2026
Mpumalanga **Water Sector** Market Intelligence Report

MPUMALANGA
GREEN CLUSTER
AGENCY

Mpumalanga Green Cluster Agency

Acknowledgements

Disclaimer

While every attempt has been made to ensure that the information published in this report is accurate, no responsibility is accepted for any loss or damage to any person or entity relying on any of the information contained in this report.

This document may be downloaded at no charge from https://thegca.co.za/resources/

Subscribe to receive e-mail alerts or MGCA news, events and publications by registering as a member on our website: https://thegca.co.za/cluster-membership/cluster-membership

Mbombela, 1200, South Africa

Document Typesetting & Layout: Muzikayise Mashele Mbungela (TheMousist.co.za)
Images: Supplied

CONTENTS

LIST OF TABLES

LIST OF FIGURES

1.

THE WATER SECTOR IN SOUTH AFRICA

South Africa is a water-scarce country due to its low average annual rainfall and the uneven distribution of surface and groundwater, influenced by its climate and geography. In fact, it is ranked as the 30th most water-scarce country globally.

1.1.

Water Quantity and Quality in South Africa

The deterioration of water quality is a pressing concern that requires urgent attention. The decline in water quality poses a significant threat and demands considerable focus. It has led to the outbreak of waterborne diseases like cholera in areas such as Hammanskraal, Kimberly, and the Vaal region, resulting in loss of lives. Furthermore, the state of wastewater treatment in South Africa is alarming.

Water security is not dependent solely on availability but also on quality. The quality of the country's water resources has deteriorated in recent years due to increased pollution from industries, urbanization, afforestation, mining, agriculture, and power generation.

This situation is exacerbated by outdated and inadequate infrastructure for water and sewage treatment plants, a lack of skilled operators, and the impact of climate change.

Strict adherence to the specifications outlined in the South African National Standards (SANS) 241 is paramount to guaranteeing the safety of domestic water supplies. These standards, in alignment with international guidelines for drinking water quality, play a vital role in ensuring the safety and integrity of the water.

1.2.

Current and Projected Water Usage in South Africa

As of 2024, the total water requirements in South Africa amount to 13 974 million cubic metres. However, these demands are expected to increase in the coming years, with projections indicating a rise to 17 559 million cubic metres by 2030 and further to 18 500 million cubic metres by 2040. The agriculture sector is the biggest consumer, accounting for 59% of water usage in South Africa, followed by municipal water usage at 25.1%.

Arguably, the Agricultural sector is also the least efficient user of water among all sectors, as it utilizes nearly 60% of the available water. Consequently, it can be proposed that addressing water shortages could involve transferring water from the agriculture sector to other sectors of the economy that use water more efficiently. However, such reallocation must be carefully balanced, considering trade-offs, particularly regarding food security requirements and the sector's growth and investment prospects.

Table 1: Current and Projected Water Requirements in South Africa, 2024 & 2030

	Current Water Use (2024)		Projected Water Use (2030)	
	Mm³	Percentages	Mm³	Percentages
Agriculture (irrigation and livestock & watering)	8 245	59.0%	9 700	55.2%
Municipal (industries, commerce, urban and rural domestic)	3 507	25.1%	5 800	33.0%
Strategic Power Generation	307	2.2%	430	2.4%
Mining and Bulk industrial	797	5.7%	1 017	5.8%
International Obligations	601	4.3%	178	1.0%
Afforestation	517	3.7%	434	2.5%
Total	13 974	100.0%	175 59	100.0%

Source: Author's calculations based on data from National Water Resources Planning – NWRP

South Africa's high per-capita water usage rates are influenced, in part, by significant levels of non-revenue water. Non-revenue water refers to water that is unaccounted for, primarily due to physical leaks in South Africa. Additionally, the country heavily relies on water-intensive coal-fired power plants for electricity. Moreover, there is an excessive dependence on surface water, with inadequate utilization of other resources like groundwater.

Access to water is vital for the socio-economic development and livelihoods of communities across South Africa. Water availability plays a critical role in ensuring food and energy security and fostering economic growth. However, South Africa is far from achieving water security, as the demand for this precious resource already exceeds the available supply.

South Africa's water infrastructure, with an average age of 39 years, faces the effects of ageing, both internally and externally. Inadequate maintenance and insufficient capital renewal have further contributed to its deterioration.

The water sector in South Africa is also plagued by several illegal water users who fail to comply with the terms of their water use licenses, thus violating the provisions of the National Water Act. Another pressing challenge is the issue of acid mining drainage (AMD), which is not limited to the Witwatersrand area but also affects other regions of South Africa, including the Mpumalanga and KZN coalfields, as well as the Northern Cape's Okiep copper district. Urgent action is needed to address these issues and prevent potential crises while stabilizing the situation.

1.3.

Transformation

Transformation is crucial in three key areas: ensuring equitable utilization of water for productive purposes, establishing representative governance of water, and guaranteeing access to adequate water and sanitation services for all. However, it is essential that any government policy interventions and regulations concerning water licensing and redistribution do not compromise the assurance of water supply to strategic sectors like Commercial Agriculture. Such measures should not have a negative impact on food security and the sustainability of commercial agriculture in South Africa.

1.4.

Funding Water Infrastructure

Water is crucial for economic development, job creation, and livelihoods. As a nation, we must explore ways to enhance the viability of the water sector and reverse the current negative trends. The domestic investor community is interested in investing in water infrastructure in South Africa, including utilizing long-term savings for financing. This presents a win-win situation for our country as it improves water access while also supporting pension funds. However, realizing this opportunity is unlikely unless water is priced correctly, and water revenue collections are increased.

The private sector already plays a significant role in the national water sector. They contribute to financing projects implemented by entities like the Trans-Caledon Tunnel Authority, Water Boards, and various municipalities. The private sector is involved as implementers of water concessions in Mbombela and iLembe, as well as operating several municipal water assets.

According to economic theory, achieving “economic efficiency” means allocating resources in a way that maximizes the production of goods and services for society. The key lesson from economic literature is that prices in every sector of the economy should reflect the underlying cost structure to enhance efficiency and increase social welfare. Financial sustainability in the water sector specifically refers to having sufficient revenues to cover operation and maintenance (O&M) costs and capital costs. O&M costs can be funded, but many municipalities in South Africa face a major financial problem due to inadequate collection of service charges, largely caused by widespread non-payment.

The projected gap between water requirements and supply is driven by factors such as low tariffs, insufficient cost recovery, over-consumption, inefficient use, wastage, leakage, inappropriate infrastructure choices (such as water-borne sanitation in a water-scarce country), inadequate planning and implementation, as well as population and economic growth. If the degradation of aquatic ecosystems (including wetlands), poor land use practices, and elevated levels of water pollution persist, water availability and raw water quality will further decline.

In South Africa, green bonds can be considered among other funding options for water development infrastructure. Green bonds are designed to raise funds specifically for climate and environmental projects, including addressing water supply shortages. These bonds are usually backed by the issuing entity's balance sheet, making them carry the same credit rating as other debt obligations of the issuer. Water infrastructure poses the greatest financing challenge in developing countries as it is part of public infrastructure.

When governments and sub-sovereign entities enter the bond market, they subject themselves to the scrutiny of credit rating agencies. Credit ratings enhance the transparency of sub-sovereign finance, allow for peer comparisons, and create market discipline for local officials and politicians.

Municipalities can also explore bond pooling as a means to finance water infrastructure. Bond pooling involves multiple municipalities, usually small- or medium-sized, collaborating to issue a single bond, with the proceeds distributed among them. This approach reduces transaction costs, which could otherwise be prohibitive, and strengthens the bond's quality by providing a collective guarantee for repayment.

1.5. Call to Action: Addressing South Africa's Water Challenges for a Sustainable and Resilient Future

South Africa needs to urgently tackle its water challenges to ensure sustainable development, safeguard public health, and protect the future of the country. All citizens and stakeholders, including the government, must collaborate in securing this invaluable resource and building a resilient nation that can effectively manage its water needs.

"*In 2026, South Africa's water sector is addressing a deepening national crisis, with water scarcity, failing infrastructure, and high non-revenue water losses (47% lost) affecting service delivery*", notes iBeef and Engineering News. The government is prioritizing regulatory reforms, including the reinstatement of Blue/Green Drop monitoring and the establishment of a National Water Resource Infrastructure Agency to enhance bulk infrastructure and mobilize private investment, say stateofthenation.gov.za and South African Government News Agency.

Key developments and challenges in 2026 include:

- Infrastructure Crisis & Management: A significant portion of the country's water and sanitation infrastructure is collapsing due to decades of neglected maintenance, corruption, and theft, notes watercan.org.za.
- Regulatory Reform & Monitoring: The government is reinforcing regulations to hold municipalities accountable. The reintroduction of Blue Drop, Green Drop, and No Drop, along with stricter accountability for Water Service Authorities, is a key focus, say stateofthenation.gov.za and Engineering News.
- Private Sector Involvement: The government is actively seeking partnerships to address the $10+ billion opportunity in water infrastructure, treating the crisis as an investment opportunity to strengthen resilience, note SAIWW and South African Business Matters.
- National Water Resource Infrastructure Agency: This new entity is being finalized to manage national water infrastructure, improve water security, and facilitate funding for major projects, says stateofthenation.gov.za.
- Alternative Water Sources: The Department of Water and Sanitation (DWS) is exploring groundwater, desalination, and wastewater treatment initiatives to supplement dwindling surface water, notes South African Government.
- Water Conservation: With 47% of treated water lost to leaks, water demand management and community education are being treated as critical.

