundwater abstraction.

The department engages extensively and intensively with water-sector users to:

- ensure the mainstreaming of water-use requirements in the critical sectoral planning decisions
- effect a change in water-use behaviour among those who negatively affect water resources
- set targets per water-use sector
- implement a mix of mechanisms to effect these changes, which will include regulatory and market-based instruments, self-regulation, awareness and education.

The substantial restructuring of the Department of Water Affairs, which is expected to be completed by 2010/2011, includes:

- establishing catchment-management agencies (CMAs) to perform water-resource management functions
- transferring water-service delivery and operations to water-services authorities (WSAs).

As WSAs are providing water services, the department's role is to:

- act as custodian of the country's water resources
- provide water-services policy and guidelines
- provide ongoing support to the water sector
- act as a water-sector regulator.

To ensure that WSAs have the correct water-resources planning information available to complete their water-services development plans and integrated development plans, the department has initiated the All Towns Reconciliation Study, which is targeting 134 towns in the Eastern Cape, of which 48 were flagged as urgent, and 10 were flagged as extremely urgent.

The focus of the study was on the reconciliation of water requirements and the available resources for each town to be able to provide for water needs in terms of the right "water mix" for each municipality, be it groundwater, surface water, return flows, recycling or rainwater harvesting. A strategy will be developed for each town.

The department remains focused on the phased implementation of the National Water Act, 1998 (Act 36 of 1998), with a particular emphasis on implementing a new organisational structure, which includes:

- establishing the National Water Resource Strategy (NWRS), which will set out the procedures, guidelines and overall strategy for managing water resources
- developing and testing a strategy for compulsory water-use licensing to facilitate equitable access to water resources for historically disadvantaged individuals (HDIs)

- enhancing water-use efficiency
- ensuring compliance with dam-safety regulations and enhancing public safety at water-resource installations
- investigating and implementing appropriate institutional arrangements for the optimal management of the Working for Water (WfW) Programme
- building national capacity to monitor the state of water resources, so that accurate information is used in decision-making about the use and management of water resources
- creating the National Water-Resource Infrastructure Agency to manage and develop national infrastructure and which will incorporate the work of the Trans-Caledon Tunnel Authority.

In accordance with the international best practice of decentralising and democratising water-resource management, the Inkomati CMA (ICMA) has been established. It is the first to be formed by government and is responsible for the protecting, conserving, developing and managing the water resources in South Africa at water-management area (WMA) level.

The central objective of the ICMA is to ensure that water is used to support equitable and sustainable social and economic transformation and development in South Africa.

Water-quality management

The Directorate: Water-Quality Management of the Department of Water Affairs is responsible for the quality management of national water resources in South Africa.

The challenge of water-quality management, within the context of integrated water-resources management, requires a multidisciplinary approach in a multisectoral environment to ensure sustainable total water management from source

New legislation to establish the specialist "Green Scorpions" environmental crime-fighting unit, which will include the "Blue Scorpions", a unit to tackle water-related crime, was completed by mid-2009, while environmental courts were expected to be established in South Africa by 2010. The prospect of a single enforcement unit, from the possible integration of the "Blue Scorpions" and "Green Scorpions", is expected to strengthen the resolve against wrongdoers. The Department of Water Affairs aims to ensure, through the "polluter-pays" principle, that behaviour such as pollution and illegal water use do not go unpunished.



In 2009, the Minister of Water and Environmental Affairs, Ms Buyelwa Sonjica, announced that the Department of Water Affairs was investing R500 million in a programme to intervene in high-risk rural and poor areas where there are water challenges. This special intervention programme focuses on:

- aging infrastructure that leads to discharge of sewerage into rivers
- water conservation in stressed systems such as the Vaal and Umgeni
- areas where there is illegal abstraction, for example, Upper Vaal
- areas where there is no infrastructure and communities are vulnerable to water-borne diseases.

This investment will address sewerage spillages, target specific treatment facilities and asset management, as well as provide technical assistance to municipalities. The department has identified nodal areas for focused interventions which were chosen based on the extent of need for refurbishment, the extent of sewage spillages and the age and dilapidation of the infrastructure.

to supply, including meeting the demands with regard to fitness for use from various sectors.

From a regulatory point of view, water-quality management entails the ongoing process of planning, developing, implementing and administering water-quality management policy; authorising water uses that have, or potentially have, an impact on water quality; as well as the monitoring and auditing of the aforementioned.

The National Water Act, 1998 further enables the Department of Water Affairs to manage water quality through source-directed and resource-directed measures. Source-directed measures include the issuing of licences to water users with a potential impact on the resource.

