




2016/17 SOUTH AFRICA YEARBOOK

WATER AND SANITATION

The Department of Water and Sanitation's (DWS) legislative mandate seeks to ensure that the country's water resources are protected, managed, used, developed, conserved and controlled in a sustainable manner for the benefit of all people and the environment.

The DWS is mandated to develop a knowledge base and implement effective policies, procedures and integrated planning strategies both for water resources and services.

This entails adhering to the requirements of water-related policies and legislation, including constitutional requirements, that are critical in delivering on the right of access to sufficient food and water, transforming the economy and eradicating poverty.

The DWS's strategic objectives are to:

- ensure efficient water usage by supporting municipalities to implement water conservation and demand management programmes continuously
- maintain a reliable and equitable supply of water by developing new and updating existing reconciliation strategies for the water management areas in Richards Bay by March 2016, Limpopo North by March 2017 and Mahikeng by March 2018
- generate information that is used to inform decisions on programmes for water management by improving the monitoring of water resources, through the development of a hydrological water monitoring network system, to enable the review of all existing water monitoring networks by March 2017
- ensure the protection of water resources by developing an integrated water quality management strategy to determine resource quality objectives for 11 river systems by March 2018.

Legislation

The DWS published the draft regulations requiring that the abstraction of water for irrigation purposes be limited, monitored, measured and recorded for public comment.

In terms of the National Water Act, 1998 (Act 36 of 1998), the Minister of Water and Sanitation must publish regulations in terms of Section 26 of the Act, which requires that the abstraction of water for irrigation of crops should be limited, monitored, measured and recorded.

The regulations limit the abstraction rate, prescribe procedures, give powers to authorities and define offences. These regulations are necessary for effective monitoring and enforcement of compliance to the limits and conditions of water use authorisation.

South Africa's Constitution enshrines the basic human right to have access to sufficient water as well as a safe and healthy environment.

Government fulfils these rights through the DWS, assisted by specific legislation:

- The National Water Act of 1998 ensures that South Africa's water resources are protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner, for the benefit of all people.
- The Water Services Act, 1997 (Act 108 of 1997), prescribes



the legislative duty of municipalities as water-service authorities to provide water supply and sanitation according to national standards and norms. It also regulates water boards as important water service providers and gives the executive authority and responsibility to the Minister of Water and Sanitation to support and strengthen the capacity of municipalities to manage their own affairs, exercise their powers and perform their functions.

- The Water Services Act of 1997 places an obligation on the Minister to maintain a National Water Services Information System and to monitor the performance of all water services institutions.
- The Water Research Act, 1971 (Act 34 of 1971), provides for the promotion of water-related research through a Water Research Commission (WRC) and a Water Research Fund.
- The National Environmental Management Act (Nema), 1998 (Act 107 of 1998), makes provision for cooperative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that promote cooperative governance and procedures for coordinating environmental functions exercised by organs of state.
- The National Water Policy is underpinned by three fundamental principles for managing water resources: equity, (environmental) sustainability and efficiency.

Sanitation provision is governed by the Strategic Framework on Water Services (2003) and the Water Services Act of 1997.

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 general authorisation, have a statutory obligation to register. This includes the use of surface and groundwater.

Other uses 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 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.

To promote sustainable and equitable water resource management, the department has developed and continues to update a range of strategies for water management.

Transformation

In pursuance of the transformation agenda, the DWS was in

mid-2017 moving towards *presenting* the National Water and Sanitation Bill that will undergo parliamentary processes and be published for public consultation.

The objective of the Bill is to radically transform the water and sanitation sector across the value chain and create an enabling environment for the delivery of basic water and sanitation services to communities that were historically disadvantaged; thereby enhancing access, equity and sustainability.

The department will also ensure that the establishment of the Water and Sanitation Infrastructure Agency finds traction while pursuing the consolidation and rationalisation of the water boards to establish wall-to-wall water boards.

The Water Use Licence regulatory framework has been revised in accordance with the integrated licence approach. In addition, the regulations for the metering of water for irrigation purposes have been gazetted for public comments to be finalised during 2016.

Budget and funding

The budget allocation for the DWS for 2016/17 was R15,2 billion. This took into account all the policy and strategic imperatives as well as the implementation of the Annual Performance Plan for 2016/17.

Over the medium term, this budget is expected to grow to slightly more than R16 billion by 2017/18 as the department strives to improve the delivery of service to the people.

Over the medium term, the DWS will continue to focus on water infrastructure, including raw water infrastructure such as dams and canals; bulk infrastructure such as water treatment works, and water services infrastructure such as reservoirs and pipelines to households.

Raw water infrastructure

The DWS is responsible for the design, construction, commissioning and rehabilitation of raw water infrastructure, including dams and bulk distribution systems.

Three raw water projects are expected to be completed over the Medium Term Expenditure Framework (MTEF) period at an estimated total cost of R6,1 billion.

Spending in the subprogramme is still set to increase at an average annual rate of 10,5% from 2015/16 to 2018/19.

Bulk infrastructure

To ensure that water is available for households and farmers, the DWS will complete two mega projects (project cost is more than R400 million) and 12 large water and wastewater infrastructure projects (project cost is more than R250 million but less than R400 million) over the medium term. These are funded through the regional bulk infrastructure grant, which is allocated R15 billion over the MTEF period.

Examples of these projects:

- The Xonxa Dam water supply to Lukhanji municipality in Eastern Cape, at a total project cost of R444 million. This project will mitigate the impact of the current water shortfall and benefit the entire municipal population of 52 050 households.

- The Wolmaransstad wastewater treatment works in the Maquassi Hills municipality in North West, at a total project cost of R154 million. The project entails upgrading the sewage treatment works to double its treatment capacity to meet the growth in sewage volumes arising from development in the area. The project beneficiaries are the existing 12 700 households and the households projected to be established in the area over the next 20 years.

Water services infrastructure

To improve household access to water and sanitation, the DWS will provide funding and institutional support to municipalities and other implementing agents to complete 234 small water and wastewater services projects (project cost is less than R250 million) over the MTEF period.

The funding is provided through the new water services infrastructure grant, which will receive R12 billion over the MTEF period. Most of the grant is allocated to the 27 priority rural district municipalities. These projects include the provision of water from tankers, boreholes, standpipes and pipelines, and the refurbishment of water treatment works.

Sanitation services

To ensure that the 32 500 remaining sanitation buckets in formal areas are replaced with adequate sanitation services by the end of 2016/17, a total of R350 million was allocated to extend the timeframe of the bucket eradication programme. The decrease in the Water and Sanitation Services programme in 2017/18 reflected the completion of the bucket eradication programme.

Regulatory function

To complement infrastructure delivery, the DWS develops and implements integrated planning strategies and effective policies and procedures, and maintains data management systems.

Over the medium term, the department will strengthen its regulatory function by finalising pricing regulations for full cost recovery on water schemes and will continue the process of establishing a water regulator.

