

7

WATER SECURITY



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7.1 Water Use Efficiency

In the water sector, the term 'water use efficiency' is generally understood to be a dimensionless ratio between water use and water withdrawal. Water Use Efficiency is about using water without waste. In the DWS Water Use Efficiency goes hand in hand with Water Conservation and Water Demand Management (WC/WDM). Within WC/WDM, there are several technical aspects such as non-revenue water, among others.

Non-revenue water (NRW) in South Africa is a big problem. Approximately 41% of municipal water does not generate revenue. While figures vary between service providers, average physical losses in municipal systems are estimated to be around 35%, against a global best practice of about 15%. As a result, municipalities are losing around R 9.9 billion each year.

7.1.1 Legislation and Policy

Water is at the core of human survival, peace and prosperity. The highest legislative mandate for efficient and effective distribution of water resources comes from the Constitution of the Republic of South Africa Act (No. 108 of 1996), Section 27 (1)(b) which states that everyone has a right to access sufficient food and water. The National Water Act, 36 of 1998 (NWA), provides the legal framework for the promotion of efficient, equitable and sustainable management of the country's water resources.

The Water Services Act (No. 108 of 1997) provides the additional legal framework for the provision of water supply and sanitation services to end users such as households, businesses, and industries, within municipalities, promoting water conservation in the provision of water services. It requires Water Service Authorities (WSAs) to outline measures to conserve water resources and places the duty to conserve water on water services institutions. The Water Services Act and its Regulations enable the implementation of Water Conservation and Water Demand Management (WC/WDM) specifically for the municipal sector by encouraging the sector to develop By-Laws, WC/WDM plans, Water Services Development Plans (WSDP), etc.

The Regulations relating to Compulsory National Standards and Measures to Conserve Water under the Water Services Act (No. 108 of 1997) provide for the protection of consumers and WSAs, and for ensuring the application of sound management principles. The National Water and Sanitation Master Plan (DWS, 2018) states that South Africa is facing a water crisis caused by insufficient water infrastructure maintenance and investment, recurrent droughts driven by climatic variation, inequities in access to water and sanitation, environmental degradation and resource pollution, and a lack of skilled water engineers. This crisis is already having significant impacts on economic growth and the well-being of everyone in South Africa.

The National Water Resources Strategy 3 (NWRS-3, 2023) outlines the importance of Water Conservation and Water Demand Management (WC/WDM) and Non-Revenue Water (NRW) management. The WC/WDM and NRW management are priority programmes for reaching the 15 % water demand reduction target. The National Water and Sanitation Master Plan (2018) recognises that building a water-secure future will require proactive water infrastructure management, effective water infrastructure operations and maintenance, and an overall reduction in future water demand while considering infrastructure development and augmentation, where necessary. The DWS Strategic Plan for the 2020/21 to 2024/25 (Vote 41) sets out a performance target approach to WC/WDM, highlighting its importance as one of the priority implementation areas for the DWS.

7.1.2 History of Benchmarking Studies

South Africa has a 20-year benchmarking history, starting with the adaptation of the International Water Association's methodology for calculating and understanding NRW and water losses in 2002, in the development of a pragmatic approach to benchmark water losses in potable water distribution systems in South Africa. The first comprehensive national benchmark study was published in 2012 in *The State of Non-Revenue Water in South Africa (2012)*. Since 2012, several detailed assessments and updates have been undertaken, including the No Drop Assessment in 2015. The last national water loss benchmarking study was based on 2021/22 data, published in the No Drop Watch Report 2023.

7.1.3 Data Submission Statistics

There has been a noticeable improvement in the quality of data for Provinces that have active data collection and collation programmes combined with regular engagements. Municipalities in these Provinces are requested to report regularly at structured forums and reconciliation strategy progress meetings.

To differentiate the useability of data, data were categorised into one of three groups:

- **High confidence level:** Data sets are submitted on a regular basis, show trends, and are credible.
- **Medium confidence level:** One or more data sets were submitted in the past three years and seem credible, with few gaps and/or inaccuracies.
- **Low confidence level:** None or one data set was submitted in the past three years, and the data sets submitted are questionable, with considerable gaps and/or inaccuracies.

A total of 88 datasets (61%) were received from WSAs, which is the highest to date. Less than 50% of WSAs were able to submit water balance data in previous surveys ([Table 7-1](#)). The confidence level of the data submitted varies between provinces and municipal categories. The confidence levels exclude those for the WSAs that did not

submit data, that is when water balances were calculated, extrapolated, or estimated.

Category A - Metropolitan municipalities continue to report consistently and most can provide a water balance monthly. This is encouraging, considering that metropolitan municipalities represent 53.3% of the total water use and 47.3% of the population.

Categories B1 and B2 - Most secondary cities and large municipalities can provide a water balance regularly, although there is considerable room for improvement in some Provinces. The secondary city and large municipalities represent 21.4% of the total water use and 20.8% of the population. These municipalities are of economic significance and should have the necessary budgets and resources to implement WC/WDM.