The Act requires that all significant water resources be classified in accordance with the prescribed classification system.

Drinking-water quality management is the responsibility of municipalities, while the Department of Water Affairs has an oversight and regulatory role in the quality of tap water. The department implemented a countrywide system to assist with the overall management of drinking-water quality.

The department deployed the Municipal Drinking-Water Quality Management System in all WSAs, and completed a pilot of the Waste Water Treatment System in 2007/08.

Special investigations into water-supply interruptions are underway, and every effort is being

made to improve WSAs' management and control systems.

Progress has been made since April 2008, and all WSAs are loading data from more than 3 200 drinking-water sampling points on the Information Management System.

About 94% of the sample points complied with the health requirements of the national standard. As part of its regulatory mandate for drinking-water quality, the Department of Water Affairs will be introducing a new incentive system for municipalities over the 2009, Medium Term Expenditure Framework (MTEF) period.

The department has commenced with its incentive-based regulation programme, the Blue Drop Certification Programme, with the objective of awarding excellent drinking-water quality management in different towns.

Blue Drop certificates will be issued to municipalities that meet drinking-water standards and Green Drop certificates to those that meet the requirements for treating waste water.

The secondary objective is to allow the general public to be adequately and responsibly informed on the regulator's confidence levels in drinking-water quality-management levels per service system (town or city).

Water and sanitation

The percentage of households with access to water infrastructure above or equal to the Reconstruction and Development Programme standard increased from 61,7% in 1994 to 91,8% in March 2009. 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 ever-increasing number of households.

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

As of March 2009, more than 10 million households (77%) had access to sanitation compared to about five million (50%) in 1994.

Government has moved closer to attaining its objective of eradicating the bucket system in formally established settlements. In 1994, 609 675 households used the bucket system, while in March 2009, 9 044 households were using the bucket system. The target date for universal access to sanitation is 2014.

Freshwater Ecosystem Programme

The Freshwater Ecosystem 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; of environmental affairs; and of agriculture, forestry and fisheries. Working for Wetlands champions the protection, rehabilitation and sustainable use of South Africa's wetlands through cooperative governance and partnerships.

In 2008/09, Working for Wetlands rehabilitated 91 wetlands, employing 1 710 people and providing 28 547 training days.

Sanbi is a partner in a nine-year research programme on wetlands that was initiated in 2002 to look at wetland rehabilitation, wetland health and integrity, and the sustainable use of wetlands.

Sanbi and the Water Research Commission funded the development of the Whole Effluent Toxicity Management Series, a set of tools designed to help wetland workers assess the goods and services that wetlands provide, and to measure wetland health.

The National Wetlands Inventory, a pioneering project to map and characterise the wetlands of South Africa, developed a second version of the wetlands map and was working on an improved third version in 2009 to provide higher accuracy and better attribute data. The project has mapped over 114 000 wetlands.

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.

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

A new initiative to monitor precipitation in mountainous areas has been launched. There are 21 operational rainfall stations in the mountains of the Western Cape and five stations are operational 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.dwaf.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.

National Aquatic Ecosystem Health Monitoring Programme (NAEHMP)

The NAEHMP, initially known as the National Aquatic Ecosystem Biomonitoring Programme, is responsible for managing aquatic ecosystems.

Until recently, the programme focused mainly on riverine ecosystems. The short name, River Health Programme (RHP), was adopted for this component of the NAEHMP. However, the original broader focus of the monitoring programme remains valid, namely, monitoring the ecological health of all aquatic ecosystems (estuarine and riverine ecosystems) managed by the department.

The NAEHMP 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 an 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.

The NAEHMP, and in particular the RHP, is regarded as the "flagship" for water-resource quality monitoring in South Africa. 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 support of the South African Local Government Association (Salga), a challenging two-year project to monitor all 169 WSAs on their drinking-water quality has been successfully put in place. By June 2008, close to 90% of all WSAs submitted their drinking-water data on a timeous and ongoing basis. 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 to 95% reported that their water quality complied with the national drinking-water standard.

Another international obligation is reporting 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.

Municipal Infrastructure Grant (MIG)

The MIG, a conditional grant from national government to local government to support investment in basic municipal infrastructure to eradicate backlogs, was implemented in April 2004.

The purpose of the MIG is to facilitate and ensure more effective and integrated service delivery by local government and the Department of Water Affairs, working with the Department of Cooperative Governance and Traditional Affairs in seeking to ensure that funds are made available. (See Chapter 11: *Government system*.)