Key features that characterize water resources availability in South Africa are the following:

- South Africa is characterized by spatial variability in rainfall, with the east of the country lying in the summer rainfall zone with high rainfalls. In contrast, the country's west lies in an all-year-round or winter rainfall region that is semi-arid to arid.
- The seasonal variability in the country's climate influences water availability and storage dynamics.
- River systems (mostly through the surface water storage in large dams) are the common surface water expression of water availability in South Africa, with others being lakes, ponds, and pans.
- Aquifer (groundwater) storage is another expression of water availability in the country where an increased groundwater utilization in the country's water mix has been observed due to the significant potential of the groundwater resources in adaptation to climatic-related stresses and augmenting conventional surface water supply systems.
- South Africa's water supply is dependent on Strategic Water Source Areas (SWSAs). SWSAs are defined as areas of land of national importance that either (a) supply enormous quantities of mean annual surface water runoff compared to their size (b) have high groundwater recharge and high dependence, or (c) areas that meet both criteria (a) and (b). They include transboundary Water Source Areas that extend into Lesotho and Swaziland.
- South Africa is a water-scarce country. Water insecurity has become severe as almost 98% of the available freshwater resources are already allocated, and over 60% is used for crop production. Water availability is highly variable, determined by rainfall variability in the national territory.

The following features characterize water resource management in South Africa:

- The water sector institutional reform is ongoing; for the current outlook, the National Department of Water and Sanitation is the custodian of

- The water sector institutional reform is ongoing; for the current outlook, the National Department of Water and Sanitation is the custodian of water resources with an obligation to perform water resource management functions. The water resource management functions are to be delegated to the six Catchment Management Agencies (CMAs), where two exist, and four are being established; this supports the principles of good governance, where water will be managed locally.
- At a local level, there are Water Services Institutions (WSI), which comprise Water Services Authorities (WSAs) that provide water services or outsource water services provisions to the private Water Services Providers (WSPs).
- The four new CMAs, namely Breede-Olifants CMA, Vaal-Orange CMA, Pongola-Mzimkulu CMA, Mzimvubu-Tsitsikamma CMA have been established, with three of the four CMAs already having interim CEO appointed.
- South Africa shares four international river basins, namely the Limpopo, Orange/Senqu, Inkomati, and Maputo, with six neighboring countries, Botswana, Lesotho, Mozambique, Namibia, eSwatini, and Zimbabwe. These water resources are managed through shared watercourse institutions, commissions, and international agreements to promote international transboundary cooperation.
- The Department of Water and Sanitation has established monitoring networks (along rivers, dams, estuaries, eyes, canals, pipelines, groundwater aquifers, wetlands, and abandoned mines), monitoring programs, and information systems to ensure that water resource data is freely available and accessible.
- South Africa faces water, energy, and food insecurity; while the country is food secure at a national level, over 50% of households still face food insecurity, 98% of the country's water resources are already allocated, and the country currently faces

instability in the energy sector (StatsSA, 2019).

Rainfall and Temperatures

South Africa experienced its hottest year since 1951 in 2024, with an annual mean temperature anomaly of 0.9 °C above the reference period. Average temperatures were consistent across the country, with temperatures in the lower teens dominating over the cooler southern to eastern escarpment and eastern Highveld. The highest average temperatures occurred over the traditionally warmer parts, including the Limpopo River Valley, Lowveld and north-eastern KZN, with values in the lower to mid-twenties dominating. Most parts of the country received below-average rainfall in total over the reporting period. Notable exceptions are the winter rainfall region, the southeastern parts of the Northern Cape, the southwestern Free State, and large parts of KwaZulu-Natal.

Drought

The Standardized Precipitation Index (SPI) for the two-year period ending in September 2024 reveals that drought was negligible, with only a few areas, including the Lower Orange and northeastern areas of the country, experiencing moderate drought conditions. Most of the winter rainfall region experienced moderate to severe wet conditions during this two-year period, with moderately wet conditions prevailing along the southern escarpment extending to Lesotho.

Surface Dam Storage

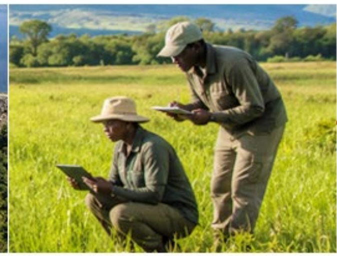
As of the end of September 2024, the national dam levels were at 79.7% of Full Supply Capacity (FSC). This level is lower than that of the previous two hydrological years during the same reporting period when national storage levels exceeded 90% of FSC. As a result of the drier and warmer conditions observed this spring relative to 2023, the storage levels of the Vaal Dam and Gariep Dam also decreased by 39.5% and 16.8%, respectively. The dams that reached critical storage levels by the end of the reporting period were located in the Eastern Cape and Limpopo.

Trophic status

The ONEMP site assessment identified 78 sites of varying trophic status and eutrophication potential. The Rietvlei Dam and Hartbeespoort Dam were hypertrophic, whereas the Koster Dam and Olifantsnek Dam were mesotrophic, with low nutrient levels and reduced aquatic productivity. Twenty-six of the sixty-nine sites assessed for eutrophication potential demonstrated an elevated risk of eutrophication, which was an improvement over the previous year. Most eutrophication-related sites are in densely populated areas with overburdened sewage systems due to rapid population growth, inadequate infrastructure, and industrial activities.

Microbial Pollution

An assessment of 75 hotspot sites in the country revealed that 70% were deemed unsafe for recreational activities, reflecting a 3% increase from the prior year. Furthermore, 48% of sites were classified as unsuitable for irrigating crops intended for direct consumption, presenting a significant risk of infection for those engaged in these practices. The detection of E. *coli* in water indicates recent faecal contamination, highlighting concerns regarding the efficacy of wastewater treatment and the potential inadequacy of pathogen removal or disinfection processes in treated water released into the river system.



River Ecological Status

The report indicates that moderately modified conditions have prevailed in most of the country's river systems, with 59% of sites classified accordingly in the current hydrological year. 18% of sites have shown an improvement in ecological conditions, whereas 23% experienced a decline in the current reporting period. Several sites within the Sabie, Komati, and Usuthu catchments have been classified as predominantly or entirely in a natural state.

Groundwater

As of September 2024, South Africa's average groundwater levels are normal but lower than those of 2023. Elevated concentrations of nitrate and fluoride are observed in the northern regions, specifically within the Limpopo-Olifants and Vaal-Orange Water Management Areas. Elevated salinity is noted in the Northern Cape and select coastal regions, influenced by geological, geomorphological, and hydrological processes.

National Water Balance

The national water balance indicates a System Inputs Volume of 4.39 billion m^3/a, with a water loss of 40.8% and a Non-Revenue Water (NRW) of 47.4%, as per the 2023 No Drop Watch Report. The COVID-19 pandemic and increased water demands resulted in the most significant increase in NWR and water losses in 2020/2021. DWS will implement the No Drop Progress Assessment Tool (PAT) during the 2025/26 fiscal year to provide a snapshot of the current state of WSI’s WC/WDM business.

Ecological Infrastructure Rehabilitation

The ecological infrastructure rehabilitation initiatives aim to improve the condition and functionality of wetland ecosystems. DFFE has achieved notable advancements in wetland rehabilitation efforts in KwaZulu-Natal and Mpumalanga, restoring wetlands that human activities have historically degraded. DWS is also engaged in the restoration of a wetland along the Blesbokspruit River in collaboration with the City of Ekurhuleni and the Gauteng Department of Agriculture, Rural Development, and Environment (GDARDE).

Resource Protection

The Department has finalized and published the Water Resources Classes (WRCs) and the corresponding Resource Quality Objectives (RQOs) in various Water Management Areas (WMAs), with the Usuthu to uMhlathuze WMA study concluded in June 2024. The Department is currently left with the Orange River System (Upper and Lower Orange), Luvuvhu, Keiskamma, and Fish to Tsitsikama Catchments, where technical processes are ongoing.

Water-Energy-Food NEXUS

The connectedness of current challenges (climate change, environmental degradation, population growth, migration, and the emergence of novel infectious diseases) requires circular and transformative approaches that holistically address these cross-cutting challenges. Managing the intricate relationships between distinct but interconnected sectors through nexus planning has provided decision-support tools to formulate coherent strategies that drive resilience and sustainability. As a result, the Water-Energy-Food (WEF) nexus has gained increasing attention in the research and decision-making communities in recent years as a prominent integrated resource management approach.

Compliance Monitoring and Enforcement

In the last three years, DWS Enforcement Units have documented 583 cases of noncompliance, of which 141 pertain to water resource pollution control. The Department issued 119 notices and 46 directives, and it initiated 56 criminal cases against facility operators. Eight cases have been resolved, with facility operators implementing corrective actions. Complaints predominantly originate from the agricultural sector (28%), local government municipalities (28%), commercial activities (5%), government sectors (1%), industrial sectors (9%), mining sectors (17%), and tourism sectors (5% and 2%).

Drinking water compliance

The drinking water quality assessment indicates that 70% of water supply systems have excellent compliance with chemical quality standards, whereas 4.2% demonstrate poor critical compliance. 75% of water services authorities failed to meet SANS:241 microbial water quality compliance standards, while 20% attained excellent status. Seven (7) Water Service Authorities (WSAs) failed to submit drinking water quality data, impacting the national perspective.

The Department will oversee and assist Water Service Authorities that fail to report or comply.

Sanitation Services

Over the past 21 years, South Africa has achieved significant improvements in sanitation access, with 83.3% of households having improved facilities, including 66% with flush toilets.

Access to pit toilets with ventilation pipes is 17%, and access to pit toilets without ventilation pipes is 14%. To achieve Sustainable Development Goal 6.2, South Africa needs multi-sectoral partnerships and collaborations from the government, private sector, academic institutions, civil society, and communities.

With only five years until 2030, WSAs must accelerate the transition to safely managed sanitation.

2.