Drought relief

The department reprioritised approximately R502 million in 2015/16 for drought relief activities, which included procuring water tankers, delivering water, protecting springs, and refurbishing and drilling boreholes.

In 2016/17, South Africa was in the midst of the worst drought in the previous 100 years and the severest for the Western Cape in the last 104 years. This drought not only affected South Africa, but also the rest of the world because of global warming and climate change.

Even after an unanticipated rainfall period thanks to a tropical cyclone to the south of the country in the beginning of 2017, breaking some of the drought in the inland areas, the drought persisted in other other areas with devastating consequences.

By May 2017, the total capacity of the 215 major dams measured weekly was at 72,6%. It was estimated that it would take at least two to three years to fully recover; with the recovery



period even worse for the Western Cape, with its winter rainfall.

Policies and strategies

National Water Resource Strategy (NWRS)

The NWRS2 sets out the vision and strategic actions for effective water management. These included the security of water supply, environmental degradation, and pollution of resources.

The NWRS2 outlines the key challenges, constraints and opportunities in water resource management and proposes new approaches that ensure a collective and adequate response for the benefit of all people in South Africa.

The strategy also responds to the priorities set by Government in the National Development Plan and National Water Act of 1998 imperatives that support sustainable development.

It is centred on three key objectives:

- Water supports development and the elimination of poverty and inequality. The strategy recognises that the manner in which water was allocated in the past was unequal and favoured certain sections of the population. The intention, therefore, is to redress past imbalances in the manner in which water was allocated.
- Water contributes to the economy and job creation.
- Water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner.

The NWRS2 also focuses on water conservation and the management of water demand as key priorities.

Raw Water Pricing Strategy

There have been continued efforts to reform and realign the water value chain so that it can achieve government's objectives since 1994.

These include ensuring equitable access to water and sanitation, the sustainable use of water for social and economic benefit, and ensuring the sustainability of water resources and water-services delivery.

As part of this process, the DWS is looking at pricing, financing and economic regulation reforms in the water sector. This project will review the raw water pricing strategy, develop infrastructure funding models and recommend an appropriate model and institutional arrangements for an economic regulator for water.

It is generally agreed that pricing and economic regulation play a key role in the provisioning of infrastructure by assuring necessary investments to support socio-economic growth and ensuring that services are widely available and accessible and priced at levels that support current and future needs.

The project will contribute to the following:

- the revision of the Raw Water Pricing Strategy to ensure equitable and appropriate raw water tariffs that will enable sustainable operation and management of raw water infrastructure and will fund catchment management
- funding/financing models for water resources infrastructure
- the establishment of an economic regulator for the entire water value chain.

The project is strategic in nature and will enable the DWS to have sound water-pricing policies, cost-reflective tariffs for the

entire water value chain in South Africa and a good funding framework for infrastructure. The project is divided into three work streams, each to be led by the DWS together with different institutions to provide support.

National Groundwater Strategy

Groundwater is a strategic resource in many parts of South Africa, especially in rural areas.

It also plays an important role in the supply of water to small towns and villages in the drier parts of the country.

There is considerable potential for additional development of groundwater resources to augment existing resources.

The need for improved groundwater management to ensure sustainable and efficient use of the resource was recognised in NWRS-1 and led to the formulation of a National Groundwater Strategy through which strategic actions were undertaken.

In 2016, the DWS issued a gazette to limit urban water use by 15% and irrigation use by 20%.

Reuse Strategy

The DWS has developed a water reuse strategy to encourage informed decisions relating to water reuse.

Reuse could be increased significantly with return flows in coastal cities, where it would otherwise drain into the sea.

In coastal cities, water reuse and desalination compete as two options for water conservation.

Reuse is becoming increasingly acceptable and feasible owing to increasing shortages, improved purification technology and decreasing treatment costs. Membrane technologies, also used for desalination of seawater, have become more affordable and have improved.

The reuse of treated wastewater would be managed to ensure public health safety.

Infrastructure upgrades and bilateral agreements

The DWS made good progress with the preparatory work of the Lesotho Highlands Water Project (LHWP), which is expected to begin in 2019.

The Polihali dam, the Polihali-Katse transfer tunnel and other infrastructural aspects of the LHWP Phase 2 should be completed by 2024. Once Phase 2 has been completed, the amount of water supplied to South Africa through the LHWP will progressively increase from 780 million m³ to about 1,27 billion m³ a year over the following 20 years.

There is progress in the Mokolo and Crocodile River pipeline project, which will transfer water through a 46-km pipeline and pump station from the Mokolo Dam to the Lephalale area.

The raising of the Hazelmere Dam wall will incorporate a Piano Key Weir, which is cutting-edge technology in dam-building. The additional water that will become available from this project is aimed at ensuring the supply of water and supporting the development of human settlements, King Shaka Airport and the Dube Trade Port.

The raising of the Clanwilliam Dam started in October 2015 at an estimated cost of R2,5 billion. The raising of the dam will also include dam safety measures to ensure the stability of the

embankment. The construction of the N7 realignment started in August 2014 and is scheduled for completion in March 2017.

Three quarters of the extra water that will be available from this project will be reserved to resource poor farmers.

The DWS is proceeding with the planning of the Mzimvubu Water Project, which entails the development of a multipurpose dam (the Ntabelanga) to supply new irrigation development, and the Lalen Dam for hydropower generation.

The project will also provide domestic and industrial water requirements in the Eastern Cape.

The department has initiated the raising of the Tzaneen Dam and construction of the new N'wamitwa Dam for the Groot Letaba River Water Development Project in Limpopo. The total estimated cost of the project is R4,2 billion with a projected completion date of 2019.

Bilateral meetings with the Department of Energy and Water Development from Zambia was held in January 2016.

Like most other countries in the Southern African Development Community, Zambia was also affected by drought. Water supply in urban areas was intermittent, with a supply of 16 hours a day on average. The highest intermittency had been measured in the small Luapula Utility, with six hours per day.

Future partnerships were being set to develop where both ministries can share knowledge and best practices on how to deal with water development as a key issue.

South Africa was keen to get water from the Zambezi in the near future to augment water supply to the Limpopo region.

There had also been many discussions with Zimbabwe at a bilateral level. An agreement on the cooperation on water resources management and the establishment of a joint water commission was concluded with Zimbabwe in April 2015.

Rainwater harvesting

The DWS supports a national rainwater harvesting programme, which has a narrow but important focus on the construction of above and below-ground rainwater storage tanks by rural households for food gardens and other productive water uses.

Several municipalities now use roof rainwater tanks for domestic purposes. These have been found to be particularly effective when used in conjunction with other water supply options.

Though there are no hard figures yet on how many cubic millimetres per year rainwater harvesting can contribute, it is an option that can be implemented in a short timeframe.