Categories C2, B3 and B4 - 53% of the small and rural municipalities can provide an accurate water balance regularly. Reasons for this include lack of budget, limited skills and capacity, difficulty measuring the supply due to the large number of boreholes, and large indigent consumer bases. These municipalities represent approximately 25.3% of the total water use and 31.9% of the population.

Table 7-1: Summary of data submissions and confidence levels

Province/ Category	WSA	Submissions	%	High	Medium	Low	% of SIV	% of Population
EC	14	7	50%	2	1	4	7.3%	8.8%
FS	19	10	53%	0	2	8	5.6%	5.8%
GT	9	8	89%	6	2	0	35.8%	29.3%
KZN	14	12	86%	11	0	1	19.5%	18.5%
LP	10	3	30%	1	2	0	7.0%	7.6%
MP	17	8	47%	2	2	4	6.5%	7.6%
NC	26	9	35%	5	3	1	2.4%	2.2%
NW	10	6	60%	0	2	4	5.5%	7.0%
WC	25	25	100%	21	2	2	10.4%	13.3%
Total	144	88	61%	48	16	24	100.0%	100.0%
A	8	8	100%	7	1	0	53.3%	47.3%
B1	19	17	89%	11	2	4	17.1%	16.3%
B2	17	10	59%	8	1	1	4.3%	4.6%
B3	71	37	52%	14	10	13	6.6%	8.3%
B4	8	5	63%	0	2	3	2.8%	4.0%
C2	21	11	52%	8	0	3	15.9%	19.6%
Total	144	88	61%	48	16	24	100.0%	100.0%
%				33%	11%	17%		

Estimated Water Balance

Prior to the 2017 benchmark report, all reports calculated the national water balance based on extrapolation. The national water balance is highly influenced by and dependent on the metro and secondary city data that have high confidence levels, while data for Category C2, B3 and B4 municipalities have low confidence levels and are poorly represented in the sample. The extrapolated results provided NRW figures between 35% to 40%, depending on the extrapolation methodology followed. To improve understanding of NRW and water losses in South Africa, the extrapolation method was substituted with a bottom-up approach, estimating a water balance for each municipality that could not provide information.

National NRW and water loss trends show a steady increase in NRW over the past 10 years and System Input Volume (SIV) projections with WC/WDM have been exceeded. The figures are dominated by Category A, B1 and B2 municipalities, some of whom have made significant strides in improving NRW management, reducing water losses, and managing the demand in line with reconciliation strategy targets. There is significant scope for improvement of NRW and all municipalities would benefit from targeted demand management programmes, including community education and awareness, leak repair, infrastructure refurbishment, pressure management, and installation of bulk meters, amongst other measures.

7.1.4 National Water Balance

The National Water Balance indicates a SIV of 4.39 billion m³/a, water losses of 1.79 billion m³/a (40.8%) and NRW of 2.08 billion m³/a (47.4%) (Figure). NRW and water losses have increased by a notable 5.9% and 4.3% respectively from June 2016. The fluctuation between 2016 and 2019 was generally less than 1%. The greatest increase was in the past two years, attributed to the increased demands and the impact of the COVID-19 pandemic.

There has been a noticeable increase in billed unmetered consumption because of incorporating Free Basic Water (FBW) supply in the estimated water balances, especially for rural municipalities. Unbilled unmetered consumption remains lower than expected, considering the high number of unbilled properties in South Africa. Municipalities must correct their water balance calculations and show any water use after an accepted connection as authorised consumption, and not as water loss.

