SOUTH AFRICA
**YEARBOOK**
2024/25

# Water and Sanitation

South Africa is a water-scarce country and rated the 30th driest in the world, with a rapidly increasing population. This is based on its average rainfall of 500 millimetres (mm) compared to the world average of 860 mm. The country's rainfall is unpredictable and common periods of drought limit the water resources even further. Rivers that used to flow throughout the year are now dry while others flow only during rainy seasons. Climate change continues to present changes in temperature, precipitation and extreme weather events.

South Africa's average annual rainfall is about half the global average. The country also has a very high evaporation rate. Raw water availability in South Africa could, however, rapidly deteriorate as demand escalates due to both economic and population growth. In addition, there are factors which could result in a contraction of supply, such as increasing physical losses in municipal distribution systems, degradation of wetlands, and the impact of climate change.

The mandate of the Department of Water and Sanitation (DWS) is set out in the National Water Act, 1998 (Act 36 of 1998) and the Water Services Act, 1997 (Act 108 of 1997)). The department's legislative mandate is to ensure that the country's water resources are protected, managed, used, developed, conserved and controlled by regulating and supporting the delivery of effective water supply and sanitation.

This is done in accordance with the requirements of water-related policies and legislation that are critical in delivering on people's right to have enough food and water, growing the economy, and eradicating poverty. Most of South Africa's freshwater comes from catchments that receive the highest rainfall (strategic water source areas). There are 22 strategic water source areas occupying 8% of the land; however, these provide 50% of the surface run-off (water in wetlands, streams and rivers). The strategic water source areas support the water needs of approximately 60% of the population, 67% of national economic activity, and supply approximately 70% of irrigation water.

Agriculture is the largest water use at 61%, followed by municipal use at 27% (including industrial and commercial users provided from municipal systems), with power generation, mining and bulk industrial use, livestock and conservation and afforestation jointly making up the remaining 12%. The assurance level at which agricultural water is supplied is lower than for other sectors at 90%. Water for power generation is seen as strategically important and is provided with the highest assurance of supply at 99,5%; which translates to a 1:200-year risk of failure.

Agricultural consumption is largely unmetered, and there are concerns about unauthorised abstraction and water wastage in the sector. Chapter 4 of the National Development Plan (NDP) envisages a South Africa that recognises the importance of secure and equitable access to water and sanitation as catalysts for socio-economic development. This is given expression by Priority 1 (economic transformation and job creation) and Priority 4 (spatial integration, human settlements and local government) of government's 2019-2024 Medium-Term Strategic Framework (MTSF), with which the work of the DWS is aligned.

Over the medium term, the department plans to focus on providing reliable water and sanitation services; improving the regulation of water quality through the application of blue drop, green drop and no drop incentive schemes; and prioritising the integration of water resource planning and development. Transfers to municipalities, public corporations and departmental agencies represent the largest component of the department's budget, accounting for an estimated 64,2% (R47.3 billion) of total spending over the medium term.

These transfers are expected to increase at an average annual rate of 3,7%, from R13.3 billion in 2023/24 to R14.8 billion in 2026/27. Large water resource projects, including the raising of the Clanwilliam Dam wall and the uMkhomazi Water Project, will be prioritised over the period ahead. These projects receive funds in 2024/25 and 2025/26 through the budget facility for infrastructure and the Water Trading Entity's capital augmentation grant. The department also works with water boards and municipalities to fast-track the delivery of water and sanitation services funded through the regional bulk infrastructure grant and the water services infrastructure grant.

Despite Cabinet-approved reductions amounting to R5 billion over the medium term, expenditure is expected to increase at an average annual rate of 3.6%, from R21.4 billion in 2023/24 to R23.8 billion in 2026/27. This is due to allocations in the current and previous two budgets from the budget facility for infrastructure water resource and bulk water infrastructure projects. To mitigate against any negative impacts of the reductions on performance, the department plans to curtail spending on travel and subsistence and consultants; capital augmentation transfers to the Water Trading Entity and the Magalies and uMngeni-uThukela water boards; and direct and indirect grants to local government.

## Providing reliable water and sanitation services

To improve the provision of reliable water and sanitation services in municipalities over the medium term, the department plans to complete 37 regional bulk infrastructure project phases (7 mega, 22 large and 8 small) and 234 small water infrastructure projects through the water services infrastructure grant that supports water services authorities such as municipalities and certain water boards. To achieve these targets, the Water Services Management programme is allocated R44 billion over the medium term.

## Regulating water quality and access

Over the period ahead, the department intends to strengthen its regulatory function through increased capacity. This is expected to be achieved through establishing a regulator commission, an independent advisory body tasked with overseeing the trading of water and ensuring its continuous, equitable and sustainable provision. In addition to its regulatory role, the department plans to strengthen interventions to address environmental and wastewater pollution in communities and support municipalities in which water and sanitation services have deteriorated.

As such, it plans to assess 1 032 water supply systems in 2025/26 for compliance with blue drop regulatory requirements, and 1 004 wastewater systems in both 2024/25 and 2026/27 for compliance with green drop regulatory requirements. It also intends to finalise 80% of water use licence applications within 90 working days

of receipt. Expenditure on these activities is expected to increase at an average annual rate of 4,7%, from R228.5 million in 2023/24 to R262.1 million in 2026/27, in the Water Resources Regulation subprogramme in the Water Resources Management programme.

## Integrating and improving water resource planning and development

To improve infrastructure planning and development and ensure better integration of these two functions, the department plans to oversee the completion of seven strategic projects, including the uMkhomazi bulk water supply scheme; the raising of the Clanwilliam Dam wall; and projects aimed at meeting high water demand for large strategic users such as Eskom, Sasol and Exxaro.

Expenditure on these projects is expected to increase from R3.3 billion in 2023/24 to R6.4 billion in 2026/27 at an average annual rate of 24,3%, due to additional allocations in the current and previous two budgets from the budget facility for infrastructure and the entity's capital augmentation grant. This work will be funded through transfers to the Water Trading Entity in the Water Resources Infrastructure Management subprogramme in the Water Resources Management programme.