The department's support to municipalities comprises:

- planning support regarding integrated development plans (IDPs) and water-services development plans (WSDPs)
- monitoring the water-purification and wastewater treatment works' operations
- facilitating project selection, feasibility studies and service-level options
- supporting the implementation of a tariff structure and the Free Basic Water (FBW) Policy
- supporting the Section 78 process (division of powers and functions for water services between district and local municipalities) and selecting water-services providers
- training councillors and officials in water-services and water-demand management
- mobilising resources to support municipalities.

Policy and legislation

The Constitution of the Republic of South Africa, 1996, and the 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 (Act 108 of 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.

National Water Act, 1998

The Act provides for:

- integrated management and sustainable use of surface water and groundwater
- 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 irriga-

tion, 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.

National Water Resource Strategy (NWRS)

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 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. These instruments will provide 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.

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 WSDPs required by municipal legislation within the framework of IDPs
- 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.

Water Allocation Reform (War) Programme

The War Programme is a proactive approach towards redressing race and gender inequities regarding water use – where “water use” refers to promoting access to water for productive purposes (and not to the provision of basic water services).

This includes actions ranging from promoting applications from HDIs to supporting the licence-evaluation process to promote equity, as well as implementing the compulsory licensing process itself. Through this programme, the Department of Water Affairs is developing and overseeing the implementation of frameworks (policies, strategies, guidelines and procedures) for compulsory licensing, and the allocation of water between and among users.

Awareness material on the programme has been developed and is available in the appropriate official languages where the programme is being implemented. The material includes pamphlets on compulsory licensing and understanding the verification and validation of water use, and a booklet on the productive use of water.

A toolkit of methodologies in support of the War Programme has also been developed. The toolkit uses the position paper as its basis, and outlines practical implementation methods that promote the goals of the programme. The department’s intention is to speed up the process and to improve the efficiency with which licences are evaluated within the Batho Pele prescripts.

As key role players in the programme, provincial and local governments, through their provincial growth and development plans and IDPs, are central to informing, and being informed by, the way water allocations are made in their areas of jurisdiction. The awareness material and toolkit assist municipalities in determining water requirements in IDPs – in terms of WSDPs, and other plans, for example local economic development, land use, agriculture and the environment.

The Olifants Basin is one of the pilot projects of the War Programme, and aims to re-allocate water to deal with the imbalances of the past.

One of the major challenges for the Olifants Basin is the issue of water pollution owing to mining activities, power generation and other land-use activities. These challenges are worsened by limited capacity to monitor and intervene.

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 CMAs and water-user associations (WUAs).

Catchment-management agencies

Through the Institutional Realignment Project, the Department of Water Affairs has begun to rationalise water-management institutions. The originally planned 19 CMAs have been reduced to nine, and will fall under the department's leadership and control.

One of the primary objectives of the project is to rationalise the number of institutions reporting to the Minister of Water and Environmental Affairs and the department for effective regulation and accountability in the implementation of the National Water Act, 1998 and the Water Services Act, 1997.

New proposals for institutional models have been developed. These rationalised and streamlined institutions will ensure that water-resources infrastructure is developed, operated and maintained in a way that takes into account enterprise-wide risk management, improved asset-maintenance and management programmes, and improved revenue management.

In addition to the Framework on Water for Growth and Development, the implementation of the strategic framework for water services continues. Water-service functions are performed by the WSAs, municipalities designated as WSAs in terms of the Water Services Act, 1997. There are 145 WSAs and it is the duty of each one to ensure that all citizens within its area of jurisdiction have efficient, economical, affordable and sustainable water services in terms of Section 11 of the Water Services Act, 1997.

The significant developments in the sector since the Act was passed, such as policy and legislation as well as legal developments, particularly in the sphere of local government, have prompted the need for a review of the Act. The new National

Water Services Bill has been drafted and is awaiting the completion of the restructuring of a number of CMAs.

Water boards

Water boards have been established as service-providers that report to the Minister of Water and Environmental Affairs. The boards manage water services in their supply areas and provide potable water at cost-effective prices.

These water boards include: Albany Coast Water, Ikangala Water, Overberg Water, Amatola Water, Lepelle Northern Water, Pelladriift Water, Bloem Water, Magalies Water, Rand Water, Botshelo Water, Mhlathuze Water, Sedibeng Water, Bushbuckridge Water, Namakwa Water and Umgeni Water.