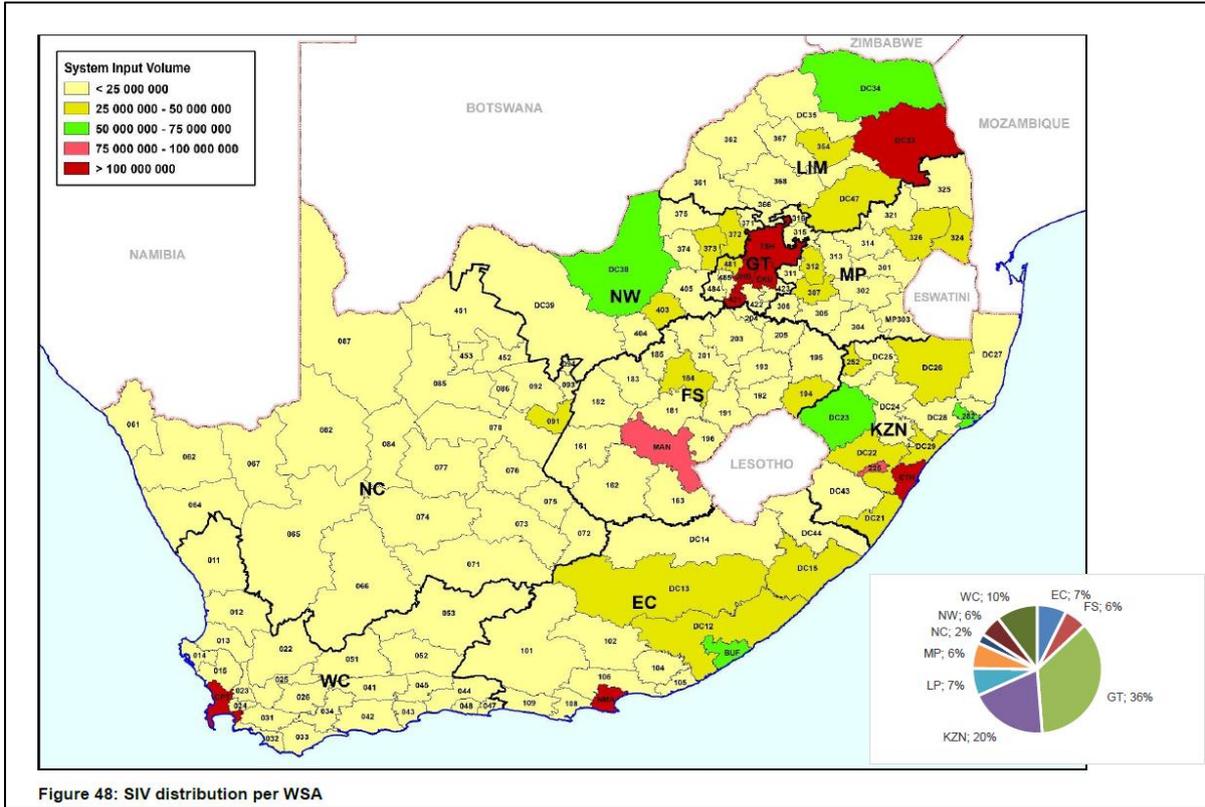


Figure 48: SIV distribution per WSA

Figure 7.3: SIV distribution per WSA.

The volume NRW in the Categories A, B1 and B2 municipalities, account for almost 75% of the national NRW and should be a focus area of the national WC/WDM programme (Figure 7.4). The Gauteng (667 million m³/a) and KwaZulu-Natal (486 million m³/a) Provinces account for over half of the national volume NRW (Figure 7.5).