To decrease over-reliance on surface water, the department intends to diversify its water mix by exploring other sources such as groundwater and aquifer systems, and by treating acid mine drainage water and desalinating sea water. Accordingly, four catchment plans for mine water and wastewater management are scheduled for implementation over the period ahead.

There are also plans in place to maintain and refurbish water resource infrastructure to ensure its optimal performance in securing water supply. These plans are related to the maintenance of conveyance systems such as the Orange-Vaal: Vaalharts, Fish Sundays government water schemes and the Qamata irrigation scheme. Funding for these initiatives is made available in the Water Resources Information and Management subprogramme, which has a budget of R1.9 billion over the next three years, in the Water Resources Management programme.

## Drinking water

Tap water inside their dwellings, on-site or off-site, is most common among households in Western Cape (99,3%), Gauteng (97,6%), and Free State (93,3%) and least common in Limpopo (64,2%) and the Eastern Cape (67,2%), according to Statistics South Africa's General Household Survey of 2023. Although the percentage of households in the Eastern Cape with access to water in the dwelling, on- or off-site increased by 23,1 percentage points between 2002 and 2012, access has declined by 12 percentage points to 67,2% since then.

A similar pattern is observed in Limpopo where access to piped or tap water in their dwellings, off-site or on-site increased from 73,8% to 84% in 2010, before declining to 64,2% in 2023, almost 10 percentage points lower than in two decades earlier in 2002. On a more positive note, access to water in KwaZulu-Natal increased by 6,1 percentage points to 81,5% over this period.

Although, nationally, access to tap water inside their dwellings, off-site or on-site improved by 2,6 percentage points between 2002 and 2023, it is notable that access declined in five provinces during this period. Declines were observed in Limpopo (-9,6 percentage points), Mpumalanga (-3,9 percentage points), the Northern Cape (-2,4 percentage points), the Free State (-2,3 percentage points) and Gauteng (-1,1 percentage points). Although the percentage of households with access to water has been declining, it is important to note that a larger number of households received tap water in 2023 than two decades earlier.

An estimated 45,2% of households had access to piped water in their dwellings in 2023. A further 29,8% accessed water on-site while 9,7% relied on communal taps and 2,3% relied on neighbours' taps. Although generally households' access to water improved, 3,3% of households still had to fetch water from rivers, streams, stagnant water pools, dams, wells, and springs in 2023. About 97,2% of households in metros had access to tap water.

This type of access to water was most common in Cape Town (99,8%), Johannesburg (98,9%), and Ekurhuleni (98,6%). The lowest access amongst metros was recorded in Nelson Mandela Bay (87,6%) and Mangaung (91,7%).

Despite a rather modest increase in the percentage of households with access to tap water between 2002 and 2023 (2,0 percentage points), the number of households with access to piped water from municipalities increased by 60,4% between 2004 and 2023, expanding from 9,2 million to 15,2 million during this period.

## Fetching water

Almost three-quarters (74,8%) of households who did not have water in their dwellings, or on their yards took less than 30 minutes to fetch water (that is, to go there, get water and come back) from the nearest collection point. A further 18,8% took between 31-60 minutes. Households that took less than 30 minutes were most common in the Western Cape (100%) and Gauteng (94,9%) and least common in Limpopo (64,4%) and KwaZulu-Natal (63,7%).

## Water quality regulation and access

The department enforces regulatory measures that ensure the provision of safe water and the effective management of wastewater. To this end, it implements the green and blue drop certification programmes, which are incentive-based regulatory tools that measure the capacity and environmental, financial, technical and quality compliance of water service institutions.

The department plans to assess 1 004 wastewater systems in 2023/24 for compliance with the green drop regulatory requirements and 1 035 water supply systems in 2024/25 for compliance with blue drop regulations. To improve equitable access to water resources, the department plans to finalise 80% of water use authorisation applications within 90 days of application.

Expenditure for these activities is within the Water Resources Regulation subprogramme in the Water Resources Management programme. The subprogramme has a total budget of R694.1 million over the medium term.

## Integrated Water Resource

## Management

In its efforts to ensure water security, the department continues to adopt an integrated approach to maintaining existing water resource infrastructure, supplying bulk water to strategic users such as large industrial companies through the Water Trading Entity, and supporting the long-term sustainability of water resources. As such, the department considers the impact of climate change, the role of ecosystems, rainwater runoff and storage, the use of other water resources such as groundwater and aquifer systems, water conservation and water demand management plans.

The department also plans to implement and monitor the river eco-status monitoring programme in 221 rivers and implement five catchment plans for mine water and wastewater management.

## Improving water services

To improve water services, over the medium term, the department plans to ensure reliable water and sanitation services by overseeing 25 large regional bulk infrastructure project phases and 14 small regional infrastructure project phases.

## National water resource infrastructure projects

Government plans to build additional surface water storage capacity to capture the remaining 25% of South Africa's available surface water resources, to augment the national bulk water resource infrastructure. It is often more cost-effective to increase the capacity of existing infrastructure rather than to build new infrastructure, and the department has several projects to raise the height of dam walls to increase the storage capacity of the dams.

The R800 million project, which was funded by government through the fiscus, to raise the wall of the Hazelmere Dam to augment water supply to the KwaZulu-Natal North Coast has been completed. The project to raise the wall of the Clanwilliam Dam to improve water supply for agriculture and to provide for water allocations to resource-poor farmers on the West Coast of the Western Cape is finally getting under way.

Several tenders for construction work and materials supply have been awarded, others have been issued, and construction teams are on site. This R4 billion project, which is also funded from the fiscus, is due to be completed by April 2028. Another project funded from the fiscus is the raising of the Tzaneen Dam wall, worth R555 million, which will augment water supply in the Greater Letaba River Catchment in Limpopo Province is also now being implemented. The Development Bank of Southern Africa (DBSA) has been appointed as the Implementing Agent; procurement is under way, and the Department's Construction Unit is on site, with an anticipated completion date of December 2024.