Rainwater harvesting gives people who live in areas where reticulation has not as yet been implemented access to water. The programme targets rural communities through the installation of tanks and awareness campaigns.

Desalination strategy

The department has developed a supporting desalination strategy, which also includes desalination as a technology for treating water other than seawater for water reuse. Desalination of seawater could potentially provide an unlimited resource of fresh water. However, the rising cost of energy may be a deterrent.



As with other infrastructure projects with potential environmental impacts, the planning for a desalination plant will have to undergo an environmental impact assessment in compliance with the Nema of 1998.

The DWS will ensure that desalination is considered as an option for meeting future water requirements, in particular in coastal cities where there is sufficient electricity for desalination.

The target is not only to implement desalination in several locations in South Africa, but also to become an international knowledge centre in this particular field.

Role players Consolidated water boards

The primary activity of water boards is to provide water services (bulk potable and bulk wastewater) to other water services institutions within their respective service areas.

They may perform other activities under conditions set out in the Water Services Act of 1997. In certain situations, the Minister of Water Affairs may direct water boards to amend their business plans to meet all the requirements of the Water Services Act of 1997. By mid-2016, there were nine water boards in South Africa.

Rand Water

The entity's core mandate is to abstract raw water, which is then treated, transported, stored and finally delivered as potable water to municipalities and to some mines and industries around Johannesburg.

While Rand Water supplies water to approximately 12,3 million consumers in Gauteng, its areas of operations have expanded to include parts of Limpopo, North West, Mpumalanga and the Free State.

Rand Water serves between 16 million and 19 million people, and 98% of its water abstraction is from the Vaal river system. Municipal customers account for 90% of total demand, with the balance being mainly direct supply to mines.

Spending on providing bulk water was projected to grow from R7,4 billion in 2016/17 to R10,3 billion in 2019/20 because of increases in raw water purchase costs, energy costs, chemical costs and labour costs.

Water purchases are expected to increase at an average rate of 13,5% and chemical costs at 17%. This is because of the inclusion of a charge for acid mine drainage, and deteriorating water quality at the Vaal catchment management area as a result of drought and flood conditions.

Rand Water derives its revenue from the sale of bulk water and work done on behalf of municipalities and the DWS. Total revenue was expected to grow at an annual rate of 14,7% over the medium term from R10,9 billion in 2016/17 to R16,5 billion in 2019/20, owing to projected tariff increases, from R6,4 per kilolitre in 2016/17 to R8,2 per kilolitre in 2019/20.

Trans-Caledon Tunnel Authority (TCTA)

The TCTA is responsible for the development of bulk raw-water infrastructure. It also provides an integrated treasury management and financial advisory service to the DWS, water boards, municipalities and other entities that are linked to bulk raw-water

infrastructure.

The TCTA is primarily responsible for off-budget projects. It also plays an important role in providing financial advisory services (structuring and raising project finance, debt management and tariff setting), project implementation services, and other technical support to the DWS and water boards.

Over the medium term, the authority will focus on planning Phase 2 of the Lesotho Highlands water project and finding a short-term solution to acid mine drainage in the Witwatersrand.

These activities were expected to drive an increase in total expenditure at an average annual rate of 10,4% over the medium term, driven by expenditure in goods and services related particularly to operational and maintenance costs.

The TCTA plans to improve business processes over the medium term to deliver projects in a timely and cost-effective manner through improving key internal processes such as the turnaround time of the procurement of goods through increased efficiency. For projects where construction is completed, the TCTA ensures the debt is managed over the lifetime of the project and repaid in such a manner that the tariff remains constant in real terms, thereby ensuring affordability to the user.

Umgeni Water

Umgeni Water works with the DWS to build regional bulk water infrastructure that will enable it to provide bulk water and sanitation services, and serve water services institutions in KwaZulu-Natal.

The entity's focus over the medium term will be on planning, constructing, operating and maintaining regional bulk infrastructure in its service area.

It will take more responsibility for regional water resources infrastructure to achieve greater integration with bulk water and sanitation systems.

These activities will see a significant growth of expenditure in bulk water and wastewater treatment services.

To support Umgeni Water's rural development drive, R1,1 billion has been set aside for regional bulk infrastructure projects over the medium term.

The major projects that the entity will focus on over the medium term include the Mshwati bulk water supply, Greater Mpofana bulk water supply project and Phase 1 of the Lower Thukela bulk water supply project. The budget for acquisition of assets declined by 12,7% from R2 billion in 2016/17 to R1,3 billion in 2019/20, as it is expected that most projects will be completed towards the end of the medium term.

Water Trading Entity (WTE)

The WTE is mandated to undertake the construction of new water infrastructure such as dams, bulk distribution systems and pipelines, reservoirs, canals and wastewater treatment infrastructure through the water infrastructure build programme; and the rehabilitation and refurbishment of existing water resource infrastructure through the dam safety rehabilitation programme to ensure a sustainable water supply for both domestic and industrial use.

The entity plans to complete the construction of three raw water projects over the medium term.

The first is Mdloti River water development project in 2017/18,

which will entail the raising of Hazelmere Dam wall to increase the water supply to Umgeni water for distribution to the KwaZulu-Natal north coast.

The second project that the entity plans to complete is the construction of the Groot Letaba River development project to meet the growing demand in the Tzaneen area.

The third project is Phase 2D of the Olifants River development project, which is the construction of a bulk distribution system between Steelpoort and Mooihoek.

The entity plans to complete these three projects in 2019/20.

Other new projects the entity anticipates to undertake over the medium term include Phase 2 of the Lesotho Water Highlands project, the long-term solution for acid mine drainage, Phases 2B and 2C of the Olifants River water resource development project, Phase 2A of the Mokolo Crocodile water augmentation and Phase 2 of the Mooi-Mgeni transfer scheme. These will be implemented by the TCTA.

The WTE will also focus on the operations, maintenance and refurbishment of existing infrastructure. The key infrastructure projects in this spending category will include the rebuilding of the Vlakkfontein canal and the rehabilitation of Boskop, Vaalharts, Ncora, Pongolapoort, Nzhelele and Lindleyspoort canals.

The entity plans to complete 90% of scheduled maintenance on this project each year with a provision for 10% deviation.

The entity will continue to supply raw water to strategic users such as industry, water boards and municipalities.

Water resources management activities such as monitoring the eco-status of 71 rivers each year remain an integral part of the WTE's work.

The entity plans to reduce the number of days for the payment and collection of outstanding debt from 150 in 2015/16 to 100 each year over the medium term. As a result, over the medium term, the revenue from the sale of raw water is expected to grow annually by 9%.

Other role players

The Breede-Gouritz Catchment Management Agency lays a key role in the use, protection and development of water resources in the Breede-Gouritz water management area.

The Inkomati-Usuthu Catchment Management Agency plays a key role in the use, protection, and development of water resources in the Inkomati-Usuthu water management area.