WATER TARIFFS / FINANCIAL PRICE OF WATER

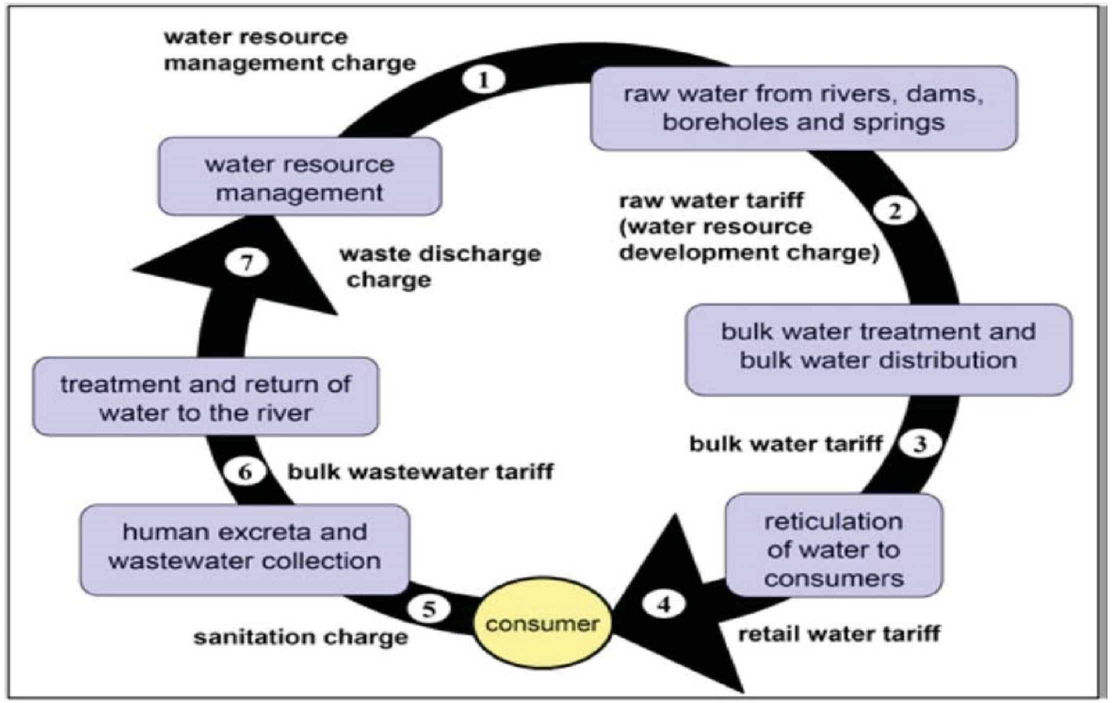
One of the financial measures of water is the cost per cubic meter paid by consumers (i.e., the water tariff). Currently, water tariffs are determined in many ways and seldom reflect the actual cost of water. The tariff values are mostly based on the production cost (treatment & pumping) and sometimes include socio-political objectives (i.e. cross-subsidization) but seldom reflect the full sustainability and conservation aspects of water (i.e. scarcity, social and environmental costs).

The elements of the value chain of water supply and demand from which the water tariffs are determined / calculated, are shown in Figure 1 below.

According to the Revised Water Pricing Strategy for Raw Water III, the water tariffs that the user of water pays consist mainly of three elements namely:

- Water Resources Management Charges, which cover the charges required to manage water resources within the nine water management areas determined in the NWRS-2;
- A Water Resource Infrastructure Charge, which includes charges relating to the development of and use of waterworks (a system of pipes and structures through which water is obtained and distributed, including but not limited to wells and well structures, intakes and cribs, pumping stations, treatment plants, storage tanks, pipelines and appurtenances, or a combination thereof), which cover the charges related to planning, capital costs, operation and maintenance, depreciation, and future infrastructure build on government water schemes; and
- Waste Discharge Mitigation Charges, which cover the discharge of water containing waste into a water resource or onto land.

Figure 1: Elements of Determining Water Tariffs



Source: Strategic Framework for Water Services. Department of Water & Sanitation 2023.

2.1.

Financial Cost of Raw, Bulk and Municipal Water

In this section, the three different water tariffs are discussed, namely; raw water tariffs, bulk water tariffs, and municipal water tariffs. These tariffs differ in terms of specific water users, as well as the quality of the water and the point of delivery.

2.1.1

Raw Water Tariff

Raw Water is sourced from rivers, dams, boreholes, and springs. The raw water tariff is determined from the management of the country's water resources. This incorporates the operations, maintenance, refurbishment and betterment of existing Government water schemes, waterworks owned by water management institutions and the development of new user-funded schemes. It is important to note that it does not include the treatment costs required for potable water and the distribution of water through pipelines.

Table 2 provides an example of the calculation of water costs for various users in 2023 prices. It should be noted that this is only an example that is not to be used in actual CBA calculations.

Table 2: Summary of Calculation of the Water Costs for a Typical River Basin

Dam Unit Cost	Current 2023 Prices
Domestic and Industrial	
Return on asset cost c/m3	16.18
Depreciation cost c/m3	1.16
Betterments cost c/m3	0.00
Operation and maintenance cost c/m3	2.15
Functional support cost c/m3	0.00
Infrastructure cost c/m3	**19.49**
Catchment management cost c/m3	0.09
Working for water cost c/m3	0.06
Afforestation/Abstraction cost c/m3	0.03
Total unit cost c/m3	**19.67**
Irrigation (full quota: 11000m3/ha)	0.00
Betterments cost R/ha	0.00
Operation and maintenance cost R/ha	321.21
Functional support cost R/ha	0.00
Infrastructure cost R/ha	**321.21**
Catchment management cost R/ha	4.25
Working for water cost R/ha	0.80
Afforestation/Abstraction cost R/ha	3.45
Sub Total	330.15
10% increase in SAAU Agreement	32.97
Total unit cost R/ha	**363.12**
Total unit cost c/m3	**3.30**

Information pertaining to raw water charges can be obtained from the Department of Water and Sanitation (Source: https://www.dws.gov.za/niwis2/RW). These figures should be used by the analyst when conducting a financial evaluation of water resource development projects.

The raw water charges pertain to the following:

- Water Resource Management (WRM) charges to plan, manage, protect, allocate and control water use and water quality, which functions, in future, will be undertaken by Catchment Management Agencies (CMAs) and Water Management Agencies (WMAs); and

- Water Resource Infrastructure charges to finance the operation maintenance, and refurbishment cost of Government Water Schemes (GWS).

Figure 3 presents the Raw Water Tariffs per Catchment while Figure 4 presents the Raw Water Tariffs for Forestry.

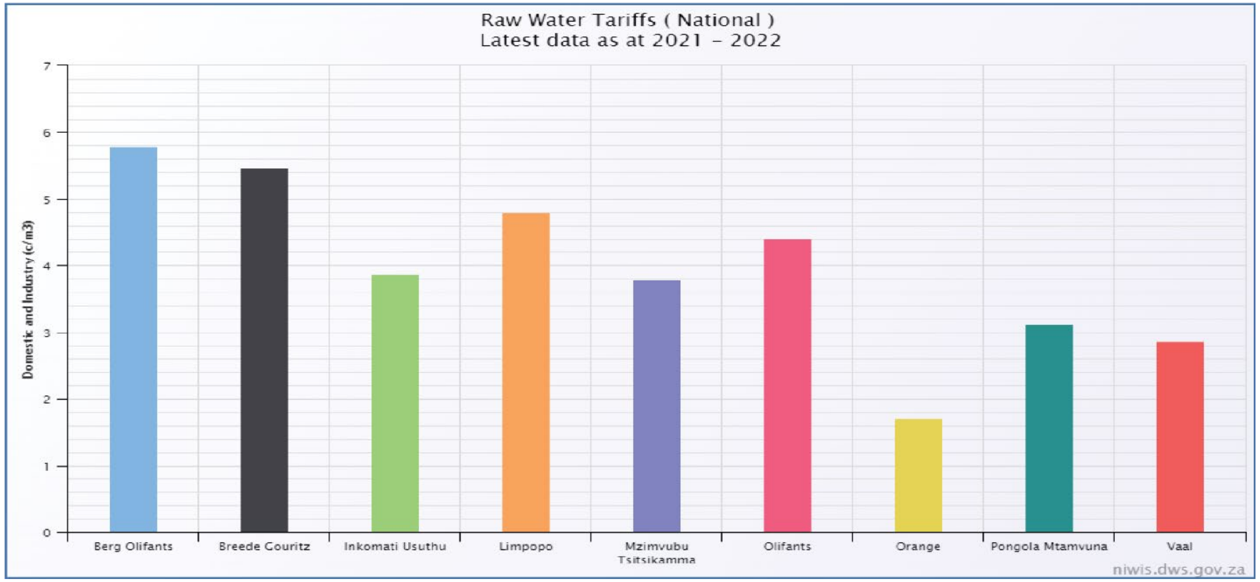


Figure 3: Raw Water Tariffs for Irrigation per CMA, 2021-2022 Prices, [c/m³]