Phase Two of the Lesotho Highlands Water Project which augments water supply to Gauteng by 490 million cubic metres and some areas of the Free State, the Northern Cape and the North West is being implemented. The project will increase water security in the Integrated Vaal River System, which is the primary water resource for the Gauteng economy.

The main contracts for the Polihali Dam, the Polihali to Katse Transfer Tunnel and the Senqu Bridge were awarded during the 22/23 financial year and contractors are on site. The estimated cost of Phase Two is R39 billion, with the Trans-Caledon Tunnel Authority (TCTA) raising the funding in the market and it is due to be completed by 2028. The President of the Republic visited Lesotho in 2023 with a delegation from South Africa, to signal the official launch of Phase Two.

The delayed Mzimvubu project is on track, following engagements between the DWS and National Treasury. The department has reconfigured the project to make it more affordable, which has resulted in the estimated cost being reduced from R18 billion to R8 billion. Work is under way and construction of the Ntabelanga Dam, which is one of the project components, has commenced. Similarly, the R23 billion uMkhomazi project is on track after being stalled for several years due to unresolved matters regarding concerns from municipalities.

This project aims to increase water security in the uMngeni Water Supply System, which supplies eThekwini, uMgungundlovu, iLembe, Ugu, Harry Gwala District Municipalities and Msunduzi Local Municipality. The funding issue was resolved during the last financial year, in collaboration with the President's Infrastructure Fund. The TCTA is busy with preparatory work and construction work is due to commence in late 2024, with an estimated completion date of 2030.

## Sanitation

Environmental hygiene plays an essential role in the prevention of many diseases. It also impacts on the natural environment and the preservation of important natural assets, such as water resources. Proper sanitation is one of the key elements in improving environmental hygiene.

## Legislation

The Constitution of the Republic of South Africa of 1996 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, including the:

- National Water Act of 1998, which 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;
- Water Services Act of 1997, which 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;
- Water Research Act, 1971 (Act 34 of 1971), which provides for the promotion of water-related research through the Water Research Commission (WRC) and the Water Research Fund; and
- National Environmental Management Act (NEMA), 1998 (Act 107 of 1998), which provides 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.

## Challenges in Water and Sanitation

A number of external and internal environment matters affect the DWS's ability to deliver on its mandate. Some of these present various challenges and opportunities impacting on its operations, influencing planning decisions and the required trade-offs. This results in the prioritisation of certain interventions and programmes over others, taking into consideration the required resourcing and associated risks.

## Deteriorating water ecosystems

South Africa's aquatic ecosystems include seven of the world's freshwater ecoregions, and are characterised by a wide range of river, wetland and estuarine ecosystem types. Many of these aquatic ecosystems make up the country's ecological infrastructure – nature's equivalent of built infrastructure that generates and delivers benefits in the water value chain.

Ecological infrastructure is currently an under-realised asset that can play a significant role in enhancing returns-on-investment in built infrastructure (for example, dams), especially if its maintenance is explicitly incorporated into the planning and construction of built infrastructure. Many of the high-value aquatic ecological infrastructure assets are poorly protected, and in some areas of the country are under severe pressure, from intensive agriculture, mining and urban sprawl that results in loss or degradation of ecosystems. Like built infrastructure, ecological infrastructure needs to be maintained, and in some cases restored so that its socio-economic benefits could be realised.

It is estimated that South Africa has lost more than 50% of its wetlands, and of the remaining 3.2 million hectares, a third are already in a poor condition limiting their ability to inter alia regulate water flow and purify water. The loss and degradation of ecological infrastructure negatively affects system yield and increases water-related risks. Degraded wetlands, for example, lose their ability to release water in times of drought, or to recharge groundwater supplies. Degraded ecological infrastructure increases the vulnerability of people and built infrastructure to floods and increases maintenance and repair costs on built infrastructure. It is often more cost effective to rehabilitate ecological infrastructure than to be faced with an ongoing need to repair or replace built infrastructure.

## Programmes

### Water Resources Management

The purpose of the programme is to ensure the protection, use, development, conservation, management and control of water resources in a sustainable manner for the benefit of all people and the environment. It provides for the development of a knowledge base for proper planning and informed decision-making. It also provides for the development of effective policies and procedures as well as oversight of all water resource management institutions. South Africa as a water-scarce country is faced with the challenge of protecting water resources (quantity and quality) and the need to utilise water for social and economic development. Some of the country's water resources are overused (polluted, the available water is already allocated and the surrounding environment is in a poor state).

Other water resources are hardly used and the dependent environment is still in a natural state. However, South Africa has very few water resources that are still in a natural state and hence the requirement for different levels of protection. The National Water Act of 1998 provides decision-making tools to achieve a balance between protecting and utilising water resources to ensure that water is available for current and future human use. The classification system and the determination of the resource quality objectives are two mechanisms that are used to balance protection and development. The classification system states the acceptable impacts on the water resource and the unacceptable impacts in order to protect the resource.

It also states the amount of water that can be used from the water resource. The classes, therefore, allow for a grouping of water resources of those that are in a very good state and those that are in a very poor state. The resource quality objectives are an indication of the required level of protection for each water resource. The objectives, therefore, state the desired water quantity and quality, condition of the instream and riparian (river bank) habitat, as well as the condition of the aquatic animal and plant life.

The National Water and Sanitation Master Plan (NWSMP) indicates that by 2040, treated acid mine drainage and desalinated seawater will make a significant contribution to South Africa's water mix, groundwater usage will increase, and the over-reliance on surface water will reduce. Although some large surface water schemes are currently planned and developed, South Africa is approaching full utilisation of available surface water yields and is running out of suitable sites for developing large dams.