The Komati River Basin Water Authority was established in terms of a treaty between South Africa and Swaziland relating to the water resources of the Komati River Basin. The basin primarily comprises the Driekoppies Dam in South Africa, commissioned in 1997, and the Maguga Dam in Swaziland, commissioned in 2002. The authority is governed by the Joint Water Commission, whose members are officials from the governments of Swaziland and South Africa.

The WRC was established in terms of the Water Research Act of 1971 and is listed as a public entity. The commission's mandate is to conduct research on water by determining needs and priorities for research, stimulating and funding water research, promoting the effective transfer of information and technology, and enhancing knowledge and capacity-building in



the water sector. Research is informed by government policies, needs, and international trends.

Households access improved drinking water

As of 2016/17, 92,5% of households across the nation have had access to improved drinking water sources, according to General Household Survey Series VIII: Water and Sanitation, 2002 – 2016 report.

The report, which was released by Statistician General Pali Lehohla on Wednesday, showed that the Western Cape, Free State, Northern Cape and Gauteng provinces have almost universal access to improved drinking sources.

Using the Millennium Development Goals methodology, the Western Cape (99,4%), the Free State (99,3%), the Northern Cape (99,1%) and Gauteng (98,6%) reported almost universal access to improved drinking water sources.

Universal access to improved drinking water sources in households living in RDP dwellings was reported to be 100% in the Northern Cape and the Free State, while the Western Cape and Gauteng was 99,8% and 99,6%, respectively.

The report noted that although the Eastern Cape had the lowest percentage of households with access to improved drinking water sources (75,7%), the province reported the largest increase from 2002, when 60,9% reported accessing improved drinking water sources.

Households living in formal and informal dwellings had greater access to improved drinking water sources than households living in traditional dwellings.

Black Africans access to improved drinking water sources increased from 86,1% in 2002 to 91,77% in 2015.

Access to improved drinking water sources was greater for households living in Mangaung with 100% access, while households in Buffalo City, eThekweni and the City of Tshwane had the lowest access to improved drinking water sources.

According to the survey, nationally, 15% of households lived more than 500 m away from water sources.

Provincially 28,2% households in KwaZulu-Natal were most likely to reside more than 500 m away from the water source, followed by 16,3% households in Limpopo.

The report said during 2009, 88% households lived less than 200 m away from the outside-yard toilet facility, whereas in 2015, the percentage increased to 94%.

Nationally, the percentage of households with access to improved sanitation facilities increased from 62,3% to 80% in 2015.

The majority of households in the Western Cape (93,3%) and Gauteng (91%) had access to improved sanitation facilities, while about half in Limpopo (54%) and just below two-thirds in Mpumalanga (65,8%) had access to improved sanitation facilities.

It is notable that access to improved sanitation facilities grew most rapidly in Eastern Cape (+48,2%) between 2002 and 2015. The metros with the largest percentage of households with access to improved sanitation facilities were the City of Johannesburg (96,9%), Nelson Mandela Bay (94,6%) and the

City of Cape Town (91,8%).

The metros with the lowest percentage of households with access to improved sanitation facilities were the City of Tshwane (82%) and eThekweni (83,5%).

The odds of households in other eight provinces to have access to unimproved sanitation facilities were greater than the odds of households in Western Cape.

Nationally, 1,2% of households reported using the bucket toilet system, with Western Cape recording the highest percentage (4%) of households using the bucket toilet system, followed by the Free State (2,7%) and the Northern Cape (2,4%).

The report noted that even though only 1,2% of households reported using the bucket toilet system, there is still a large proportion of households living in informal dwellings (6,8%) that reported using the bucket toilet system.

Resources

South Africa's water resources are, in global terms, scarce and extremely limited.

The precipitation per year for Africa is 22 300 km³, of which the evaporation rate is 80% and the runoff rate is 20%. Southern Africa only has 12,25% of the total water in Africa, making it a highly arid region.

Rainfall is, however, relatively higher in the northern and eastern parts of southern Africa (the Democratic Republic of Congo, Zambia and Mozambique) with the drier parts of the region including Namibia, Botswana and South Africa.

South Africa has an mean annual rainfall of approximately 500 mm, compared to the world's average of 860 mm. It is characterised by low, variably distributed rainfall as well as high evaporation rates, resulting in the uneven distribution of run-off across the country.

The country experiences severe and prolonged hydrological droughts, which may last as long as 10 years at a time. The quality of water in South Africa is also negatively impacted by dissolved salts from host rocks in certain areas such as Namaqualand in the Northern Cape.

The surface water potential of the major drainage systems in South Africa are dominated by the Orange and the Limpopo river basins, which are shared with neighbouring countries.

Over 60% of the country's river flow comes from 20% of the land area. To overcome the uneven spread of water resources and to manage floods and drought, more than two thirds of the country's mean annual rainfall is currently stored in dams.

The country's water security is mainly reliant on fresh surface water, with ground water and return flows underused.

However, the freshwater available for use is currently at its limit, and alternative sources such as ground water needs to be further exploited. In addition, the country shares four major rivers with six neighbouring states, namely Zimbabwe, Botswana, Mozambique, Swaziland, Lesotho and Namibia. Therefore, international agreements on water sharing are in place on all of these river basins.

There is a well-developed infrastructure, with more than 4 395 registered dams in South Africa, including 350 dams belonging to the department, and a number of large-scale inter-

basin water transfer schemes. Water services infrastructure covers more than 35 000 km of bulk pipelines and 200 000 km of reticulation systems that are managed by 152 water service authorities and providers.

However, this existing infrastructure needs maintenance and the country is already experiencing challenges with lack of focus on sustainable asset management. The schemes also require efficient and effective operations, for which specialised skills and capabilities at all levels are needed. Major challenges are experienced regarding the capabilities of water services authorities to effectively manage the schemes on a sustainable basis. This issue needs to be dealt with decisively through a review of the mandates and policies in relation to the management of water infrastructure, and available capacity.

Work is also required in terms of rolling out the establishment of appropriate institutions, such as regional water utilities, as well as to better leverage private sector support. Non-revenue water is also a challenge to be dealt with.

Medium to long-term capital investment plans must be based on up-to-date reconciliation of changing water requirements and water availability from surface water, groundwater, reuse, desalination of seawater and rainwater harvesting sources.

The main contributors to water quality problems and environmental concerns are mining (acidity and increased metals content), urban development (salinity, nutrients and microbiological), industries (chemicals and toxins) and agriculture (sediment, nutrients, agro-chemicals and salinity through irrigation return flows). Untreated or poorly treated wastewater is severely affecting the quality of water in many areas, as well as negatively impacting on the environment.

Climate change is expected to exacerbate the already substantial pressure on freshwater and estuarine ecosystems by altering rainfall patterns and the more frequent or intense occurrence of events such changes in flow patterns, droughts and storms.