Source: https://www.dws.gov.za/niwis2/RW

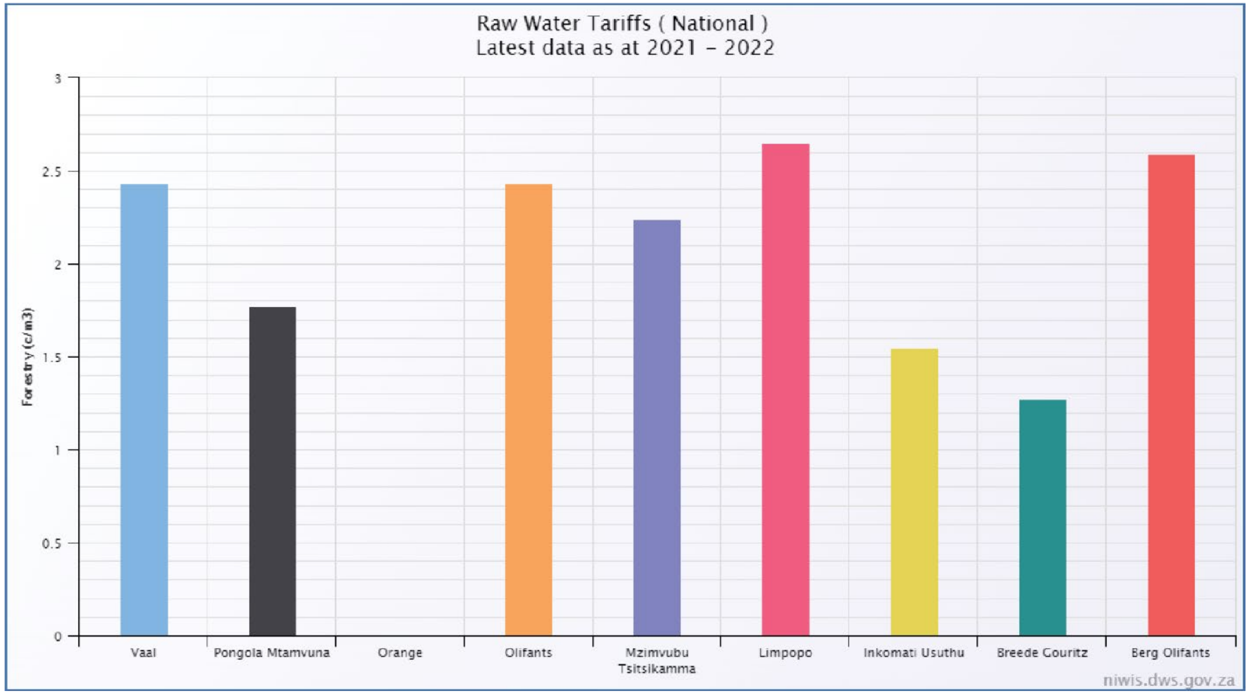


Figure 4: Raw Water Tariffs for Forestry per CMA, 2021-2022 Prices, [c/m³]

Source: https://www.dws.gov.za/niwis2/RW

3.

THE ROLE OF THE ENVIRONMENT IN ACHIEVING WATER-SECURITY

3.1.

The Challenge

To achieve water security, there is a need to restore and protect important water source areas and manage water resources in an integrated way. More so than ever before, natural ecosystems and the services they provide are increasingly being recognized as important for addressing water-security challenges. Healthy, functioning ecosystems increase water availability through improved soil retention and groundwater recharge, improve water quality by reducing sediment and nutrient loads into river systems, and reduce water-related disasters and climate change risks, such as floods and landslides. In other words, intact ecosystems play a key role in the movement of water through the landscape, its storage, and its transformation (Mishra et al., 2021).

At the extreme, ecosystem functioning can be completely lost through irreversible degradation or the intentional conversion to alternative land uses. When this happens, landscapes lack the functionality and resilience to sustain the delivery of ecosystem services. Not only does this effect livelihoods and quality of life of the people that are reliant on these services, but it also increases the costs of water supply (Blignaut et al., 2008).

Thus, achieving sustainable water management, in which water resources are used and allocated efficiently to achieve positive economic and social returns, requires investing in the restoration and conservation of critical catchment areas and finding sustainable "green" solutions to achieve cost savings and reduce environmental impacts. Such approaches are termed green infrastructure and ecological infrastructure and are described in the following sections.

3.2.

Green (environmentally friendly) Infrastructure

Engineers are continually improving their designs in order to reduce the environmental impacts associated with conventional grey infrastructure. For example, they have come up with ways to retard water flows from urban structures such as buildings, paved areas, and drainage systems, by improving their capacity for infiltration and storage. These reduce environmental impacts indirectly in that they reduce the need for more conveyance infrastructure.

Whilst these can be purely structural innovations, they often involve the use of vegetation, especially where doing so can also help to address water quality issues. These measures are examples of green infrastructure, where the "green" is used in the sense of lower environmental impacts. Another example is the construction of artificial treatment wetlands to further improve the quality of treated wastewater.

Such investments can lead to considerable cost savings, particularly for the management of downstream environmental issues in urban environments, although in the case of their contribution to water quality, they tend to be most effective when the fundamentals (sanitation measures) are already in place (Turpie et al., 2017a). Note that the term "green infrastructure" is often used to include both the engineering innovations described here and ecological infrastructure, which we describe separately below.

3.3.

Ecological infrastructure

Investments are also needed in restoring and maintaining the natural ecosystems that play a key role in complementing and supporting grey and green infrastructure investments. These ecosystems are known as ecological infrastructure. In the context of climate change and growing populations, traditional built infrastructure implemented alone is unlikely to be sufficient in addressing water supply challenges, and the importance of ecological infrastructure is becoming increasingly clear.

Natural systems such as forests, grasslands, wetlands and floodplains, have a direct influence on catchment hydrology, contributing towards a clean and reliable supply of water. The ecosystem services provided by healthy ecosystems – the regulation of water flows, the control of sediments, and the removal of excess nutrients that affect water quality – all help to save on grey infrastructure costs and offer some of the most effective ways to improve water security. However, the extent and condition of these Water Resource Development ecosystems are threatened by increasing levels of degradation (i.e., soil erosion, wetland drainage, land use change).

The protection and/or restoration of these ecosystems is increasingly being shown to be critical to meeting water resources management challenges.

Similarly, the management of cultivated lands is also important in this regard. Indeed, whilst investment in built infrastructure is a primary element of achieving water security, even the best-built infrastructure will not be able to supply sufficient water without maintaining the integrity of natural systems and cultivated land. Securing ecological infrastructure can be a cost-effective way to enhance service delivery and ensure resilience (WWAP, 2018; Browder et al., 2019).

By investing in ecological infrastructure, the existing lifespan of conventional grey infrastructure can be lengthened or the need for additional built structures can be reduced, usually with significant cost savings. In addition, whilst the investments might be focused on water security, they also have the added advantage of a range of co-benefits associated with having healthier ecosystems.

The value of the ecosystem services that are lost or degraded through the development would be included as a cost unless the project is being compared to an environmentally friendly alternative in which case the net values of the potential losses incurred through the project would be included as a benefit in the form of avoided losses or cost savings.

Examples of potential environmental impacts and their associated costs to society are shown in Table 3.

Table 3: Examples of the Main Environmental Costs Associated with Water Resource Development

Project	Environmental Impact	Costs to Society
Water supply / hydropower dam	• Loss of important/iconic fauna and flora and loss of land for alternative use (inundation). • Fragmentation of river ecosystem impacting the movement of migratory river animals. • Reduced sediment deposition leading to increased erosion of downstream aquatic habitats (i.e., coastal deltas, floodplains). • Hydrological alteration of flows downstream influencing flood regime and flows to estuaries.	• Loss of biodiversity, sense of place • Lost land use opportunities • Tourism losses • Loss of flood-dependent ecology and floodplain agriculture & fishing (losses in human uses of floodplains) • Loss of nursery value
Largescale irrigation	• Changes to floodplain land use and ecology • Worsening downstream water quality through nutrient runoff from agricultural chemicals and fertilizers • Reduced river flow • Waterlogging and salinization	• Higher water-treatment costs • Loss of flood-dependent ecology and floodplain agriculture & fishing (losses in human uses of floodplains) • Loss of nursery value • Loss in agricultural productivity
Channelization & canalization of rivers	• Loss of aquatic habitats • Loss of river connectivity to floodplain • Changes in water quality • Increased levels of erosion and sedimentation	• Loss of flood-dependent ecology and floodplain agriculture & fishing (losses in human uses of floodplains) • Amenity losses

3.4.

Cost reductions and economic co-benefits of ecological infrastructure

The nature and magnitude of the impact of a specific water resource development project can be improved significantly through investment in ecological infrastructure. For example, degraded catchments lead to the reduced capacity and lifespan of water supply dams, increasing the cost of their maintenance, decreasing their ability to produce hydroelectric power, or reducing availability of water for irrigation and municipal use. The loss of vegetation from the catchment may increase flood risk, resulting in damage to downstream infrastructure such as roads and bridges. Therefore, it is generally more cost-effective to restore the ecosystems or integrate ecological infrastructure with engineered solutions than it is to keep repairing or replacing the built infrastructure. Improving the environment and having combined infrastructure approaches can thus enhance water development projects.

Table 4 provides a description of the ecological infrastructure interventions that can be employed to improve the nature and magnitude of the impact of water development projects and provides examples of the benefits that can be achieved in terms of water supply (or infrastructure cost reductions) as well as potential economic co-benefits that should also be included in a project's economic evaluation. The environmental co-benefits associated with the implementation of ecological infrastructure interventions are often significant and can be a driving factor in the selection of the project for implementation, often attracting further investment from the private sector and international donors.