The water reuse could guarantee availability of water supply (particularly for non-potable water uses); substantially lower water bills; supplement industry's profitability by harvesting valuable resources contained in wastewater; and practise more environmentally sound water usage operations. Although the NWSMP indicates a planned reduction in the reliance of surface water, there will be development of strategic water resources infrastructure projects – Lesotho Highlands Water Project Phase 2, uMkhomazi Water Project, Mokolo Crocodile (West) Water Augmentation project and many more.

The recent water-related disasters have shown that water security is significantly impacted due to the delays in implementing certain infrastructure projects as well as water demand management. Although many scholars suggest the diversification of the water mix as a way to respond to water insecurity, this would not be sufficient to balance supply and demand if water demand management is not implemented. Climate change is projected to increase the variability of rainfall throughout the country, and to reduce average rainfall.

However, the total water supply requirements in the country will increase due to population and associated economic growth. There is a need to optimise the water mix which is currently strongly dominated by surface water, with some groundwater and return flows. The delayed reaction of groundwater to climate change impacts and other stresses such as land-use change is one of the motivating factors for

its increased use. In the face of climate change, groundwater, which will not experience the increased evaporation that will impact on surface water as temperatures increase, will become increasingly important. Artificial recharge of aquifers will be an important element of water management.

The National Water Act of 1998 requires the establishment of national monitoring and information systems, for all aspects of water resources. There is a well-established network of monitoring points that provides for the collection of data and information to assess among other things water quantity and quality as well as water use. It further includes information on the ecological properties of water resources, both surface and groundwater. The development, maintenance and refurbishment of gauging weirs seeks to improve the coverage of rainfall and runoff gauging that has deteriorated and in some instances is no longer functional.

Strong regulation is critical to achieve water security in South Africa, in terms of water quality (in rivers and taps). An incentive-based regulation initiative pursuing excellence in wastewater service management was introduced to create a paradigm shift from minimum requirement compliance towards continued risk management. The Green Drop Report reviews the water and sanitation authorities' compliance with the requirements for wastewater service management. One of the main mechanisms of ensuring access to sufficient water, protection of the environment, and reallocation of water to advance the previously disadvantaged communities is to control water use.

Water use registration regulates the manner in which water can be used. Regulations indicate that the process of water use applications is undertaken within 300 days of submitting such application. However, the Framework Agreement for the Jobs Summit requires a review of the turnaround time for considering water use licence applications. This is essential in the effective implementation of the various projects particularly emerging farming enterprises in the agricultural sector. The aim of setting waste discharge standards is to ensure that the aquatic ecosystem will not be compromised.

It also seeks to ensure that the quality will always comply with the requirements for basic human needs and other economic uses, bearing in mind that at least some basic treatment process will be applied before the water is used. It, therefore, supports the pricing strategy in differentiating between different types of water uses and water users as it affects the charges for different uses and users.

It is one mechanism that the pricing strategy achieves equity. Compliance, monitoring and enforcement is one of the priority focus areas identified in the second edition of the National Water Resources Strategy. It is essential to support water allocation and water allocation reform to ensure that water is used according to authorisation conditions, and by legally authorised water users.

The National Water Act of 1998 provides for the establishment and transformation of institutions to assist in giving effect to DWS's mandate. The enactment of the National Water Act of 1998 provided for the establishment of the institutional framework for water resource management. To manage water resources at the catchment level, the National Water Act of 1998 provides for the establishment of catchment management agencies that must ensure that all interested and affected stakeholders, including poor communities that have been disadvantaged and marginalised, participate in the decisions of the agencies. It also provides for the transformation of existing irrigation boards into water user associations that include emerging farmers.

### Water Services Management

The programme addresses the water and sanitation services provision across the water and sanitation value chain in support of water service authorities. The integration of bulk and retail water services improves the coherence of the sector and realises economies of scale and efficient use of water. It also provides for the development of effective policies, strategies, guidelines and procedures and plans as well as oversight and regulation of all water service management institutions.

The Municipal Strategic Self-Assessment is an annual review on the effectiveness of water services management within water and sanitation authorities. The authorities, which may be a district, local, or metropolitan municipality, undertake a structured self-evaluation of their current and expected future performance in providing water and sanitation services.

The review is based on five "essence questions" for 18 "business health attributes" related to service delivery in general and water and sanitation services in particular. The Municipal Strategic Self-Assessment reports for each water and sanitation authority provide an insight particularly into the strengths and vulnerabilities in terms of water and sanitation service delivery. Water conservation and water demand management targets will be set for all water use sectors (namely agriculture, industries, mining, power generation, municipal and domestic water supply) to reduce total the water requirements from existing infrastructure.

In addition, through the existing grant mechanisms, water conservation and water demand management strategies would be implemented by supporting projects that will directly impact on bulk infrastructure requirements. Domestic rainwater harvesting should be encouraged as a way of improving household food security, income savings and improved reliability of water supply, especially in rural areas. Although mostly only suitable as augmentation, it has been proven that, with good management, rainwater harvesting can yield more economical water than formal municipal water supply.

An incentive-based regulation initiative pursuing excellence in drinking water quality was introduced to create a paradigm shift from minimum requirement compliance towards continued risk management. The Blue Drop Report reviews the water and sanitation authorities' compliance with the requirements for drinking water quality management. The review is based on five "essence questions" for 18 "business health attributes" related to service delivery in general and water and sanitation services in particular.

The National Water Act of 1998 provides for the establishment and transformation of institutions to assist in giving effect to the DWS's mandate. The enactment of the Water Services Act of 1997 provided for the establishment of the institutional framework for water services. The NDP indicates that while local government will retain responsibility for ensuring adequate service provision in its areas, regional water utilities will provide services where municipalities have

inadequate technical and financial capacities.

## Entities

## Breede-Gouritz Catchment Management Agency

The Breede-Gouritz Catchment Management Agency was established in terms of the National Water Act of 1998. The agency's mandate is to protect, use and conserve water resources within the Breede-Gouritz water management area. Over the medium term, the agency continues engaging with users within its area of operation as part of its public participation programme. It plans to do this while monitoring and authorising their water usage and finalising 85% of user registrations.