The impact of their financial performance on the Department of Water Affairs has been limited. Apart from providing seed funding to some of the newly formed water boards, and rendering operating subsidies where they have undertaken specific functions on behalf of the department, the department has only had to provide financial assistance in exceptional circumstances.

Water-user associations

A WUA is a cooperative association of individual water users who wish to undertake water-related activities for their mutual benefit. The specific nature of the service that a WUA provides differs from case to case. A WUA serves its members and its design conforms to its members' specifications.

A WUA may be established for a range of activities, including stream-flow reduction, treatment of effluent and waste and its disposal and control of the use of water for recreational and/or environmental purposes. Upon establishment, a WUA carries out its principal functions as contained in its constitution.

Alongside its principal functions, a WUA may have a range of other functions that affect its structure and management. In terms of the National Water Act, 1998, such functions may be performed only if they do not limit the capacity to perform the organisation's principal functions or financially prejudice the institution and its members.

A common example of such an ancillary function is the provision of management services and training to water-services institutions and rural communities.

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 a 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 in 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 the

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

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
Olifants	2 042	460
Inkomati ⁽³⁾	3 539	1 008
Usutu to Mhlataze ⁽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
Olifants/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 Sengu and Caledon rivers in Lesotho (mean annual run-off = 4 765 billion m³/a).

Source: Department of Water Affairs

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

The WRC's key objective is supporting the development of human resources in the water sector. Involvement in 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 HDIs.

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 (WfW) Programme

Invasive alien species are causing 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. IAPs can divert enormous amounts of water from more productive uses and invasive aquatic plants such as the water hyacinth, agriculture, fisheries, transport, recreation and water supply.

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 being 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, which is administered through the Department of Water Affairs. This programme works in partnership with local communities, to whom it provides jobs, and also with government departments, including the departments of environmental affairs; tourism; agriculture, forestry and fisheries; trade and industry; provincial departments of agriculture, conservation and environment; research foundations; and private companies.

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

- Mechanical methods: Felling, removing or burning IAPs.
- Chemical methods: Using environmentally safe herbicides.
- Biological control: Using species-specific insects and diseases from the IAP's country of origin. Some 76 biocontrol agents have been released in South Africa against 40 weed species.

- Integrated control: Combinations of the above three approaches. An integrated approach is 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.

In 2009, the WfW was in its 14th year, had more than 30 000 employees across South Africa and had cleared about two million ha of land of IAPs.

Flood and drought management

The South African Disaster-Management Policy and ensuing legislation brought about a major shift in focus from reactive to preventative and mitigative disaster management.

From a flood-management perspective, the South African focus has shifted from primarily structural to non-structural, accentuating the value of, for example, floodplain zoning and flood warnings.

Draft regulations for support to resource-poor farmers were published, and support to these farmers was expected to be increased during 2009.

On 1 April 2009, the former Minister of Water Affairs and Forestry, Ms Lindiwe Hendricks, hosted an event to celebrate the achievement of significant milestones with the implementation of the R2,7-billion Vaal River Eastern Subsystem Augmentation Project (Vresap), aimed at securing water delivery to the Eskom power stations and to Sasol industries located in the Mpumalanga highveld.

Communities residing along the route of the pipeline have benefited from the project. Many previously unemployed adults and youth at Vaal Marina and in the area of Charl Cilliers, situated along the pipeline route of about 30 km south of Sasol's plant outside Secunda, were trained and employed.

This project contributed to the achievement of government's objectives for promoting Broad-Based Black Economic Empowerment. Socio-economic policies were implemented to maximise employment, procurement and training opportunities for local communities.

Other achievements of the Vresap include the rescuing of endangered plants, rehabilitating roads, dust control and rehabilitating working areas and quarries.



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 (EIAs) 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. In the previous two years a total budget of about R750 million has been utilised.

The committed budget for 2009/10 was R611 million and the budget allocated for 2010/11 is R839 million.

In 2009, five projects were completed, 23 were in construction phase, 11 in tender/design phase, and 47 feasibility studies were undertaken. The budget allocated may appear a lot but it is a mere fraction of the total need for regional bulk infrastructure in South Africa, which is estimated to exceed R70 billion.

Initiatives to identify and establish new water resources are occurring for both surface and groundwater. In 2009, the De Hoop Dam was under construction at a cost of R5,5 billion, the Nandoni Dam was being completed at R403 million, the Olifantspoort schemes were being implemented and the Lephallale Transfer Scheme was underway with an estimated cost of R20 billion.

The allocations for the implementation phase of the De Hoop Dam Project was fully provided for in the department's budget for the Orange River Water-Resource Development Project.