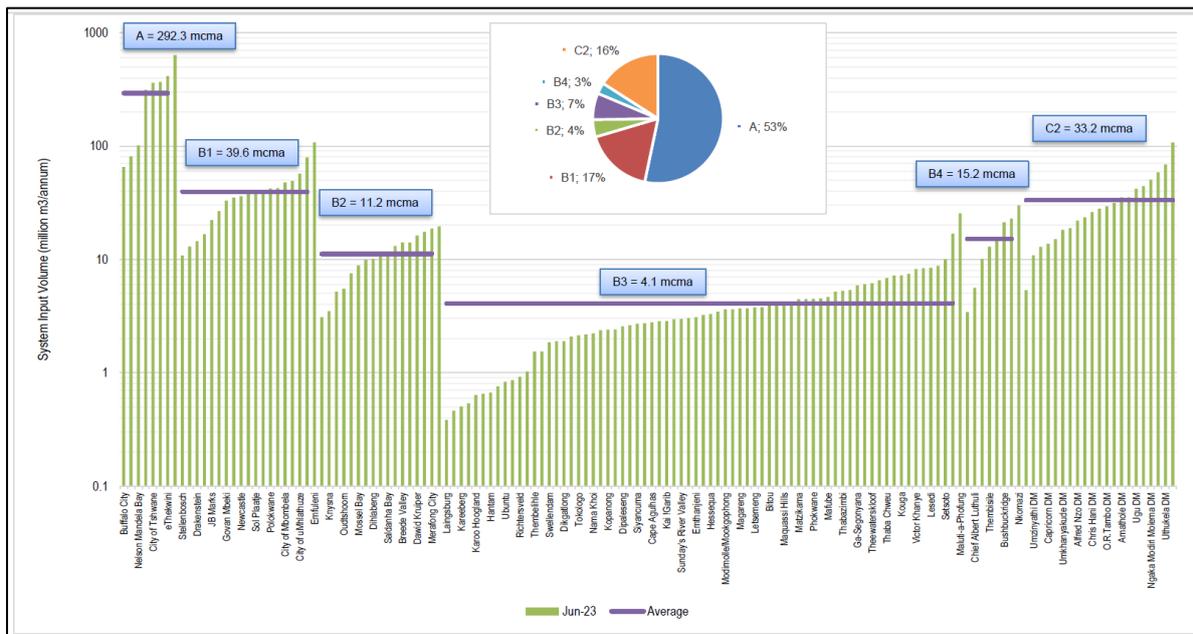


Figure 7.4: Volume NRW distribution per municipal category

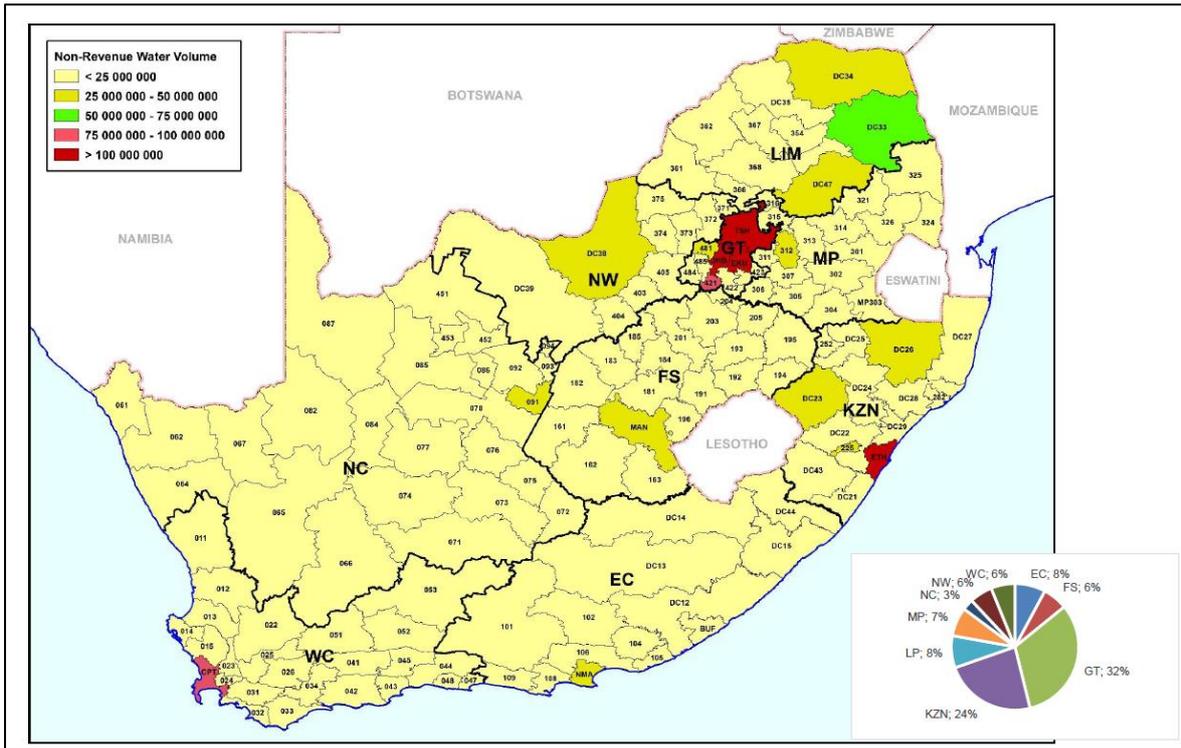


Figure 7.5: Volume NRW distribution per WSA.

In all municipal categories, the performance varies from very poor to very good (Figure 7.6). Category A and B2 municipalities are performing better, and it is assumed that they have sufficient budgets and resources to implement effective WC/WDM programmes. Category B1, B3 and rural municipalities face significant budget, cost recovery, and resource challenges, and have higher NRW. The national average of 49.1% is higher than the weighted average of 45.1% because it is not influenced by the size of the metropolitan municipalities which have lower NRW (Figure 7.7).

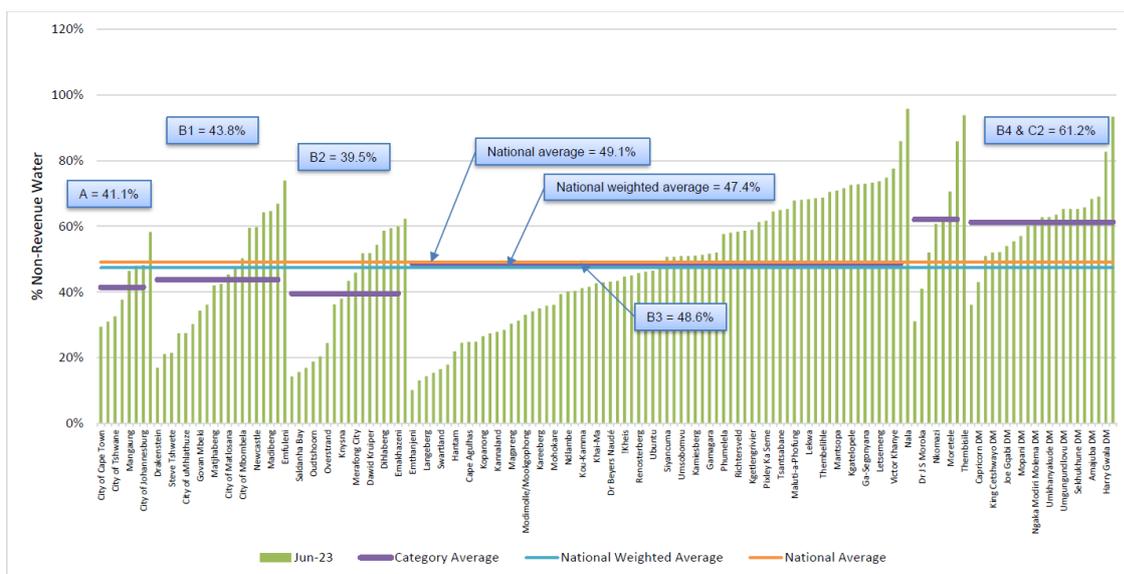


Figure 7.6: Percentage NRW distribution per municipal category.