South Africa's water ecosystems are not in a healthy state. Of the 223 river ecosystem types, 60% are threatened, with 25% of these critically endangered. Less than 15% of river ecosystems are located within protected areas, of which many of which are threatened and degraded by upstream human activities. Of 792 wetland ecosystems, 65% have been identified as threatened and 48% as critically endangered.

A further key factor impacting on water quality is the treatment of wastewater. Maintenance of these systems is the responsibility of local government and is highly impacted by a lack of resources and requisite skills to manage and maintain the systems to the required standards, resulting in untreated effluent flowing into river systems, with detrimental effects on the ecosystems.

Acid mine drainage has also been reported from a number of areas in South Africa, including the Witwatersrand Gold Fields, the Mpumalanga and KwaZulu-Natal Coal Fields and the O'Kiep Copper District.

The DWS must continue to support and lead improvements in water quality and environmental protection across the value chain through a range of interventions, including the

assessment of water supply and wastewater treatment systems and the close monitoring of non-compliant systems in terms of the Water Services Act of 1997.

Dams must be evaluated in terms of dam safety regulations, and water management institutions must be monitored to ensure they in turn effectively monitor affiliated water users. Non-compliance will continue to be investigated and punitive action taken where applicable and possible.

In addition, the DWS must continue to monitor the level of compliance of mines against their water use entitlements. In this regard, the mine water management policy is in the process of being finalised and approved. Once in place, the intention is to implement the environmental levy on mines.

South Africa's challenge into the future is to ensure that there is fair and equitable redistribution of water resources across the various sectors. This should take into account the country's socio-political and economic transformation agenda. As the country has a limited resource base, with competing sectoral interests, trade-offs must be made in prioritising uses, affordability and sustainability.

South Africa is still heavily reliant on surface water and its further development with more than two-thirds of the country's mean annual runoff already stored in dams. Where additional water is still available, such as in the uThukela, Mzimvubu and Pongola basins, it is located in areas far from the existing centres of demand. It is thus important for South Africa to focus its water resource planning in the following areas:

- Ground water currently reflects only 9% use and is underused, undervalued and not well managed. With about 3 500 million m³ of groundwater estimated to be available for further development, much scope exists to exploit the potential of ground water as a freshwater source.
- At 14%, water reuse is already a major component of the water mix, albeit mostly indirectly. Direct reuse, especially in the coastal areas, must be further encouraged
- There is also large scope for increasing desalination, which is currently providing less than 1% of the country's water needs. Inland measures are in place to desalinate acid mine water and brackish water resources, while coastal areas have an opportunity to desalinate seawater.

From the above, the DWS is committed to improve integrated water resource management to ensure continued water security. This includes optimising dam storage and transfer systems, effectively managing the water resources mix and exploring various options for the reconciliation of water availability with demand.

The already constrained water resources is further impacted by the current prolonged dry spell coinciding with the drought legacy conditions in a number of provinces. The predictions of climate forecasting models indicates that dry spell effects could last for up to seven years. Therefore, the construction of additional bulk water storage capacity, such as the Lesotho Highlands Phase 2 project and others, are critical to ensuring water security in the long term.

Approximately 9,3% of available potable is water lost through leakage. This is water that the country cannot afford to lose,

especially within the current prolonged drought. In the short term, the DWS's mitigation measures include the implementation of the "war on leaks" programme that will train youth to repair leaking taps and pipes in their communities.

In addition, an allocation of R350 million has been made to drought-related projects in the short term. Infrastructure would also be upgraded, rainwater harvested and water desalination projects would be expedited.

Through various communication campaigns, the consumers within the various sectors within agriculture, domestic, industrial, power and mining would be encouraged to limit their water consumption patterns especially during this drought period.

Dams and water schemes

In an attempt to respond adequately to demand and anticipate future demand, South Africa has built numerous large and medium-sized dams, and developed sophisticated inter-basin transfer schemes. The country now has more than 350 government-owned dams countrywide. They range in storage capacity from a volume of 5 500 million m³ of water down to 0,2 million m³.

Most water consumption can be attributed to drinking, irrigation, electricity, mining processes and industrial processes.

The DWS follows an integrated approach to managing South Africa's water resources. Proposed new water schemes have 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, while the guidelines issued by the World Commission on Dams must also be followed.

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

Groundwater resources

An estimated 80 000 to 100 000 boreholes are being drilled annually. By May 2017, there was an estimated 252 240 boreholes in South Africa.

The bulk of the records were obtained from state-drilled boreholes. The National Groundwater Archive is a web-enabled database system that allows capturing, viewing, modifying and extraction (dissemination) of groundwater related data.

The DWS has a legal obligation to ensure that water resources (including groundwater) are protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner.

The National Water Act of 1998 requires the establishment of national monitoring and information systems as the availability of information about water resources is regarded as critical to the main purpose of the Act.

The need for groundwater data and information continues to increase to assist in planning to provide water to people, monitoring, drought relief and climate change

Groundwater, despite its relatively small contribution to bulk water supply, 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.

The lack of perennial streams in the semi-desert to desert parts means that two thirds of South Africa's surface area depend largely on groundwater.

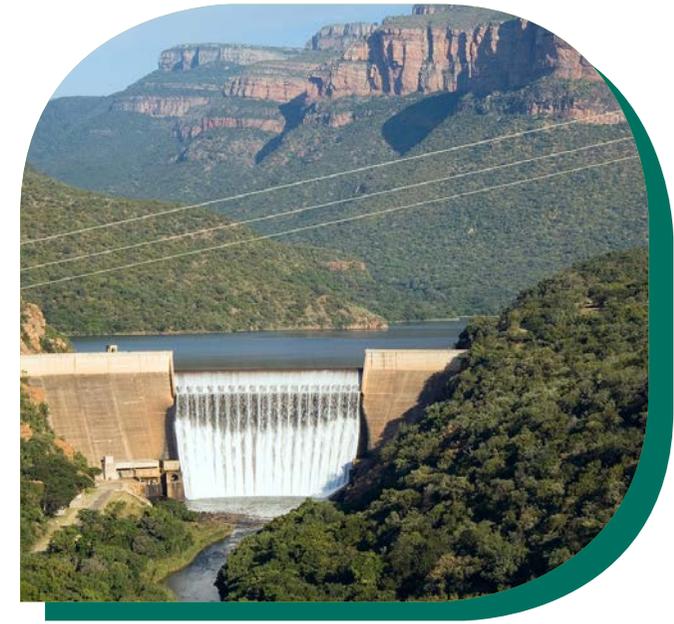
Although irrigation is the largest user, the supply to more than 300 towns and smaller settlements is very important.

Through Government's commitment towards 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 considerably to river flow. This requires reserving a significant share of groundwater resources to protect aquatic ecosystems in terms of the National Water Act of 1998. The maximum quantity of groundwater that can be developed economically is 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.