Table 4: Ecological infrastructure interventions and the benefits that they can provide

Ecological infrastructure	Water supply benefit/Potential economic co-benefits intervention	Infrastructure cost reduction
Restoration of catchment areas to improve infiltration (i.e., clearing of invasive alien plants)	Increased water yields, flow regulation	Climate mitigation, biodiversity, and recreational values
Active restoration of catchment areas to reduce erosion and soil loss (i.e., tree and/or grass planting, stabilization)	Improved water quality, extended lifespan of the dam, reduced hydropower equipment, and water treatment plant operational and maintenance costs	Climate mitigation, biodiversity, and recreational values
Incentives for better catchment management (Payments for Ecosystem Services) to improve land management practices that supply target ecosystem services such as soil retention	Improved water quality, extended lifespan of the dam, reduced hydropower equipment, and water treatment plant operational and maintenance costs	Climate mitigation, biodiversity, and recreational values
Soil conservation measures on cultivated land to reduce erosion and soil loss (i.e., reduced tillage, contour ploughing, terracing, agroforestry, farmer-managed natural regeneration)	Improved water quality, extended lifespan of the dam, reduced hydropower equipment and water treatment plant operational and maintenance costs, reduced irrigation requirements	Increased crop yields, climate mitigation, natural resources for subsistence use (i.e., wood)
Restoration or rehabilitation of wetlands	Improved water quality and flood protection	Climate mitigation, biodiversity and recreational values, natural resources for subsistence use (i.e., fish, medicinal plants, wild foods)
Protection and/or restoration of riparian zone to maintain a natural vegetative buffer along streams and rivers	Improved water quality and flood protection, extended lifespan of a dam through reduced sedimentation	Climate mitigation, biodiversity
Improved rangeland management to reduce soil erosion and maintain vegetative cover	Increased base flows during the dry season (assurance of supply), extended lifespan of the dam, reduce hydropower equipment and water treatment plant operational and maintenance costs	Climate mitigation, biodiversity
Maintain or reinstate natural vegetation buffers between agricultural crops and rivers and wetlands	Improved water quality, improved soil quality	Climate mitigation, biodiversity

The viability of such projects is usually evaluated using an approach where, the impacts of a development project, which would without any intervention follow a business-as-usual (BAU) approach, are compared with the impacts of following a more environmentally friendly development path where the scenario/s comprise measures that reduce the rate of loss of ecosystem services and/or reduce the cost of grey infrastructure components by either reducing capital costs, reducing operation and maintenance costs, or by increasing climate resilience.

The environmentally friendly scenarios which include interventions to restore or conserve ecological infrastructure is then compared to the 'do nothing' BAU scenario. This is achieved by dividing the difference in benefits of the environmentally friendly scenario versus the BAU scenario by the costs of restoration interventions in achieving the conservation outcomes. This produces a benefit-cost ratio (BCR) or return on investment (ROI), which suggests how many units of benefit each unit of cost brings.

An example, taken from Turpie et al. (2021) is shown in Table 5 below, where the potential costs and benefits of addressing land degradation in the Thukela catchment (one of South Africa's most important catchments in terms of water supply and one that is severely degraded) were estimated using a scenario-based approach. The study estimated the costs and benefits of interventions under a fully restored catchment scenario and a land degradation neutrality scenario and compared these with a BAU scenario.

Present value (R millions)			
Costs relative to BAU	LDN Scenario		Full restoration scenario
	Upper bound costs	Lower bound costs	
Clearing IAPs	514.4	514.4	2 355.2
Addressing bush encroachment	507.2	237.6	691.1
Active restoration of grasslands, erosion	2 623.6	-	-
Sustainable land management	-	1 981.02	6 093.62
Total present value of costs	**3 645.18**	**2 733.09**	**9 139.98**
Water supply	2 591.4	2 591.4	10 757.2
Sediment retention	38.9	38.9	63.1
Tourism	121.8	121.8	243.6
Carbon storage (avoided national cost)	-274.91	-274.91	597.5
Harvested wild resources	70.6	70.6	2 391.3
Livestock production	620.7	620.7	1 476.9
Total present value of benefits	**3 168.6**	**3 168.6**	**15 529.6**
Net Present Value	**-476.6**	**435.5**	**6 389.6**
BCR	**0.9**	**1.2**	**1.7**

Table 5: Present value of the costs of interventions and ecosystem service benefits relative to BAU under the LDN and Full Restoration scenarios (2020 R million, 3.66% discount rate, 25 years). Source: Turpie et al., 2021

The Thukela catchment provides a range of ecosystem services which contribute to benefits used by the economy and to the provision of sustainable livelihoods. The study included the following ecosystem services: water retention (regulation of water supply); sediment retention (erosion control); carbon sequestration; provisioning of livestock products; provisioning of wood products; provisioning of non-wood products; and nature-based tourism.

The benefits were estimated as the difference in value of ecosystem services compared to the BAU outcome, and the costs of the interventions were based on the literature and previous studies undertaken in the catchment. The key finding from the study was that halting and reversing ecosystem degradation can have positive net economic benefits. The degradation of natural landscapes and ecological infrastructure has significant social, economic, and environmental costs. Measures to slow, halt and reverse the net impacts of poor land management were in most estimations expected to have positive net benefits. Therefore, addressing land degradation could be justified in economic terms.

The Working for Water Programme is also an important programme in South Africa which is geared toward removing alien plants that reduce the stream flows. Zit creates job opportunities and on the other hand enhances the flow of water into the streams thus improving water supply . The Working for Water programme operates at the **Albert Luthuli, Mbombela, Umjindi, Thaba Chweu, High lands, Bushbuckridge, and Nkomazi municipal areas.** Creating employment opportunities for women in the Working for Water programme.

3.5.

Major Mega Projects in South Africa's Water Sector

Major mega projects in South Africa's water sector aim to secure supply and upgrade infrastructure, with key initiatives including the Lesotho Highlands Water Project Phase 2, the uMkhomazi Water Project, and the Olifants River Water Resource Development Project. These projects address water shortages in Gauteng, KwaZulu-Natal, and Limpopo through new dams, pipelines, and treatment works.

Key Water Sector Mega Projects

- Lesotho Highlands Water Project (LHWP) Phase 2: A critical project connecting water from Lesotho to the Gauteng system to boost supply to South Africa's industrial hub.
- uMkhomazi Water Project: A R24 billion initiative designed to supply water to eThekwini (Durban) and surrounding districts, including the construction of a new dam, says YouTube.
- Olifants River Water Resource Development Project (ORWRDP): A project aimed at supplying water to mining and residential areas in Limpopo, specifically through the expansion of infrastructure to commercial and institutional users, says DBSA.
- Mokolo Crocodile River (West) Augmentation Project (MCWAP 2A): A large project designed to transfer water from the Crocodile River to the Lephalale area in Limpopo, targeting increased industrial demand.
- Lower uMkhomazi Water Scheme: A major project aimed at alleviating water shortages in KwaZulu-Natal, says YouTube.
- Moretele North-Klipvoor Bulk Water Supply Scheme: A R5.2 billion project enhancing water access in North West and Limpopo provinces, says Facebook.

Key Infrastructure Upgrades and Dams

- Clanwilliam Dam Wall Raising: Enhancing the existing dam in the Western Cape to increase storage capacity.
- Cwabeni Off-Channel Storage Dam: A water security project in the Eastern Cape near Port Shepstone, says infrastructurenews.co.za.
- Vaal River System Improvements: Ongoing maintenance and upgrades to the main water source for the Gauteng province.
- Rooiwal Wastewater Treatment Works Phase 2: Upgrades to existing infrastructure to improve sanitation services, says Infrastructure South Africa.

Sector Strategy and Governance

- National Water Resources Infrastructure Agency (NWRIA): Established in August 2024 to oversee the development of national water infrastructure and facilitate new, large-scale projects, says Webber Wentzel.
- Private Sector Participation (PPP):

3.6. Major Water Infrastructure Projects Underway Across South Africa

The following are committed investment in bulk water supply infrastructure projects geared towards vigorously assisting municipalities with water reticulation to ensure that unserved communities receive the services at the various provinces.

Mpumalanga Province

The Loskop Regional Bulk Water involves the construction of a bulk pipeline from Loskop Dam in Mpumalanga to Thembisile Hani Local Municipality in Mpumalanga for domestic water supply. The project will also benefit communities in the Moutse area, under the Elias Motsoaledi Municipality. The bulk pipeline passes through the Moutse-East area under the Sekhukhune District Municipality in Limpopo, and the project includes distribution infrastructure to supply treated water to villages in Moutse-East valued at R1.67 billion.

The Upgrading Embalenhle Sewer Bulk Lines, Pump Stations, and Waste-Water Treatment Works. GMM is developing a 25-year bulk sanitation infrastructure plan which will consist of an upgrade that will be able to accommodate estimated 2048 system demands. There are five existing pump stations in Embalenhle, strategically positioned to pump to nearest bulk gravity lines. The gravity lines are overloaded as more housing developments are being implemented by the department of human settlements without prior bulk sanitation planning. The challenge that Embalenhle settlement faces is the unusually high population growth rate due to its location being in close proximity to Sasol. Many people have moved closer to the business whilst seeking employment opportunities.

The Western Highveld Bulk Water Supply Scheme aims to provide water in the Nkangala District Municipality (NDM). The Project Focus Area falls under Nkangala District Municipality in Dr JS Moroka local municipality, with the villages that will benefit on the implementation of the project located within Mathanjana Magisterial District (MMD) and Rapotokwane settlements. Under MMD thirteen villages (Masobe, Katjibane, Loding, Marapyane, Nokaneng Mantiole, Mmaduma, Mmamethlake, Phake, Ramantsho, Rankaile, Seabe and Semahlase villages) that are falling within 10 wards in Dr JS Moroka.

There are also plans to construct a small hydro power station in Mpumalanga Province.

Free State Province

The Vaal Central Water Board is assisting the Maluti-a-Phofung Local and Matjhabeng Local Municipalities with a range of projects aimed at addressing the dire state of water and sanitation infrastructure in the two municipalities. The two key projects amount to a total of R5.4 billion over the next 5 years.

KwaZulu Natal Province

- The uMngeni-uThukela Water Board and Zululand District Municipality are accelerating the R9.5 billion Mandlakazi Bulk Water Supply Scheme to benefit communities under Zululand as well as uMkhanyakude District Municipalities. The pipeline includes abstraction of raw water from Jozini Dam, laying of 28 km bulk line, pumpstation and upgrading of Mandlakazi Water Treatment Works, Mkhuze Water Treatment Works, and others.
- The new R26 billion Upper uMkhomazi Dam and associated works are also earmarked to provide urgently needed additional water to eThekwini and surrounding districts including Ugu, Harry Gwala, iLembe and Mgungundlovu.
- The new R1.8 billion Cwabeni off-channel storage dam will provide additional water to Port Shepstone and surrounding areas.
- The new R800 million Stephen Dlamini Dam will provide sustainable water supplies to the town of Bulwer and surrounding peri-urban and rural communities.
- The R500 million project to raise the wall of the existing Klipfontein Dam will provide additional water for domestic use and irrigation.