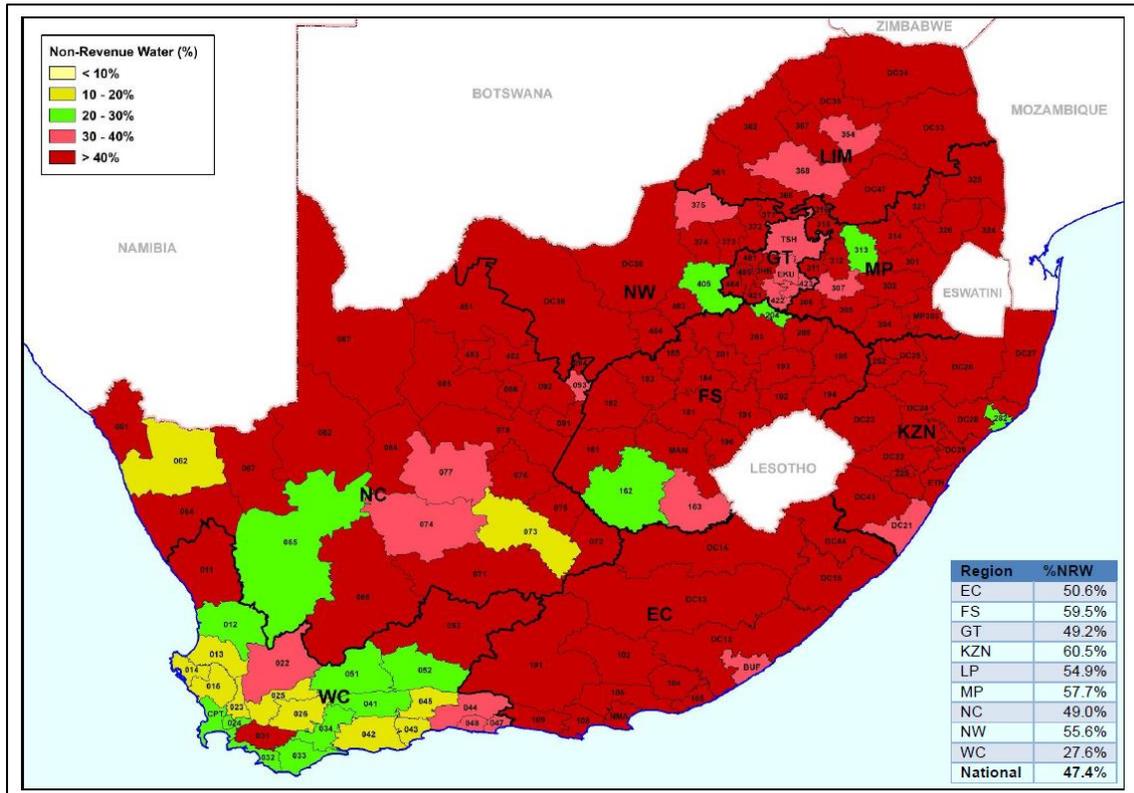


Figure 7.7: Percentage NRW distribution per WSA.

Zooming into the provincial NRW figures, we see Western Cape (25.5%) and Gauteng (34.7%) presenting excellent to good NRW respectively (Figure 7.8). The Western Cape Province has historically had an excellent NRW data reporting programme in place. Most WSAs submitted NRW data in the high confidence category. This trend is encouraged as this level of credible data coming from the Western Cape Province helps to create a realistic understanding of the nature and extent of NRW in South Africa.