## Consolidated water boards

The water boards are mandated, in terms of the Water Services Act of 1997, to provide bulk industrial water services to industries and bulk potable water services to municipalities within their areas of operation. The water boards vary in size, activities, customer mix, revenue base and capacity.

## Inkomati-Usuthu Catchment Management Agency

The Inkomati-Usuthu Catchment Management Agency was established in terms of the National Water Act (1998). The agency is mandated to protect the use of water resources in the Inkomati-Usuthu water management area in Mpumalanga. Its functions include resource allocation, protection, use, conservation, monitoring, planning development and operations.

## Rand Water

Rand Water was established in terms of the Water Services Act of 1997. The entity serves an estimated 11 million people, providing bulk potable water in Gauteng, parts of Mpumalanga, the Free State and the North West. Rand Water stores, treats and delivers water to municipalities, mines and industries in its area of service.

## Trans-Caledon Tunnel Authority (TCTA)

The Trans-Caledon Tunnel Authority is a specialised liability management entity that derives its mandate from the National Water Act (1998). It is responsible for financing and implementing the development of bulk raw water infrastructure and providing treasury management services to the DWS. The entity was expected to merge with the Water Trading Entity by 2024/25 to form the National Water Resources Infrastructure Agency.

## Umgeni Water

Umgeni Water was established in terms of the Water Services Act of 1997 to provide water and sanitation services in its service area, which comprises mostly rural areas in KwaZulu-Natal and the eThekwini metropolitan area. The entity supplies water to an estimated six million consumers.

## The Water Trading Entity

The Water Trading Entity was established in 1983 to manage water infrastructure and resources, and the sale of raw water. It was converted into a trading entity in 2008 in terms of the Public Finance Management Act of 1999.

## Water Research Commission

The legislative mandate of the Water Research Commission is set out in the Water Research Act of 1971. Its primary functions include promoting coordination, cooperation and communication in water research and development; establishing water research needs and priorities; enhancing knowledge and capacity building within the water sector; and stimulating and funding priority-based water research.

## Policies and strategies

- Mine Water Management Policy: The policy seeks to balance the mining sector's economic development with the protection and sustainable use of water resources in a manner that is beneficial to all. It provides a coherent and integrated South African approach for sustainable mine water management by building on existing strengths; addressing gaps and weaknesses and seizing identified opportunities relating to mine water management, including acid mine drainage.
- Sustainable Hydropower Generation Policy: The policy aims to support the long-term energy master plan that pursues hydropower as part of the energy mix. In addition, it will provide policy positions on the establishment and development of hydropower from infrastructure owned by the DWS as part of interventions that support and contribute towards sustainable power supply in South Africa.
- Integrated Water Quality Management Policy: The policy seeks to develop an intergovernmental water quality management approach that facilitates an integrated response to address water quality management challenges in the country. The policy also strengthens the existing integrated water quality management strategy that identifies priority programmes to be implemented country-wide.
- National Water and Sanitation Bill: This is a consolidation of the National Water Act of 1998 and the Water Services Act of 1997 into a single piece of legislation. It clarifies the legislative framework regarding water management across the water and sanitation value chain. It further obviates the need for cross-reading between the two Acts.
- National Water Resource Strategy 3 (NWRS-3): The strategy provides a framework for the protection, use, development, conservation, management and control of water resources for the country as a whole. The National Water Act of 1998 requires the review of the National Water Resource Strategy (NWRS) at intervals of not more than five years and this is the third edition of the strategy.
- Review of The Water Pricing Strategy: The strategy review seeks to improve the financial viability of government's bulk raw water business to ensure that this scarce resource is valued by all citizens. One of the major changes of the review is to replace the return on asset to future infrastructure-built charge over a 10-year rolling period.

- National water and Sanitation Master Plan (NWSMP):

The plan operationalises the NWRS and aims at mobilising commitments and efforts of all role players and stakeholders in the water and sanitation sector towards collectively achieving the desired future state of the sector, as defined by government's vision, goals and targets until 2030. It provides a critical overview of the present state of the sector and the key challenges it is currently facing, together with a consolidated plan of actions required to enable the achievement of the set targets.

The plan of actions includes a detailed schedule of consolidated and prioritised interventions, actions, investments, projects and initiatives. For each action, the plan defines specific intermediate and final targets, the parties responsible for their achievement, the deadlines for delivery and the estimated costs or other required resources. The achievements are monitored and evaluated annually and the plan is updated biannually to reflect the dynamics in the sector.

## National Water Policy

The National Water Policy is underpinned by three fundamental principles for managing water resources: equity, (environmental) sustainability and efficiency. 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 are:

- 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 cubic metres or where the water area at full supply level exceeds one hectare 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; and
- 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 DWS has developed and continues to update a range of strategies for water management.

## National Water Resource Strategy 2 (NWRS2)

The National Water Resource Strategy 2 (NWRS2) sets out the vision and strategic actions for effective water management, including the security of water supply, environmental degradation, and pollution of resources. The NWRS2 outlines 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 NDP and the National Water Act of 1998 imperatives that support sustainable development.

It is centred on these 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, ensuring that 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

Since 1994, there have been continued efforts to reform and realign the water value chain so that it can achieve government's objectives. 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 reviews the Raw Water Pricing Strategy, develops infrastructure funding models and recommends an appropriate model and institutional arrangements for an economic regulator for water.

It is generally agreed that pricing and economic regulations 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 contributes to the following:

- Revision of the Raw Water Pricing Strategy to ensure equitable and appropriate raw water tariffs that enable sustainable operation and management of raw water infrastructure, and fund catchment management funding models for water resources infrastructure; and
- Establishment of an economic regulator for the entire water value chain.

The project is strategic in nature and enables 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.

## 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 the National Water Resource Strategy 1 and led to the formulation of a National Groundwater Strategy through which strategic actions were undertaken.