- Ugu District Municipality is also implementing various projects aimed at improving the water and reducing the non-revenue water, though non-revenue reduction programmes, refurbishment and replacement of infrastructure, revenue management plan, pipeline replacement of infrastructure and emergency borehole programmes, amongst others.

Gauteng Province

In Gauteng, Rand Water continues to assist Emfuleni and Midvaal Local Municipalities with a range of projects to address the sanitation challenges in the Vaal. This includes the unblocking of blocked sewage pipelines, replacing collapsed sewage pipelines, repairing, and refurbishing pump stations, and assisting the Emfuleni Municipality to restore its operation and maintenance functions. The investment is estimated at R4.7billion.

Eastern Cape Province

- The new R8 billion Ntabelanga Dam on a tributary of the uMzimvubu River will provide additional water for irrigation and domestic use in the eastern
- The new R2 billion Foxwood Dam to provide additional water for irrigation and for the town of Adelaide.
- The new R1 billion Zalu Dam will provide additional water for the town of Lusikisiki and surrounding villages.
- The new R600 million Coerney Balancing Dam will improve water security for the Nelson Mandela Bay Metropolitan area.
- Development of Phase 3 of the Nooitgedacht Water Treatment Works
- Mnquma Municipality to provide water to unserved communities, through the Nqamakhwe Regional Bulk Water Scheme and provide funding to develop the Lower Sundays River, Greater Mbizana, and Ndlambe water schemes.

Limpopo Province

- The R4 billion new water transfer pipeline from the Crocodile West River to the Lephalale area of Limpopo will augment the water supply to the recently completed Medupi Power Station, Lephalale Town and the existing Matimba Power Station.
- The Lepelle Northern Water is implementing Phase 1, of the Olifants Ebenezer aimed at bringing relief and sustainable water provision for Polokwane, Seshego and surrounding. This phase 1, estimated at R4.7 billion, is part of a 10-year R18 billion programme.
- The R750 million project to raise the wall of the existing Tzaneen Dam will address water shortages in Tzaneen and surrounding areas.
- The new R4 billion N'wamitwa Dam on the Great Letaba River will provide additional water for irrigation, domestic and industrial use and increase flows into the Kruger National Park.

Northern Cape Province

- R24 billion Olifants River Water Resource Development Project in Limpopo and the R10 billion Vaal Gamagara Phase Two Project in the Northern Cape. These two projects are being implemented in partnership with the mining sector, with joint funding by the government and the mines. Both projects will increase water supply and ensure water security to enable investment in mining. Communities adjacent to the bulk pipelines will also benefit from these projects.
- Kimberley Bulk Water Supply Project Emergency Refurbishment that includes the refurbishment of the Riverton Water Treatment Plant, emergency leak repairs at Newton Reservoir Complex.
- R10 billion Vaal Gamagara Phase Two Project in the Northern Cape to provide additional water for mining and communities.

Western Cape Province

- The R7 billion project to raise the wall of the existing Clan William Dam will double the size of the dam to provide additional water for irrigation, and domestic and industrial use to Clan William and surrounding areas is also underway in the Western Cape.
- A R1.2 billion project is underway to abstract water from the Berg River and convey it to the existing Voëlvlei Dam, to increase the supply of water to the City of Cape Town and surrounding areas.

4.

WATER SECTOR IN MPUMALANGA PROVINCE

Water sectors in Mpumalanga are heavily dominated by agriculture (irrigation), industrial use, and forestry, supported by major water management areas like the Inkomati-Usuthu and Olifants. The sector faces challenges with ageing infrastructure, high water demand for coal-fired power generation, and pollution from mining.

Key Water Sectors and Users

- Agriculture: Irrigation is the largest consumer, supported by 42 irrigation boards, requiring significant water for cultivated perennials and cane.
- Forestry: Plantation and woodlot management are high water users, particularly on the escarpment and lowveld.
- Industrial/Mining: Key users include mining operations and energy production, particularly in the Highveld region, notes this Research Gate article.
- Water Services Authorities (WSAs): Local municipalities manage domestic and municipal water supply, which currently struggles with shortages in areas like Bushbuckridge and Mbombela.

Water Allocations in Mpumalanga Province

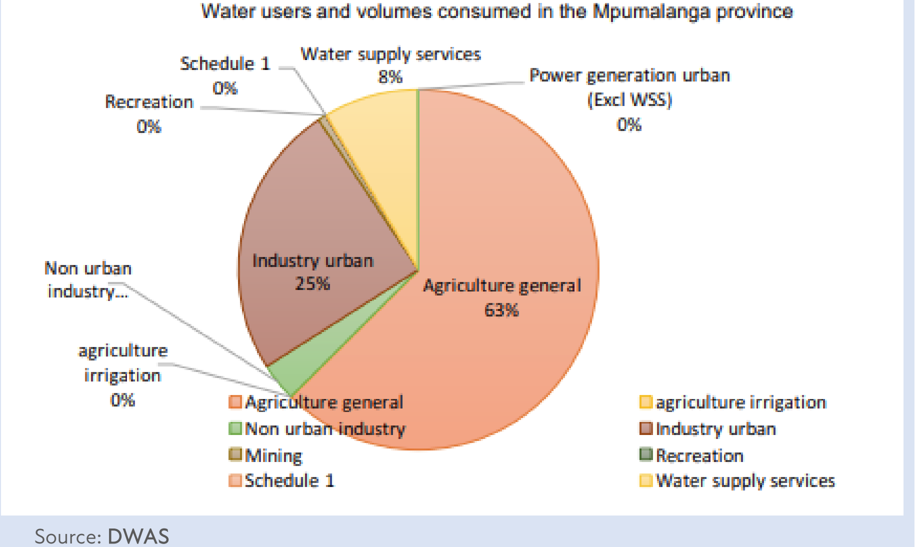
The registered water users in the Mpumalanga province indicate the two main leading water users as the agricultural sector (63 per cent) and the industry (25 per cent) (see Figure 3).

Water supply services constitute only 8 per cent, non-urban industry only 3 per cent, and schedule one only 1 per cent. Other sectors, such as recreation, irrigation and power generation urban, constitute less than 1 per cent each.

Water Supply projects are currently being executed in all Mpumalanga District Municipalities ranging from Internal Bulk (in all districts with more funds allocated in Ehlanzeni), planning (Gert Sibande), regional bulk (all districts), and Reticulation (Ehlanzeni and Nkangala).

The biggest industries of forestry, mining, synfuel production and power generation are all water intensive activities in Mpumalanga. The registered water users in the Mpumalanga province indicate the two main leading water users as the agricultural sector (63%) and the urban industry (25%).

Figure 5: Water Users and Volumes consumed in the Mpumalanga Province



Source: DWAS

Water supply services constitute only 8%, non-urban industry only 3%, and schedule one only 1%. Other sectors, such as recreation, irrigation and power generation urban, constitute less than 1% each (Morokong et al., 2016).

Key Infrastructure and Management

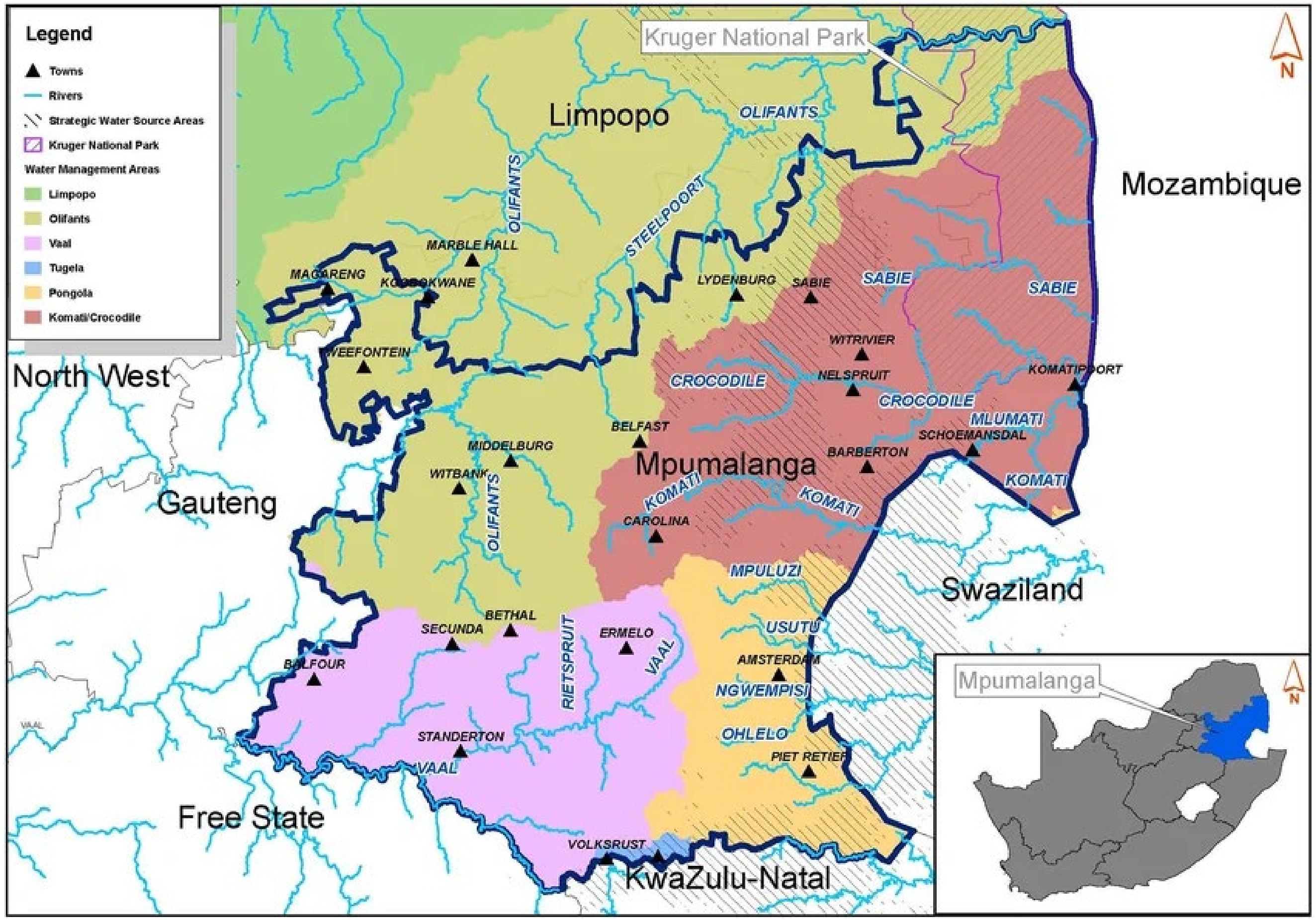
- Dam Systems: The province relies on significant dams, including Witbank, Middelburg, and the historical Loskop Dam, which the Middelburg Tourist Information Centre notes is over 70 years old.
- Water Management Areas: Management is overseen by the Department of Water and Sanitation, primarily within the Inkomati-Usuthu and Olifants management areas.
- Challenges: The sector faces high water losses (non-revenue water), inadequate maintenance of infrastructure, and pollution from historical mining activities.