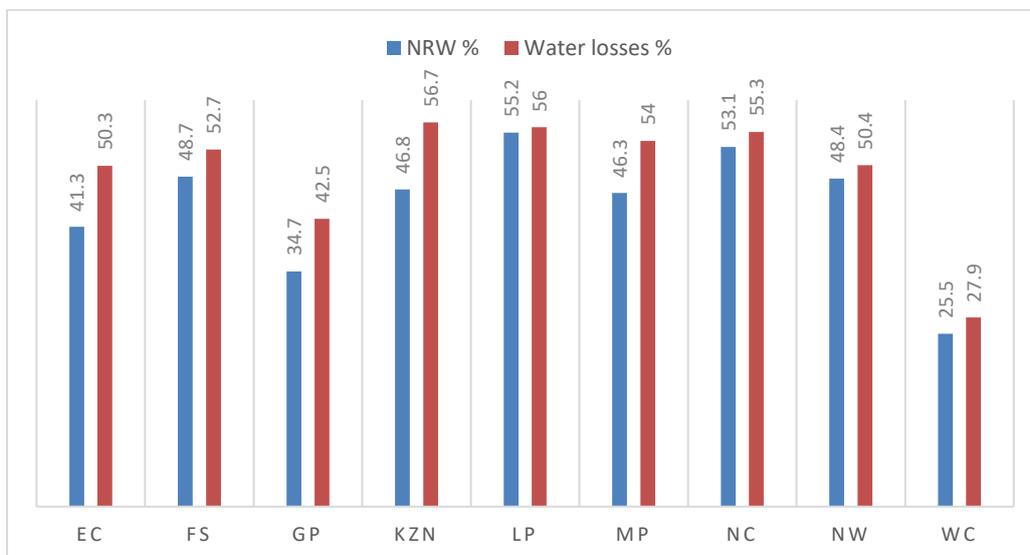


Figure 7.8: NRW vs Water losses per province.

The Gauteng Province has maintained its record of good reporting practices and sound data management. All but one WSA submitted data for the study and regularly provided reports to the Provincial Office, enabling adequate trend analysis. The Provincial Office has a coherent and coordinated reporting system in place and has continued its commendable efforts to maintain a sound relationship with the municipalities and monitoring activities. The efforts of the Gauteng Office are strongly supported by Rand Water which also provides and requires regular feedback through its Project 1600 programme.

The two worse-performing provinces are Limpopo (55.2%) and Northern Cape (53.1%). Limpopo Province, currently displaying 55.2% NRW, has historically had significant challenges with data collection and reporting on NRW. However, improvement is noted, with the water balance for the province based on a 30% submission rate. Data quality remains a concern, with only one WSA in the high confidence data category. The next step for the province would be to promote the submission of the most basic water balance and improve data quality, to ensure that results are based on credible data that reflect the true state of NRW, particularly with the proportionately larger number of rural municipalities. This would facilitate an understanding of the true nature and extent of NRW in rural environments, which constitute a critical part of the NRW management picture in South Africa, and the water management and distribution discourse overall. The Northern Cape Province shows significant variance in data quality across WSAs. Less than half of the municipalities (35%) submitted data, which is a significant decline from previous studies. The province could benefit from improved data reporting efforts and a coherent system of monitoring and verification. A closer working relationship between the Provincial Office and the municipalities is required to improve data generation and reporting practices.

National NRW and water loss trends show a steady increase in NRW over the past 10 years and SIV projections with WC/WDM have been exceeded (Figure 7.9). The figures are dominated by Category A, B1 and B2 municipalities, some of whom have made significant strides in improving NRW management, reducing water losses, and managing the demand in line with reconciliation strategy targets. There is significant scope for improvement of NRW and all municipalities would benefit from targeted demand management programmes, including community education and awareness, leak repair, infrastructure refurbishment, pressure management, and installation of bulk meters, amongst other measures.

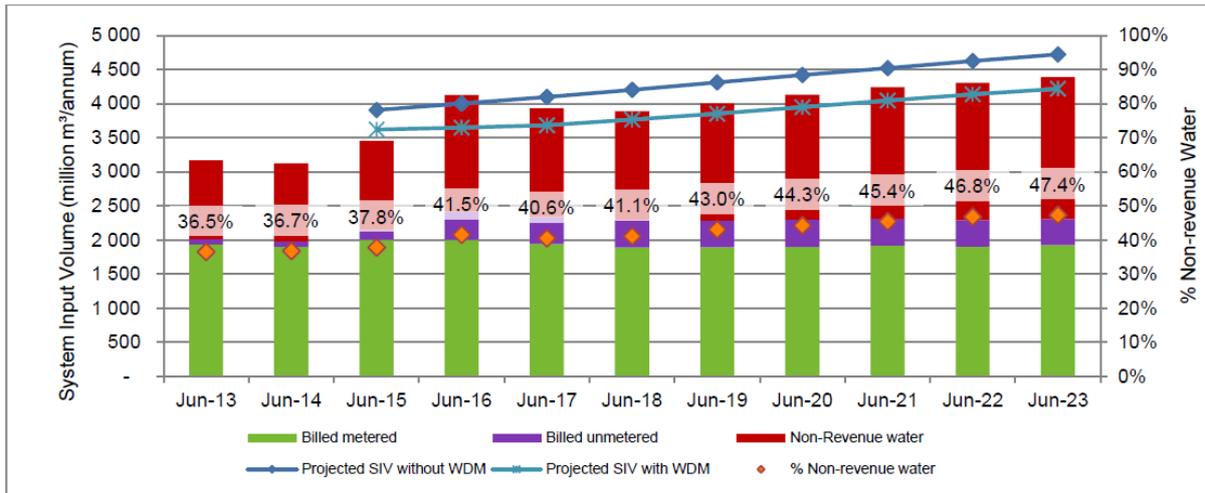


Figure 7.9: National NRW and water loss trends.