## Re-use Strategy

The DWS has developed a Water Re-use Strategy to encourage informed decisions relating to water reuse. Re-use 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. Re-use is becoming increasingly acceptable and feasible due to increasing shortages, improved purification technology and decreasing treatment costs.

Membrane technologies, also used for desalination of sea water, have become more affordable and have improved. The re-use of treated wastewater would be managed to ensure public health safety.

## Infrastructure upgrades and bilateral agreements

The DWS has made good progress with the preparatory work of the Lesotho Highlands Water Project, with Phase 2 under way. The project comprises the construction of Polihali Dam, which provides an additional 465 million cubic metres of water per year, bringing the total to about 1 245 million cubic metres of water per year into the Integrated Vaal River System from Lesotho.

South Africa currently receives approximately 780 million cubic metres of water per year from Lesotho into its Integrated Vaal River System which supplies water to Gauteng and the surrounding areas. The Integrated Vaal River System needs to be urgently augmented in order for it to cope with the increasing water requirements. Phase 1 of the Mokolo and Crocodile River West Water Augmentation Project, which will transfer water through a 46km pipeline and pump station from the Mokolo Dam to the Lephalale area, is complete. A second pipeline is being constructed as Phase 2A of the project to transfer water from the Crocodile River (west) to the Lephalale area.

The raising of the Hazelmere Dam wall incorporates a Piano Key Weir, which is cutting-edge technology in dam-building. The additional water that becomes 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 TradePort. The construction of the dam wall is complete and the capacity of the dam can be increased to 120% on impoundment of the previous dam level which is beneficial to water users.

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 Laleni Dam for hydropower generation. It 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 first phase of the multi-phase Lesotho Highlands Water Project entailed the construction of Katse Dam, Mohale Dam, Matsoku Diversion Tunnel and the Muela hydropower station.

Lesotho benefits from a sustainable, independent energy supply that meets the country's electricity requirements and royalty revenue from the project, while South Africa benefits from the security of supply of high-quality water that is transferred into the Vaal River system for domestic and industrial use in Gauteng. As per the provisions of the Phase 2 agreement between the governments of Lesotho and South Africa, the implementation of the Kobong Pump Storage Scheme or any other hydro scheme was subject to the outcome of a joint feasibility study.

The technical and the economic feasibility studies for the Kobong Pump Storage Scheme were completed in 2013. However, the outcome was that further studies should be undertaken. These included a market study, an integration study, geotechnical investigations and legal and commercial arrangements.

Lesotho secured funding from the World Bank to undertake the above studies, including conventional hydropower options. The further feasibility studies have looked at pumped storage and conventional hydropower options. The decision was taken to defer the pump storage option (due to prevailing economic conditions) and advance the conventional options. This entails one site at Oxbow on the Malibamatšo River and two sites on the Senqu River.

The topography of the region allows for the possibility of developing hydro-power generation in Lesotho in conjunction with the provision of water supplies to South Africa. For South Africa, construction of this dam and related infrastructure guarantees the desired level of water availability in Gauteng and the Vaal River system in the most cost-effective manner.

In parallel with water conservation measures in the Vaal River, it also influences the improvement of water quality among many benefits. Phase 2 water delivery and hydropower generation were expected to be commissioned at the same time – early 2026 and the project close out is forecast for December 2028.

The Lesotho Highlands Water Project has two main goals:

- to contribute to South Africa's economic development by providing South Africa with a supply of low-cost, high-quality water to meet the household and industrial water needs of Gauteng, the industrial heartland of South Africa; and
- to contribute to Lesotho's economic development by using the water transfer system to increase the country's capacity for the generation of electricity that meets its requirements and earn it revenue in the form of royalties on the water transferred to South Africa.

Each country has the opportunity to undertake ancillary developments within its borders. These developments include the provision of water for irrigation, potable water supply, the development of tourism, fisheries and other projects for economic and social development.

## Rainwater harvesting

The National Rainwater Harvesting Strategy is an adaptation to climate change. Climate change poses significant social, economic and environmental risks, especially in developing countries. This then necessitates the implementation of high-impact climate change response measures that realise considerable mitigation, adaptation and broader socio-economic benefits.

It is in this context that the DWS, in partnership with the

Department of Forestry, Fisheries and the Environment (DFFE), is developing the National Rainwater Harvesting Strategy to provide a roadmap for enhanced planning, development and scaled-up implementation of Rainwater Harvesting as a key component of South Africa's water resources and efforts to enhance climate resilience.

The strategy provides guidance for the implementation of a series of action programmes towards the mainstreaming of rainwater harvesting in South Africa. This National Rainwater Harvesting Strategy also serves as the guiding tool for district and local municipalities to effectively and economically put rainwater harvesting into practice.

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

A resource guideline has been developed to assist municipalities that are providing rainwater harvesting systems to communities as an interim service or to reduce demand on their water supply systems with best practices. In some areas rainwater harvesting systems are provided as drought relief but the DWS is using the programme to advise municipalities to plan for alternative water sources or water mix, since municipalities seem to rely on surface water for water services and a lot of water schemes are failing because of dependency on a single source.

## Desalination Strategy

The DWS 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 has to undergo an environmental impact assessment in compliance with the National Environmental Management Act (NEMA) of 1998.

The DWS ensures 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.

## Resources

South Africa's water resources are, in global terms, scarce and extremely limited. The precipitation per year for Africa is 22 300 cubic metres, 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 the Congo (DRC), Zambia and Mozambique) with the drier parts of the region including Namibia, Botswana and South Africa.

South Africa has a mean annual rainfall of approximately 500 millimetres, compared to the world's average of 860 millimetres. 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 is 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 groundwater and return flows underused. However, the freshwater available for use is currently at its limit, and alternative sources, such as groundwater, need to be further exploited. In addition, the country shares four major rivers with six neighbouring states, namely Zimbabwe, Botswana, Mozambique, Eswatini, Lesotho and Namibia. Therefore, international agreements on water sharing are in place on all of these river basins.