Water Sources

- Surface Water: Extensive use of dams for agriculture and industry.
- Groundwater: Increasing reliance on boreholes, particularly in rural communities facing service delivery challenges.

Below is a Map of Mpumalanga Province depicting its Water Management Areas, main rivers, and major towns.

Map 1: Mpumalanga Province WMA's



Water is essential for the survival of all living organisms, both a direct way of consumption and maintaining the environment. It particularly plays a strategically key role in terms of its contribution to the South African economy. The reliable supply of water in sufficient quantities and to the required quality standards is a critical input to the country's economic growth and job creation. The extent to which it is abundant or scarce, clean, or polluted, beneficial, or destructive determines the quality of life to a larger extent.

Water is a scarce resource in **Mpumalanga Province and** needs to be carefully managed. Water resources available in the province consist of surface water representing 65%, transfers to the province accounting for 19%, groundwater at 6% and return flows from mining, industrial irrigation and urban settlements which contribute 10%.

Mean annual runoff is not evenly distributed across Mpumalanga and certain areas receive a lot more water than other areas. Four large rivers run through Mpumalanga. Nearly half of Mpumalanga is drained by the Olifants River System, the Orange River system, Inkomati River System and the Pongola River System.

The Province recorded an average of 0.3% decline in dam levels from 81.7% to 81.4%. The WMAs also recorded a slight decline in water volumes, with the Olifants catchment dropping from 73.7% to 73.4% and the Inkomati-Usuthu catchment also dropping from 82.1 % to 81.9%. The majority of dams recorded a decline in water levels except Kwena, Driekoppies and Blyderivierpoort in Ehlanzeni District. All listed major dams in Gert Sibande recorded declines in water levels. All listed major dams recorded decrease in water volumes in the Nkangala District. Restrictions notices have been issued on systems facing deficits (< 40%) to prolong the water supply during periods of water shortage. Restrictions are gazetted by the Minister (or as delegated) and if implemented, lasts until the drought ends.

Restrictions were gazetted in 2016 for the Ohrigstad Dam, Mkhombo Dam and Buffelskloof. Notices were also issued by IUCMA to water users of the Crocodile River System (Kwena Dam), Lomati Dam, Primkop Dam and Sabie River system (Inyaka Dam).

There are numerous factors that affect water quality in Mpumalanga, the most significant water quality issues include:

- Poor maintenance of sewerage systems,
- Mining (water from old mines is not treated before it flows into catchment dams), and
- Soil erosion from agricultural activities.

The total capacity of all the 22 dams in Mpumalanga is 2627 million m3. The Bossiespruit, Ohrigstad and Rhenosterkop dams are stressed (exceeding capacity). The Gemsbokhoek, Rietfontein Weir, Acornhoek, Witklip, Jericho, Westoe, Nooitgedacht, Morgenstond, Kwena, Loskop and Heyshope dams are approaching design capacity. The Kabokweni Sewage Treatment Ponds are underutilised and the Geelhoutboom Pump Dam, Vlakbult, Kasteel, Buffelskloof, Trichardtsfontein, Blyderivierspoort, Vygeboom and Grootdraai dams are being moderately used. The Weltervreden Weir was found to be of strategic redundancy (DWS Provincial Water Services Perspective Phase 1.

4.1.

Water and Sanitation on decline in Mpumalanga water levels

The Department of Water and Sanitation (DWS) made a clarion call in 2025 on the people of the Mpumalanga Province to intensify water conservation measures and continue using water wisely and sparingly as water levels continue to decline in the water management areas and listed dams.

The latest DWS State of Reservoirs report shows that the average dam levels in the Mpumalanga Province further dropped, recording a decline from 98.3% to 98.2%. The Water Management Areas (WMAs) recorded mixed results with the Limpopo-Olifants WMA remaining unchanged at 93.4% while the Inkomati-Usuthu WMA dropped from 97.4% to 97.1%.

In terms of water levels in the three districts of the province, Nkangala recorded an improvement from 99.9% to 100.7% whilst Ehlanzeni and Gert Sibande continue to record declines, dropping from 95.1% to 94.7% and from 99.0% to 98.5%, respectively.

Most of the listed dams in the Lowveld and Ehlanzeni District recorded declines in water levels with only Buffelskloof and Klipkopjes dams recording slight improvements, increasing from 100.2% to 100.3% and from 93.2% to 93.6%, respectively.

The listed dams which recorded declines in the Lowveld include Blyderivierpoort from 97.1% to 96.3%, Driekoppies from 91.9% to 91.7%, Longmere from 88.2% to 83.9%, Witklip from 98.0% to 97.6%, Primkop from 90.6% to 89.4%, Kwena from 99.8% to 99.3%, Da Gama from 96.5% to 95.5%, Inyaka from 97.1% to 96.8%, and Ohrigstad from 73.4% to 72.7%.

The listed dams in the Gert Sibande District recorded mixed results with only Morgenstond Dam remaining unchanged at 100.1%. Nooitgedacht and Vygeboom dams recorded slight improvements, increasing from 100.0% to 100.3% and from 100.1% to 100.4%, respectively.

On the decline in Gert Sibande District, Grootdraai dropped from 99.4% to 98.6%, Jericho from 96.8% to 95.2%, Westoe from 83.5% to 81.9%, and Heyshope from 100.3% to 100.2%.

All the listed dams in the Nkangala District recorded improvements in water levels. Witbank Dam increased from 100.8% to 101.5%, Middelburg from 94.0% to 94.6%, Loskop from 100.4% to 101.1%, and Rhenosterkop from 100.0% to 100.9%.

With South Africa being a water scarce country and one of the 30 driest countries in the world, the Department of Water and Sanitation reminds the public that water conservation remains critical to ensuring reliable water supply to all citizens and water security for the current and future generations.

DWS also encourages communities to be responsible citizens and prevent unnecessary loss of precious water by fixing leaks, reporting pipe bursts to the relevant authorities, and protecting infrastructure from theft and vandalism.

4.2.

Rivers and Wetlands

An aquatic ecosystem consists of both rivers and wetlands. Wetlands are areas that are wet temporarily, seasonally, or permanently. Wetlands support a diverse collection of plant and animal species. Wetlands occur on hydromorphic soil, which has been developed under prolonged periods of water-logging. This soil type provides for water storage and controlled water flow above and below the surface.

Wetlands perform ecological functions that are vital for human welfare and environmental sustainability. Plant cover in the wetlands provides slow run-off, filters and purifies the water that reduces the impacts of drought and floods. The wetlands have high value in ecological infrastructure to supply water for human consumption. Plant cover in the wetlands slows run-off, filters and purifies the water. It reduces the impacts of drought and floods. Wetlands also provide special habitats and breeding ground for many species of plants and animals. They provide resources for the local communities like food, grazing, medicinal plants, and natural fiber for thatching of roofs. Wetlands are South Africa's most threatened ecosystems, with 48% of wetland ecosystems listed as critically endangered1, resulting in an urgent need to increase awareness of wetland importance to incorporate natural wetland resource considerations into municipal governance mechanisms and planning.

Mpumalanga wetlands are classified by the national classification system as palustrine wetlands (seepage and floodplain wetlands), which include vegetated and unvegetated endorheic pans (Hayes, 2016). Numerous wetlands, including one RAMSAR site of high ecological value and exceptional beauty, occur within the region and provide crucial habitat for a variety of critically endangered flora and fauna species as well as providing key ecosystem services for local communities living in the area. A large number of the wetlands in the region however are under threat due to mining, afforestation, Historical and current socio-economic developments, historical unsustainable development as well as encroachment of invasive alien plants (IAPs). Most of Mpumalanga's wetlands occur in grasslands of the wetter Highveld and Escarpment regions.

4.3.