7.1.5 Consumption Trends

National trends indicate that the per capita water consumption has remained constant (218-220 l/c/d) over the past 7 years, which is commendable. However, WC/WDM efforts must be elevated considering the level and reliability of service and inefficiencies, and that South Africa is one of the 30 driest countries in the world. The per capita consumption has significantly declined after peaking at 237 l/c/d national average in June 2016 because of the prevailing droughts in parts of South Africa, deteriorating infrastructure and service delivery (Figure 7.10). The enforced water restrictions and WC/WDM interventions had a significant impact on the SIV, especially in the Western Cape.

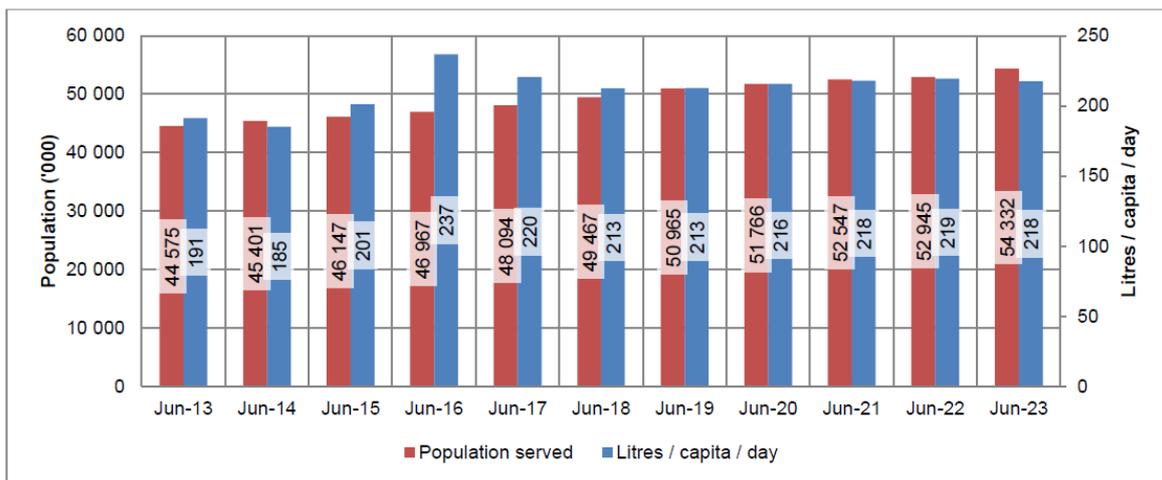


Figure 7.10: National water consumption trends.

The Infrastructure Leakage Index (ILI) deteriorated drastically from 2016 to date, showing signs of improvement in 2017 and 2018 (Figure 7.11). The COVID-19 pandemic escalated the deterioration from 2020. The ILI of 6.9 and 7.0 for 2022 and

2023 respectively indicates poorly managed physical losses, this trend is expected to improve once municipalities have returned to normal, eliminated the leak repair backlogs, and improved revenue collection.

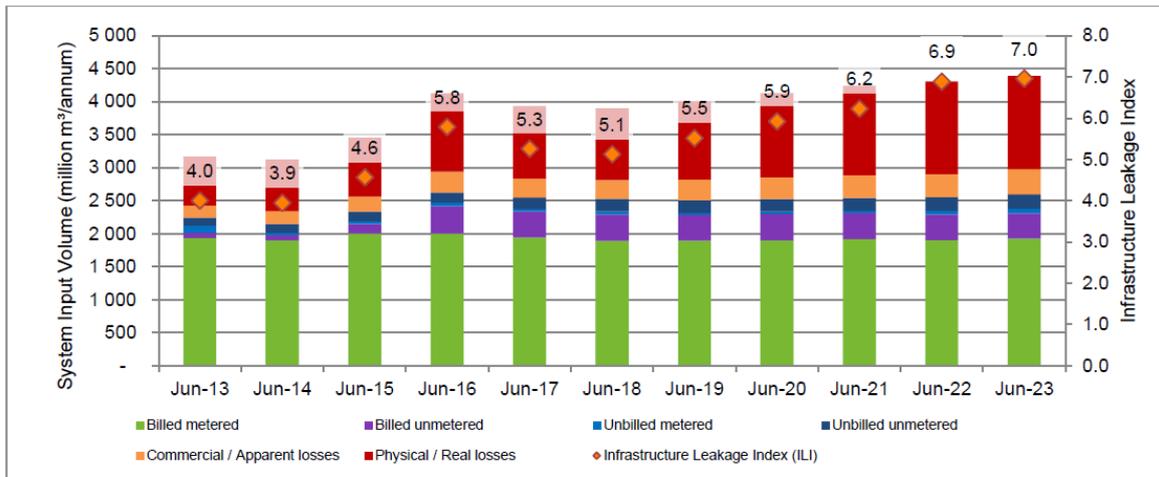


Figure 7.11: The Infrastructure Leakage Index

The results indicate increased NRW, water losses, and ILI, but a significant decrease in the national per capita consumption. Given the increases in three key NRW metrics, WC/WDM must be implemented as a matter of urgency in all Provinces, especially considering that several Provinces have NRW and water losses above 50%. There is significant scope for improvement in reporting levels, data accuracy and a reduction in SIV, NRW, water losses and improved efficiency across South Africa. Only continuous monitoring and analyses will provide a credible benchmark against which progress made with the implementation of WC/WDM can be measured. Continuous monitoring should also influence interventions required to manage demand, water losses, and NRW.