Southern Africa also has large hidden underground water reserves, with 12 to 15 aquifer systems, of which three are considered very important for the future.

In South Africa, a substantial resource lies in a massive dolomite aquifer system that covers a vast area, extending from Springs and Brakpan, east of Johannesburg to Lenasia, south of the city; Zuurbekom, Carltonville and Magaliesberg on the West Rand; Kuruman in the Northern Cape and even as far as parts of Botswana.





The Witwatersrand mining basin's aquifer storage capacity is about the size of Lake Kariba.

Managing and developing water resources

To facilitate the management of water resources, the country has been divided into 19 catchment-based water management areas, of which 11 share international rivers.

Sufficient water resources have been developed and are available to ensure that all 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 water.

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

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

Managing water quality and wastewater

To ensure compliance with minimum water quality norms and standards, the DWS started the annual Blue Drop and Green Drop assessments to guarantee that water and wastewater 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 wastewater effluent standards.

This incentive-based regulation system aims to improve the quality of municipal drinking water quality and management of wastewater.

Because of the scale and magnitude of resources needed for the national certification programme, the Green Drop and Blue Drop programmes take place every second year, alternating with each other. In a programme's "gap" year, progress in the wastewater sector is tracked and reported via the assessment of the cumulative risk status of treatment systems.

The DWS was honoured to receive international recognition in terms of Environmental Engineering Excellence for the Blue Drop and Green Drop Certification programmes from the American Academy for Environmental Engineers. This academy is affiliated to the International Water Association.

Programmes and initiatives

Integrated Water Resources Management (IWRM)

The DWS, with the assistance of the Royal Danish Government, initiated a programme in 2000 to pilot IWRM approaches in three water management areas of South Africa: Crocodile West-Marico (mainly in North West), Mvoti-uMzimkulu (KwaZulu-Natal) and Olifants-Doorn (mainly in the Western Cape).

These water management areas were selected as they represent a cross-section of water resources conditions as well as water-use conditions and user interests.

The IWRM requires intensive planning to ensure efficient, equitable and sustainable management of water resources and for coping with conflicting demands.

Back to Basics Programme

While the Back to Basics Programme is focused on 27 district municipalities, the PICC has given the DWS the task to intervene when there are problems.

These interventions shall be on a case-by-case basis in accordance with legislation to safeguard the well-being of communities.

In partnership with the Eastern Cape and North West provincial governments, respectively, the DWS intervened in municipalities that have been placed under administration. These include the Makana Local Municipality in the Eastern Cape, as well as the Madibeng Local Municipality and Ngaka Modiri Molema District Municipality in North West.

An important element of these interventions has been the successful use of the water boards of Amatola, Magalies and Sedibeng, respectively, to supplement the capacity of the department to improve operational performance and build new infrastructure where necessary.

In Limpopo, the DWS has appointed the Lepelle Northern Water as an implementing agent for the Mopani District Municipality Revitalisation Programme, which includes various water treatment works, wastewater treatment works, boreholes and pipelines.

In Bushbuckridge, Mpumalanga, through Rand Water, the DWS executed an emergency intervention to solve operational problems that were causing water shortages and also accelerating the implementation of water reticulation infrastructure.

In each of the identified municipalities, qualified and experienced personnel are being deployed to work on, and implement, a road map for a "Water Secure and Safe Sanitation Future", using budgets pooled from national and provincial governments and from the affected municipalities.

The Water and Sanitation Revolution

The key strategic priorities for the water and sanitation revolution are:

- water resource management
- water infrastructure development
- water and sanitation services
- policy regulation.

The key pillars of this revolution are:

- water conservation and demand management that involves the use of innovation and regulation to reclaim water already developed and available for use
- improving the water mix involves the increased use of a variety of water sources in addition to the country's current reliance on surface water.

Brits Water Treatment Works

The DWS, working together with the Madibeng Local Municipality, set aside R381 million to address water challenges in Majakaneng through the upgrade of the Brits Water Treatment Works (BWTW) which also supplies the Majakaneng area.

The works will ensure that the BWTW has an additional production capacity of 20 megalitres per day. Work is underway at the BWTW with civil works (Phase 1). It will be implemented by a DWS construction unit as contractors and two professional service providers have been appointed for electrical and mechanical works.

The BWTW is expected to be completed by 2017/18.

In the short term, DWS allocated R1,1 million to the Madibeng local municipality to address the water challenges in Majakaneng, which are mainly attributed to vandalism and leakages in the water supply system.

The Madibeng Local Municipality embarked on leak detection exercises and filling the reservoirs. The municipality started with the distribution of water to identify and repair visible leaks. This required isolation of certain sections of Majakaneng and it was expected that not all sections would water.

The DWS and Madibeng Local Municipality will continue cooperating to deal with the water leakages, which cause low water pressure in Majakaneng and, as a result, water shortages in some areas.

Water Tribunal

The Water Tribunal was established in 1998 to hear appeals against directives and decisions made by responsible authorities, CMAs or water management agencies about matters covered by the National Water Act of 1998, such as the issuing of licences to use water. It is an independent body and can hold hearings anywhere in the country.

The WRC and the Judicial Services Commission recommend people to be included as members of the Water Tribunal, and the Minister of Water Affairs appoints them. The members have to be familiar with water management, engineering, law and other related matters, and they are given administrative support by the DWS.

Strategic Water Partners Network – South Africa (SWPN-SA)

SWPN-SA is one of South Africa's most innovative public-private civil-society sector partnerships, making progress that would not have been possible.

The efforts of the SWPN-SA are integral to the NWRS, which the DWS released in 2012.

A cornerstone of the SWPN-SA is developing innovation that leverages the strength and expertise of the DWS, the South African private sector, civil society and expert organisations.

Ncorha Water Treatment Works

President Jacob Zuma officially launched the Ncorha Water Treatment Works at Bhanti village, Intsika Yethu Local Municipality, in the Eastern Cape in June 2016.

The Ncorha Water Treatment Works forms part of the Government Infrastructure Development Programme, which is



aimed at providing services to communities and transform the economic landscape of the country.

The DWS funded the R64-million project, which will benefit an estimated 18 429 families from 208 villages in the four surrounding municipalities. In addition, the project has created 188 jobs, with local people, the youth and women being major beneficiaries.

Lushushwane Water Project

Phase 2 of the Lushushwane Bulk Water Supply Project at Bettysgoed Village in Mpumalanga was launched in April 2017.

The Lusushwane Bulk Water Supply project is aimed at providing water to the rural communities of the Chief Albert Luthuli Local Municipality. The project will benefit at least 16 000 people in the vicinity.

The DWS funds Phase 1 to Phase 3 of the project, which is being implemented by the Gert Sibande District Municipality.

The scheme, in all its phases, is valued at R90 151 000. On completion, it will benefit local communities including Bettysgoed, Smithfield, Oshoek, Lochiel, Robinsdale, Aankomst, Pampoen, Houtbosch and Hartbeeskop.