There is well-developed infrastructure, with more than 4 395 registered dams in South Africa, including 350 dams belonging to the DWS, and a number of large-scale, inter-basin water transfer schemes. Water services infrastructure covers more than 35 000km of bulk pipelines and 200 000km 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 the development of tourism, fisheries and other projects for economic and social development.

## Groundwater resources

An estimated 80 000 to 100 000 boreholes are being drilled annually. 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 – it services between 52% and 82% of community water-supply schemes in the Eastern Cape, Limpopo, the Northern Cape, the 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 cubic metres a year, while some 4 000 million cubic metres of groundwater (mainly in the dry season) contribute to surface water flow annually.

Southern Africa also has large hidden underground water reserves in 12 to 15 aquifer systems, three of which are very important for the future. South Africa has a massive dolomite aquifer system covering a vast area 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 can store water equivalent to the size of Lake Kariba, which is located on the border between Zambia and Zimbabwe.

## 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 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.

## Strategic Integrated Projects (SIPs)

SIP 18, which was approved by the Presidential Infrastructure Coordinating Commission (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 10-year plan addresses 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 focuses 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 underserviced or unserviced. The DWS has identified several projects that will be used to drive SIP 18, including the Sedibeng Regional Sewer Scheme – 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, 8.6km away, increases 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. 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 supplements the Komati Water Scheme from the Vaal Eastern Subsystem to help Eskom overcome its water supply challenges.

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 delivers an additional 57 million cubic metres of water a year to the Komati Water Scheme.

## Water Allocation Reform Programme

The Water Allocation Reform Programme's objectives are to ensure equitable access to water, eradicate poverty and promote social and economic 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, through its Learning Academy External Bursary Scheme, provides bursaries yearly to help close this gap. Applications are open to people who would like to pursue careers in line with the department's core business. 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, geohydrology, 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, 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. Water leaks account for nearly 36% of the nation's unaccounted for water and costs the country about R7 billion annually.

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;
- investing in innovative water-saving solutions, such as the Drop-the-Block Campaign;
- incorporating all municipal and privately-owned dams into the management system for the future;
- implementing further transfer schemes to improve drought resilience;
- building additional storage capacity; and
- 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 considered in return flows).

## Enhanced local government support approach

A rapid response unit in the DWS 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 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 is the further development of strategic relationships with other organisations with shared objectives.

It includes managing the Working for Wetlands Programme on behalf of the DWS, the Department of Forestry, Fisheries and the Environment, and the Department of Agriculture, Land Reform and Rural Development. 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 the 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. The adoption of ecosystem-based approaches and implementing the open space planning and management programmes add impetus to the protection of these systems and associated services, especially at local government level.

This 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

The programme 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.

## Integrated Water Quality Management Strategy

The pollution of South Africa's water resources, both surface and underground water, not only adversely affects human and environmental health but has severe consequences for the economy and social well-being. In response to the country's need to take an improved integrated approach to water quality management, the DWS recently developed the Integrated Water Quality Management Strategy.

This strategy sets forth a number of objectives, each supported by key actions, which collectively aim to ensure that government, in partnership with the private sector and civil society, secures water that is fit for use for all. These actions range from the need to strengthen institutions, to the need to improve monitoring and information management, and to strengthen regulation of activities that degrade water quality.

## Managing water resources under a changing climate

With climate change, water resources that are already under pressure due to increasing water demand will be under even greater stress in the future. Already, physical evidence suggests that there are changes in historical rain patterns and intensities, as observed in the increasing temperature and drought trends. Water distribution in South Africa is spatially skewed, with decreasing rainfall and increasing evaporation from east to west.

Even though rainfall trends cannot be clearly defined, it can be said with high confidence that potential impacts of climate change in South Africa on water availability will be negative. Just with increasing temperatures alone, without considering other climatic and non-climatic factors, evaporation rates will increase and that will affect water availability. Climate change impacts on the water sector will thus amplify the current existing conditions.

The DWS has made good progress in trying to understand the impacts of climate change on the different water management areas through conducting Risk and Vulnerability Assessment Studies, and accordingly suggesting adaptation strategies as appropriate. These studies reveal that catchments in the eastern side of the country, for example, the Mzimvubu-Tsitsikamma water management area, rainfall has shown an increasing trend, and the area is also projected to experience increasing rain days both in the intermediate and distant futures. This, however, comes with other challenges such as severe erosion and siltation.

Evaporation rates, in most cases, have been shown to exceed precipitation, becoming relatively higher in areas where it rains less, for example, in the Lower Vaal and Lower Orange catchments. What needs to be considered even further is not only the direct impacts of climate change

on the water sector, but secondary impacts on other water-dependent sectors, such as agriculture, mining and energy. As such, any adverse effects of climate change may negatively affect progress towards development in a number of economic sectors in the country.

## National Water and Sanitation Master Plan (NWSMP)

The development of the National Water and Sanitation Master Plan (NWSMP) aims at mobilising the commitment and efforts of all role players and stakeholders in the water and sanitation sector towards collectively achieving the desired future state of the sector, as defined by government's vision, goals and targets until 2030 (NDP, Sustainable Development Goals, MTSFs and other key drivers). It provides a critical overview of the present state of the sector and the key challenges it is facing, together with a consolidated plan of actions required to enable the achievement of the set targets.

The plan of actions includes a detailed schedule of consolidated and prioritised interventions, actions, investments, projects and initiatives. For each action, the plan defines specific intermediate and final targets, the parties responsible for their achievement, the deadlines for delivery and the estimated costs or other required resources. The achievements are monitored and evaluated annually by a dedicated project management unit managed by the DWS. The master plan is updated bi-annually to reflect the dynamics in the sector.

It acts as the implementation tool for the Water and Sanitation Resources and Services Strategy, and the two documents will be aligned.