The De Hoop Dam Project aims to provide water to various communities in the Nebo Plateau area, and to mines and industry. In mid-2009,

the relocation of graves was completed, a site office was established, and the realignment of the P-169 (R555) road was underway.

The Orange River Water-Resource Development Project aims to develop distribution links to Steelpoort, Olifantspoort, the Lebelelo WUA, Roosenekal, Jane Furse, and the Nebo Plateau and Mokopane areas. A record of implementation decisions for Phases Two B to D and H was issued to the Department of Water Affairs.

A draft directive to the Trans-Caledon Tunnel Authority has been prepared to fund and implement the commercial component of phases two B to I. The Minister of Water Affairs has approved and signed the memorandum of agreement addendum with individual mines and the Joint Water Forum, and a process has been initiated to draw up the associated off-take agreements with the water users, which are a prerequisite for secure project funding from the private sector.

Nandoni Water Treatment Works and Distribution Scheme (60 megalitres/day) aims to supply water to the Vhembe District Municipality. In mid-2009, civil structures of the water-treatment works were completed to allow access for work on the mechanical contracts. Civil work on three pump stations was complete. Construction of reservoir NR6 was completed to roof level. The construction of a reservoir at Valdezia had begun.

Nwamitwa Dam aims to provide an additional yield of 50 million m³ per year to meet growing primary water-supply requirements projected to 2025. In 2009, the dam was in the design phase, with geotechnical investigations, the development of the civil engineering plan for bulk infrastructure, and the scoping phase of the EIAs underway.

Mokolo River's augmentation aims to supply 45 million m³ per year to increase the water supply to Matimba Power Station, Grootegeluk Mine and Lephallale Municipality, and for irrigation downstream of the dam. For Phase One of the project, designs of a new pipeline from the Mokolo Dam to Lephallale were drafted in 2009.

Mzimkulu River's off-channel storage dam will ensure a reliable water supply to the northern part of the lower south coast in dry periods.

The raising of Clanwilliam Dam will provide an additional yield of 10 million m³ per year.

The lower Sundays River Government Water Scheme Extension will extend the scheme to expand irrigation, with an emphasis on establishing and supporting resource-poor farmers in identified areas.

Inyaka Pump Station and Water-Treatment Works aim to provide reliable water supply of around 50 megalitres per day to the Bohlabela District Municipality.

The Dam Safety Rehabilitation Programme aims to assist dams in need of rehabilitation, namely:

- Majola
- Magwa
- Albert Falls
- Rust de Winter
- Kromellenboog
- Klein Marico
- Elandsdrift
- Nzhelele
- Grassridge
- Glen Brock
- Tsojana
- Mnyameni
- Mhlanga
- Mankanzana

and those in urgent need, namely:

- Nsamo
- Molepo
- Chuniespoort
- Acornhoek
- Bospoort
- Mashashane
- Gcuwa
- Toleni
- Lakeside
- Belfort Dam.

These dams have been identified as having inadequate spillway capacity to handle big floods. About R514 million has been budgeted over the MTEF from 2009/10 onwards for the next three years for the rehabilitation works.

The Dam Safety Rehabilitation Programme provides for the rehabilitation of 160 dams in all the provinces. Over the MTEF period, 59 dams were prioritised. The project started in 2007/08 with seven dams. Progress on the programme has been satisfactory.

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

The Berg Water Project in Franschhoek in the Western Cape was officially inaugurated by former President Kgalema Motlanhle in March 2009.



The Berg Water Project is the culmination of a 14-year strategic integrated planning process by the Department of Water Affairs to identify appropriate measures to address the water shortage in the Western Cape.

Implemented by the Trans-Caledon Tunnel Authority, the project increases Cape Town's water supply to 523 million m³ per year.

The dam supplies an incremental historical firm yield to the Western Cape water system of 56 million m³ per year.

Cabinet approved the construction of the R1,5-billion project in 2002, which comprises the Berg River Dam and the Supplement Scheme.

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. All the countries involved benefit, while sharing development costs.

South Africa is increasingly seen as a leader in addressing the pressing water and sanitation challenges faced by the poor and by people living in rural areas. This view was supported during the launch of the 2006 United Nations Development Programme's *Human Development Report* in the Western Cape.

In addition to participating in the African Ministers' Council on Water, 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 December 2008, Cabinet approved the second phase of the LHWP. Construction of a 2,3 million m³ dam would start from 2011 in the Maluti mountains. The LHWP supplies about 46 million m³ water a year. The second phase will raise this to 70 million m³.

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