Mpumalanga Water Infrastructure

According to the projected scenarios in Vision 2030 for Mpumalanga province, there is an indication of the vulnerability of water supply. Water resources are vulnerable by over-use in various sectors such as industrial, agricultural, and human activities. Mpumalanga has had a challenge in facilitating basic water infrastructure over the last 15 years. In 2010, there was an increased number of households without access to basic water infrastructure. However, only Gert Sibande District Municipality able to reduce water backlog. There are a variety of problems that drive or determine the result of water infrastructure planning. Mpumalanga is one of South Africa's provinces which are substantially affected by global climate change and projected water accessibility is unlikely to satisfy the projected demand. This successively has the potential to have an enormous impact on water security, and after, on the economic growth of the region.

A growing population can place additional strain on accessible water resources. Water resources in Mpumalanga are vulnerable by over-use and are impacted upon by industrial, agricultural, and human activities. Socioeconomic growth in Mpumalanga depends on the availability and physiological condition of water resources. The increasing demands placed on water resources from industry, urbanization, mining, and agricultural activities necessitate the requirement for the sustainable management of those resources. According to the No drop assessment for Mpumalanga, which was conducted recently , it indicates a score of 18.6% for overall performance. The No drop assessment score is based on infrastructure leakage, commercial losses, nonrevenue water, and water use efficiency.

Regarding infrastructure designing and managing the water cycle, the Provincial Government does not have a governing authority responsible for this. However, it plays a crucial role in coordinating infrastructure planning and implementation. Environmental management as a constitutional mandate of the provincial government is an important vehicle for ensuring long-term water security in Mpumalanga. The sharing of water resources with neighboring provinces as well as Mozambique and eSwatini highlight the importance of a facilitating role and strategic oversight by the provincial government when handling water resources. According to the Department of Water and Infrastructure Master Plan 2013, there are many water treatment and water scheme areas. The water treatment areas are majorly distributed amongst the three districts of the province. The water scheme areas are concentrated in Gert Sibande and Nkangala Districts while water treatment works are concentrated in Ehlanzeni district. The water project supplies to nearby provinces such as Gauteng and Limpopo Provinces.

4.4.

Level of Water Services in Mpumalanga Province

According to the StatsSA Community Survey, there are 1 238 861 households in Mpumalanga, and 1 090 892 (88%) of the households have access to water. The number of households with access to water has been increased after the 2016/2017 fiscal year to 91%. Nkangala District with 97% receives the highest access to water supply followed by Gert Sibande District with 92% and least District Ehlanzeni with 84%. There are various sources of drinking water in the households, and some of the major sources are rainwater tanks in the yard, neighbours tap, public and communal tap, water tanker, borehole, flowing water, well and spring. Most of the water supply source is from piped tap water inside the yard with 49.2% in Gert Sibande, 45.4% in Ehlanzeni and 43.3% in Nkangala. In addition, piped inside the house comprises 33.6% in Gert Sibande, 39.6% in Nkangala and lowest in Ehlanzeni with 14.6 %.

4.5.

Water Demand in Mpumalanga Province

Water demand in Mpumalanga province has increased due to rapid industrialization, mining, urbanization, and population growth. Water demand in household consumption will increase in medium order towns such as eMalahleni, Middelburg, Secunda, Mbombela, and Bushbuckridge areas. The future water supply provision restricts economic and household expansion in certain areas. The project water demand in the local municipalities score more than 60% for providing safe drinking water. The municipalities which scored more than 20% of unsafe water are Bushbuckridge LM, Emakhazeni LM, Steve Tshwete LM, Emalahleni LM, Lekwa LM and Chief Albert Luthuli LM.

Mpumalanga is unlikely to meet the water availability due to climate change impact on the province. Some areas of the Mpumalanga, the availability of raw water is limited which will increase the demand compared to supply. The annual runoff is not evenly distributed across Mpumalanga, where some parts receive more water supply than other areas. The indigent households are also lacking in proper water and sanitation service due to uncontrolled settlements.

Due to the ageing of the water infrastructure and lack of water metering systems, there is high water losses and non-revenue water. There is a report of tampering with bulk supply and reticulation systems through illegal connections.

4.6.

Mpumalanga Land and Water Use

According to the WARMS database, the highest water use volumes are registered in Mpumalanga for taking water (1.43 billion m^3 a-1), storing water (0.92 billion m^3), disposing waste (0.89 billion m3 a-1), removing groundwater (0.62 billion m^3 a-1) and discharging wastewater (0.14 billion m^3 a-1). By water resource types, water is taken mainly from boreholes (32.3%), rivers/streams (30.3%), scheme (24.4%), and dams (12.0%). The highest water withdrawals per sector were for agricultural irrigation (0.70 billion m^3 a-1 or 49.0% of the total), mining (0.39 billion m^3 a-1 or 27.3%), water supply services (0.17 billion m3 a-1 or 11.8%) and non-urban industry (0.10 billion m^3 a-1 or 6.9%). Mpumalanga is the province with the highest water storage, water use in mining and dewatering mines, urban use (excluding industrial and domestic), and the highest water use for aquaculture. Within the Inkomati-Usuthu Water Management Area, a larger portion of water is allocated to afforestation, urban industry and less to mining; a larger portion of water is used from surface water compared to the rest of the province.

The largest areas in Mpumalanga are covered by grassland (20,671 km2), woodland/open bush (9,411 km2) and thicket/dense bush (8,382 km2). The main changes in land cover between 1990 and 2013/14 occurred for thicket/dense bush (+3.005%) and cultivated perennials (+0.950%) at the expense of cultivated commercial annuals (-2.426%), grassland (-0.863%) and woodland/open bush (-0.824%).

4.7.

Mpumalanga Blue Drop

The province's overall Blue Drop performance is characterised by particular strengths when measured against the KPAs. The water supply systems operated by Rand Water, Silulumanzi in Mbombela/Umjindi and Nkomazi LM stand out for its compliance, good practice and risk management practices that are well embedded in the water supply business.

The KPAs that require attention and reflect scores below 50% are KPA 3 Financial Management (49%), KPA 4 Technical Management (35.3%), and KPA 5 Drinking Water Quality Compliance (43.3%).

The provincial Blue Drop Risk Rating (BDRR) remained in the medium risk category but improved slightly from 54.8% in 2022 (BD PAT) to 54.0% in 2023. 52 (of 100) water supply systems are situated in the low-risk category, 16 WSSs in the medium risk category, 23 WSSs in the high-risk category, and 9 WSSs in the critical risk category.

The Regulator is optimistic that the BD 2023 report provides an updated residual basis from where a positive trajectory for water services delivery and improved performance will follow in the next BD audit.

Municipalities and their service providers are encouraged to start preparation for the next Blue Drop audit cycle, which is planned to cover the fiscal year 2023/24 and released in 2025.

The 2023 Blue Drop status for WSAs in the province are summarised in the table (right).

Table 6: 2023 Blue Drop Summary

WSA Name	2014 BD Score (%)	2023 BD Score (%)	2023 BD Certified ≥95%	2023 Critical State (<31%)
Albert Luthuli LM	53.2%	19.1%↓		All 8 WSSs
Bushbuckridge LM	64.2%	62.2%↓		
Dipaleseng LM	10.6%	7.0%↓		Greater Dipaleseng
Dr JS Moroka LM	89.3%	53.4%↓		
Emakhazeni LM	50.0%	31.2%↓		Belfast, Dullstroom
Emalahleni LM	43.8%	65.7%↑		
Govan Mbeki LM	77.2%	90.8%↑		
Lekwa LM	14.5%	33.5%↑		
Mbombela/Umjindi	88.9%	69.3%↓	Karino, Matsulu, Nelspruit, Primkop	Elandshoek, Hazyview, White River, White River Country & Golf Estates, Mjindini Trust-Madakwa, Rimers-Suid Kaap, Sheba, Mjejane, Legogote, Nyongane River, Dwaleni, Mshadza
Mkhondo LM	32.4%	54.5%↑		Rural WSS
Msukaligwa LM	18.1%	21.6%↑		Breyten, Davel, Douglas dam, Lothair, South works (noitgedacht farm)
Nkomazi LM	51.5%	68.6%↑		
Pixley Ka Seme LM	43.4%	45.0%↑		
Steve Tshwete LM	97.1%	67.4%↓		
Thaba Chweu LM	9.1%	8.2%↓		Coromandel, Graskop, Lydenburg, Sabie
Thembisile LM	67.6%	75.3%↑		Langkloof
Victor Khanye LM	63.5%	90.1%↑		
Totals	-	-	4	34

5.

GUIDELINES AND RECOMMENDATIONS

Agriculture is the major water user. Incentivizing smart farming practices may reduce the volumes used in agriculture and hence reduce the burden on water resources, in particular with the shift from annual to perennial crops.

Smart water use measures need also to be implemented in forestry to limit streamflow reduction.

- Discharging wastewater, removing underground water, and especially disposing waste are substantial water uses due to industrial and mining activities. It is recommended that mining houses try and remediate wastewater and re-use it for irrigation and power generation close vicinity to the waste generating streams.
- The existing pool of wastewater streams can potentially become a valuable water–reuse source (currently 0.3% of water abstracted is re-used for wastewater irrigation; 0.8% by IUCMA).
- Increased industrial development will likely impact on industrial water use as well as water schemes and supply. Rural unregistered users may impact the results more than urban activities as these may have never been accounted for.
- Although groundwater use is fairly large in Mpumalanga, there is potential for increasing conjunctive use of surface water and groundwater.
- Vast areas of thicket/dense bush (water use 616 mm a-1) encroaching grassland (623 mm a-1) and woodland/open bush (451 mm a-1) can be traded-off in support of development. Vast areas, however, need strong conservation efforts such as wetlands.


WATER
BIODIVERSITY
COMMUNITY
RESILIENCE
PROSPERITY
SOLUTIONS
INNOVATION
COLLABORATION
IMPACT

2026 Mpumalanga **Water Sector** Market Intelligence Report

MPUMALANGA **GREEN CLUSTER** AGENCY