National Water Resources Infrastructure (NWRI) Programme

The NWRI ensures reliable supply of water from bulk raw-water resources infrastructure. The programme sources funding to implement, operate and maintain bulk raw-water resources infrastructure efficiently and effectively by strategically managing risks and assets.

Regional Bulk Infrastructure Grant Programme

Regional bulk infrastructure is defined as the infrastructure required to connect water on a macro or subregional scale, over vast distances, with internal bulk and reticulation systems or any bulk infrastructure that may have an impact on water resources in terms of quality and quantity. The DWS is responsible and accountable for the management of funding, which is administered by the National Treasury.

Over 16 000 households will benefit from the R52 million Makapanstad and Mathibestad Bulk Water Project, which aims to address water shortages in villages in the Moretele Local Municipality in North West.

Upon completion, the project will address water shortages in the villages of Kwa-Mmatlwaela, Tladistad, Leeukraal, Kgomo-Kgomo, Kontante, Moretele, Makapanstad, Phomolong, Potoane, Prieska, Mathibestad, Thulwe and Opperman.

The Mathibestad and Makapanstad Bulk Water Project is funded through the Provincial Infrastructure Grant and Municipal Infrastructure Grant.

Strategic Integrated Projects (SIPs)

SIP 18, which was approved by the PICC, aims to address water supply and sanitation backlogs to millions of households.

The PICC's 18 SIPs are divided into geographic, energy, spatial and social infrastructure development projects. These projects – headed by different departments – cover more than

150 specific infrastructure interventions in rail, road and ports, dams, irrigation systems, sanitation and electricity.

This programme is a 10-year plan that will address the estimated backlog of adequate water to 1,4 million households and that of basic sanitation to 2,1 million households.

SIP 18 is expected to fast-track the issuing of water licences, expand the capacity of the water system, speed up build programmes, address backlog projects and rehabilitate and upgrade existing water and sanitation infrastructure.

The project, which will also focus on priority small towns and rural areas where water service delivery is a problem, is also expected to create jobs, raise the quality of service delivery of water around the country and extend water supply to areas that are either underserved or unserved.

The department identified several projects that will be used to drive SIP 18, including the Sediberg Regional Sewer Scheme, which is a R5-billion project to be implemented in the area.

Rand Water's BG3 pipeline, which is sub-Saharan Africa's largest water pipeline, running from the Vaal Dam to its Zoekfontein Plant, which is 8,6 km away, was launched in June 2013. The pipeline will increase water distribution in this district and surrounding areas.

The BG3 pipeline runs adjacent to Rand Water's existing BG1 and BG2 pipelines that supply water to Gauteng and parts of the neighbouring Free State, Mpumalanga and North West.

Once in commission, the BG3 pipeline will allow for Rand Water's two pipelines (BG1 and BG2) to be shut down for refurbishment and maintenance. The BG3 pipeline will augment raw-water capacity to Zuikerbosch by up to 2 100 megalitres per day, which will accommodate the region's projected growth in water demand to 2030.

The Komati Water Scheme Augmentation Project was designed to resolve the water supply problems to Eskom's Duvha and Matla power stations in Mpumalanga.

The Komati Water Scheme Augmentation Project augments the Komati Water Scheme from the Vaal Eastern Subsystem to help Eskom overcome its water supply challenges. The Matla power station reservoir will in turn also provide water to Kusile power station, which reached another major milestone with Unit 1 reaching full load in March 2017.

This means Unit 1 is running at the full design and operating capacity – 800 MW – taking Kusile one step closer to commercial operation. The initial synchronisation of Unit 1 took place in December 2016.

The interaction of the water resources of the Komati, Usutu and Vaal River systems provides a higher assurance of water supply to all Eskom's thermal power stations and other water users in Mpumalanga. The Komati Water Scheme Augmentation Project will be able to deliver an additional 57 million m³ of water a year to the Komati Water Scheme. On the department's instruction, the TCTA is financing and implementing the project, which is part of SIP 18.

Dam Safety Rehabilitation Programme

The Dam Safety Rehabilitation Programme ensures the continued structural and operational safety of the dams owned by the DWS.

In April 2016, the DWS highlighted the developments made in the Dam Safety Rehabilitation Programme:

- a cumulative 135 of the planned 138 planned catalytic projects and dams were branded
- the pipelines and electrical installations were finalised for the short-term acid mine drainage mitigation measures in the Eastern Basin
- the provincial Regional Bulk Water and Sanitation Infrastructure Master Plan for the Eastern Cape had been developed
- more than 500 resourceless farmers were financially supported to enhance access to water. A total of 420 rainwater harvesting tanks were installed.

Support for resource-poor farmers

In accordance with the National Water Act of 1998 as well as regulations on financial assistance to resource-poor farmers, the Minister may allocate assistance to those farmers who fulfil requirements.

To ensure that water resources are protected, the regulations explicitly state that financial assistance may be granted and used only for activities that ensure water is protected, used, developed, conserved and managed in a sustainable and equitable manner.

Water Allocation Reform

The Water Allocation Reform Programme's objectives are to ensure equitable access to water, eradicate poverty and promote social and economical development.

The programme's priorities are to meet the water needs of historically disadvantaged people, ensure their participation in water resources management and promote the beneficial and efficient use of water in the public interest.

Licences are required for storage and use of water, among other things. To facilitate the availability of water for historically disadvantaged people, attention is also given to the allocation of water following principles of equity and sustainability.

Women in Water

The Women in Water Project aims to strengthen the active participation of rural women in water resource management. Women identify water-related challenges in their communities and conceptualise ideas to address them. They are registered for Women in Water awards. The national winners receive cash prizes which are used for further project development and implementation.

Learning Academy

There is a shortage of skills in the water and sanitation sector. The DWS, as the custodian of South Africa's water resources, through its Learning Academy External Bursary Scheme, provides bursaries yearly to aid in closing this gap. The DWS welcomes all applicants who would like to pursue careers that are in line with the department's core business.

The DWS scheme boasts an all-inclusive package recognised in South Africa as being highly competitive. The DWS External



Bursary Scheme aims to attract exceptional young and innovative talent to the department.

Students pursuing the following fields of study are eligible to apply: Analytic Chemistry, Aquatic Sciences, Biochemistry, Biological Sciences, Water and Sanitation, Geographical Information Systems, Civil/Electrical/Mechanical Engineering, Water Resource Management, Environmental Law/Management/Science, Water Utilisation, Cartography, Geochemistry, Geo-hydrology, Geology, Hydrology, Limnology, Microbiology, Surveying and Water Care.