## National Aquatic Ecosystem Health Monitoring Programme (NAEHMP)

The NAEHMP is a national programme managed by Resource Quality Services with support from the WRC, the Council for Scientific and Industrial Research 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; and
- 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 comprises three separate monitoring programmes,
namely:

- The River Eco-status Monitoring Programme (REMP): This is the oldest component of the NAEHMP. It focuses on the monitoring of ecological conditions of river ecosystems as it is reflected by the system drivers and biological responses. The basis of the REMP is the establishment of a reference condition derived from best available information. Present conditions (ecological category) for the different indicators are determined as a change from reference.

  The REMP is built upon the use of particular models incorporating existing approved Eco-status models. The assessment can be done on a sub- quaternary or site level and includes the use of the Index of Habitat Integrity, Fish Response Assessment Index, Macroinvertebrate Response Assessment Index, Vegetation Response Assessment Index and Integrated Eco-status. Monitoring is conducted on a quarterly basis and technical reports are produced annually.

  Currently, a number of provinces are only partially implementing the REMP, focusing mostly on the macroinvertebrates and habitat components but the programme is fully implemented in the Inkomati-Usuthu as well as the Breede-Gouritz, Berg-Olifants and Pongola-Mtamvuna water management areas. Information obtained through the REMP is also used in monitoring the biological and habitat components of the Resource Quality Objectives.
- The National Estuaries Monitoring Programme (NEsMP): The purpose of this programme is the monitoring of water quality, physic-chemical and biological aspects for determining long-term trends and changes in the condition of South African estuaries. The NEsMP coordinates national monitoring efforts and provides support in the form of sampling equipment, training, data management and information dissemination, while collaborating institutions collect physicochemical data and water samples.
- The National Wetland Monitoring Programme: The programme's design is based on minimising duplication of effort, while maximising the value of outputs of wetland assessment and monitoring, finding suitable methods for prioritising wetlands to be assessed and monitored, adaptive management and maximum engagement and participation by stakeholders.

  It has not been implemented yet, but aims to assess and monitor the extent of wetlands, the threats to, and the change in, the present ecological state and ecosystem services provided by wetlands in South Africa. It is a state-of-wetland reporting programme, designed to demonstrate trends in the state or integrity (biological, physical and chemical components of its ecosystem and their interactions) of wetlands over time.

## National Toxicity Monitoring Programme

The National Toxicity Monitoring Programme reports on the status of dichloro-diphenyl-trichloroethane (DDT) and other persistent organic pollutants. This information is reported internationally to the Stockholm Convention through the DFFE. The National Toxicity Monitoring Programme was designed to assess the status of water resources through measuring the concentration of a selection of priority pollutants at a number of hot spots, and also assessing the toxicity of the water to some aquatic organisms through direct measurement of effect.

The priority pollutant selection is aligned to the extent possible with South Africa's responsibility for reporting under the Stockholm Convention. The geographic distribution of monitoring points is still largely determined by fiscal and operational constraints. It currently focuses on the upper reaches of the Crocodile (West)-Marico and Olifants River catchments. The combination of chemical and biotic assessment in conjunction with the other national monitoring programmes also supports strategic and operational decision making by identifying areas of impairment of fitness for use.

The first five years of monitoring indicated that the persistent priority pollutant concentrations were generally low but that mild seasonal toxicity occurs, possibly in conjunction with agricultural activity. It also tends to confirm that the major human exposure route of DDT (used in malaria vector control) is unlikely to be through the water. Future development includes extending analyses to riverine sediments.

## Education and awareness

### National Water Week

The National Water Week campaign is aimed at educating the public about their responsibility in water conservation initiatives, and raising awareness around the need to protect and conserve the country's water resources. The DWS celebrated National Water Week from 20 to 26 March 2023 by urging everyone to use water sparingly to ensure water for all. Each year, the United Nations Water sets a theme for World Water Day which responds to a current or future challenge.

The theme for 2023 was "Accelerating Change", and the theme sought to urge policy and decision-makers, inside and outside the water community, to heighten efforts to ensure universal access to water. World Water Day was celebrated on 22 March 2023. The day raises awareness of the global water crisis and focuses on the achievement of Sustainable Development Goal 6: Clean Water and Sanitation for all by 2030. The DWS launched the #SaveWater campaign to remind all South Africans that every drop counts.

Despite good rainfall, South Africa remains a water-scarce country and, as such, is susceptible to sustained droughts exacerbated by climate change.

### 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, the DRC and Eswatini in the region.
- Mozambique and Eswatini 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.
- Eswatini 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, Eswatini 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 has global relations with countries such as Iran, China, Denmark, Russia, Mexico, South Korea, Australia, Germany, the Netherlands and Japan.

### Acid Mine Drainage

The DWS launched the Eastern Acid Mine Drainage Treatment Plant, which ensures 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 the 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 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. The Eastern Basin Plant in Springs is one of the largest of its kind in the world, treating approximately 110 megalitres per day.

The Eastern Basin Plant is located in one of 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 to Nigel areas. Both the Western and Central Basins were commissioned previously and are running smoothly.

### Bucket eradication

Government started a 'bucket eradication' programme in 2012, focusing on projects to replace buckets with waterborne sanitation in the Eastern Cape, the Free State, the Northern Cape and the North West. The project was delayed, partly because of the sanitation function being transferred between departments on several occasions, and the programme being repeatedly transferred between different implementing agents appointed by the different departments. The project has also been delayed because there was inadequate engineering planning and design for the required upgrading of wastewater treatment works to receive additional sewage from the new household waterborne sanitation connections.

The progress to date is that all the elements of the original programme have been completed apart from one project in the Northern Cape and eight projects in the Free State. These were expected to be completed during the 2023/24 financial year. In reality, the programme will not "eradicate"

buckets because municipalities are continuously initiating new bucket systems in informal settlements. To address this, the DWS has developed a National Sanitation Framework, which was approved by Cabinet.

In terms of the framework, the department issues revised norms and standards for sanitation services under the Water Services Act of 1997 which make it clear that it is unacceptable for municipalities to implement the bucket system. The planned amendments to the Water Services Act also enable the department to regulate and ensure adherence to these norms and standards.

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