The purpose of the learning academy is to:

- investigate technical and scarce skills development needs within the department
- address technical and scarce skills gaps in the overall water supply value chain
- address scarce skills gaps in specific technical areas of the department
- plan and build capacity for medium and long-term needs of the department and the water and sanitation sector
- develop and implement structured training for engineering and scientific graduate trainees
- develop and propose interventions (regarding mentoring, skills and knowledge transfer, and professional registration processes) with the Engineering Council of South Africa, the South African Council for Natural and Scientific Professions and the Surveying Council of South Africa in line with the Occupations Specific Dispensation.

Management of water conservation and demand

Although South Africa has been classified as a water-scarce country, water from the source to the consumer is often lost as a result of inappropriate and inadequate asset management.

Lack of education on the part of the consumer also leads to inefficiency in the day-to-day use of water. The loss of water depletes the country's resources and reduces revenue to water services authorities.

The municipalities' revenue is lost due to leaking pipes, illegal connections and poor billing systems.

In terms of the water-use efficiency programme, 68 municipalities were supported in implementing water conservation and water demand measures to reduce water loss by 519 million m³. Measures to improve efficient water use in the catchment areas were also undertaken and the volume of water loss was reduced to 32 million m³.

Water leaks account for nearly 36% of the nation's unaccounted for water and costs the country about R7 billion annually.

Realising that South Africa is a water-scarce country, the DWS is also putting in place medium to long-term interventions that are intended to reduce the risks for water scarcity in the future.

These include:

- rainwater harvesting (drinking water, water for livestock, water for irrigation)
- integrating groundwater and surface water use in the future
- desalination at a large scale

- invest in innovative water-saving solutions, such as the Drop-the-Block campaign
- incorporating all municipal and privately owned dams into the management system or the future
- implementing further transfer schemes to improve drought resilience
- building additional storage capacity
- rolling out large-scale reuse of water (recycling of effluent, focus on coastal towns where treated effluent is disposed of via sea outfalls and not taken into account in return flows).

Enhanced Local Government Support Approach

A rapid response unit in the department addresses poor performance of water and wastewater systems, which has resulted in community protests in some cases.

The unit deals with proactive and reactive non-compliance cases of municipal service delivery. The unit's specialists enable the department to intervene directly in high-risk operational situations, where the lives of citizens and the environment are under threat because of water and wastewater treatment failures.

Freshwater Programme

Recognising the value and threatened status of South Africa's freshwater biodiversity, and the need to build competence and leadership in this area, the South African National Biodiversity Institute (SANBI) has established a programme focusing on freshwater biodiversity.

The Freshwater Programme aims to grow and consolidate freshwater activities within SANBI.

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 the further development of strategic relationships with other organisations with shared objectives.

This includes managing the Working for Wetlands Programme on behalf of the departments of water and sanitation, 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.

Monitoring programmes

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

The oldest flow-gauging station still operating 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 a cellular short message system.

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 monitors rainwater quality.

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

The formal protection, restoration and rehabilitation of wetlands is strengthened through improved land-use planning, land and development management policies, as well as operational and regulatory means at national, provincial and local level.

Adopting of ecosystem-based approaches and implementing the open-space planning and management programmes adds impetus to the protection of these systems and associated services, especially at local government level.

It requires integrated approaches and the involvement of multiple sectors, particularly those dealing with human settlements, development and planning.

The DWS is also designing programmes to assess and report on the radiological (radioactivity) and toxicological quality status of the country's water resources.

National Chemical Monitoring Programme (NCMP)

The NCMP assesses and reports on the chemical status of water resources in South Africa. 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 because of 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 because of poor sanitation and hygiene at household level. The Eastern Cape and KwaZulu-Natal are prone to cholera outbreaks.

River Eco-status Monitoring Programme (REMP)

The REMP evolved from the River Health Programme, replacing the programme in 2016. It is a component of the National Aquatic Ecosystem Health Monitoring Programme (NAEHMP).

The REMP focuses on the monitoring of the ecological conditions in river ecosystems as they are reflected by the system drivers and biological responses (instream and riparian).

National Aquatic Ecosystem Health Monitoring Programme

The NAEHMP is a national programme managed by Resource Quality Services with support from the WRC, CSIR and various regional and provincial authorities.



It is responsible for managing aquatic ecosystems. It focuses on the biological attributes of a river that serve as indicators of its ecological health. 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 DWS 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.

National Toxicity Monitoring Programme

The National Toxicity Monitoring Programme reports on the status of dichloro-diphenyl-trichloroethane and other persistent organic pollutants. This information is reported internationally to the Stockholm Convention through the Department of Environmental Affairs.

Education and awareness

Youth development and National Water Week

The National Water Week is an awareness week campaign by the DWS. It serves as a powerful campaign mechanism reiterating the value of water, the need for sustainable management of this scarce resource and the role water plays in eradicating poverty and underdevelopment in South Africa.

The campaign seeks to continue building on the ongoing awareness creation within the broader South African community.

This awareness creation is coupled with the responsibility that every citizen must take in ensuring the integrity of South Africa's water resources and its efficient use.

The linkages between water services, supply, resource management, poverty eradication, social and economic development were emphasised in a number of innovative ways. The campaign is influenced by local needs and international sectoral trends.

The National Water Week took place from 14 to 22 March 2016 under the theme "Water for People, Water by People", which also coincides with World Water Day and National Human Rights Day. The theme was people-centred and was adopted from the International theme for World Water Day 2016.

Regional and international cooperation and initiatives

In line with the DWS's regional and international responsibilities in the water sector, the department entered into collaborative relationships with countries such as Lesotho, Namibia, Botswana, Zimbabwe, DRC, Swaziland in the region.

- 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
- Swaziland on the Komati River Development Project.

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

South Africa shares four of its major river systems with six immediate neighbouring countries, namely Botswana, Lesotho, Mozambique, Namibia, Swaziland and Zimbabwe.

In the area of shared river basins, South Africa continued participating in joint water commissions to form part of Africa bilaterals with Botswana on Joint Permanent Cooperation and with Mozambique regarding the breach of the Usuthu River, where a feasibility study was completed.

South Africa also formed global relations with countries such as Iran, China, Denmark, Russia, Mexico, South Korea, Australia, Germany, the Netherlands and Japan.

Acid Mine Drainage

The purpose of the Eastern Acid Mine Drainage Treatment Plant in Springs is to ensure that the rising water levels in the abandoned Grootvlei mine do not contaminate groundwater.

The Eastern Basin Plant in Springs is one of the largest of its kind in the world, treating approximately 110 megalitres per day.

The plant is among the three main basins in the Witwatersrand Goldfields. These include the western basin in the Krugersdorp area, central basin in the Germiston area and the eastern basin in the Springs area. Both western and central basins have been launched and are running smoothly.

The first long-term solution to acid mine drainage was launched at the Central Basin Acid Mine Drainage Treatment Plant in Germiston in May 2016. This was the commencement of several integrated projects aimed at providing a long-term solution to acid mine drainage as well as a water secure future for the economic hub of Gauteng.