Litres Per Capita Per Day

The metropolitan (A) municipalities have the highest per capita consumption and the highest number of wet industries (Figure 7.12). Category B1 and B2 municipalities have slightly lower consumption figures, which are above the national average of 189 l/c/d. The national weighted average of 218 l/c/d is dominated by the Category A and B1 municipalities (Figure 7.13). The l/c/d in some municipalities is extremely high and needs further investigation to ensure the population served figures are accurate.

7.1.6 Financial Analysis

In *The State of Non-Revenue Water in South Africa* (WRC, 2012), the value of NRW is estimated at R 7.2 billion per annum using production tariffs of between R 3.00/kl for Category B4 and R 5.00/kl for Category A municipalities. The DWS First Order Assessment of the status of water loss, water use efficiency and NRW in municipalities (2014) used R 6.00/kl to calculate the potential savings. The R 6.00/kl was based on the *Water Services Tariffs Report for 2012/13* (DWA, 2013). The results from these studies gave a high-level understanding of the potential financial benefit of implementing WC/WDM in the municipal environment.

The Medium-Term Revenue and Expenditure Framework (MTREF) submitted by municipalities on an annual basis provides valuable information on the revenue and expenditure for the current year, past three years, and projected three years. This financial analysis is an attempt to align the actual water revenue and expenditure with the International Water Association (IWA) water balance to assess water cost and potential revenue.

7.1.7 Conclusions

- The 2022/23 national water balance indicates an SIV of 4.39 billion m³/a, NRW of 2.08 billion m³/a (47.4%) and water losses of 1.79 billion m³/a (40.8%). NRW and water losses have increased by a notable 5.8% and 4.3%, respectively, from 2016. However, the greatest increase was in the past three years and attributed to the COVID-19 pandemic. The fluctuation between 2016 and 2019 was generally less than 1%.
- There has been a noticeable increase in billed unmetered consumption because of incorporating FBW supply in the estimated water balances, especially for rural municipalities. Unbilled unmetered consumption remains lower than expected, considering the high number of unbilled properties in South Africa. Municipalities must correct their water balance calculations and show any water use after an accepted connection as authorised consumption and not as water loss.
- National trends suggest that the per capita consumption of 218 l/c/d has remained constant over the past 8 years, which is commendable. However, WC/WDM efforts must be elevated, considering the level of service and inefficiencies, and that South Africa is one of the 30 driest countries in the world.
- The results indicate increased NRW, water losses and ILI, but a significant decrease in the national per capita consumption. Given the increases on three key NRW metrics, WC/WDM must be implemented as a matter of urgency in all Provinces, especially considering that several Provinces have NRW and water losses above 50%. There is significant scope for improvement in reporting levels, data accuracy, and reduction of SIV, NRW, water losses and improved efficiency across South Africa. Only continuous monitoring and analyses will provide a credible benchmark against which the progress made with the implementation of WC/WDM can be measured.
- All municipalities would benefit from targeted demand management programmes, including community education and awareness, leak repair, infrastructure refurbishment, pressure management, and installation of bulk meters, amongst other measures.
- Based on the functional expenditure and SIV of 127 WSAs, the average cost of supplying water is R 13.07/kl. This ranges from R 17.32/kl for metropolitan municipalities to R 12.06/kl for Category B3 municipalities. The cost of supplying rural municipalities (Categories B4 and C2) is the highest, ranging from R 14.26/kl to R 17.64/kl. This is a meaningful change from previous assessments that suggested that the cost of supplying water in rural schemes is less than in large municipalities. The higher cost is justified, considering that these schemes often consist of many small systems with boreholes, which are expensive to operate.
- Using the national average and category average tariffs, the estimated cost to supply water in South Africa is between R 60 and R 70 billion per annum and revenue of between R 42 and R 44 billion is generated from water sales. The value of NRW is between R 28 and R 33 billion at R 13.07/kl which is higher than previous estimates. The increase is due to above inflation water tariff increases from water boards, and the under estimation of water supply costs to rural municipalities.
- The results show that approximately R 1 billion per annum could be saved if the SIV is reduced by 2%, and municipalities would generate nearly R 1 billion per annum for every 2% increase in revenue. The net benefit could be R 10 billion per annum if revenue is increased by 10% and the SIV is reduced by 10%. Reducing the SIV by 10% and increasing the revenue by 10% would reduce the national NRW figure to 35.7%, and the per capita consumption to 195 l/c/d.
- The estimated water balances increase the national percentage NRW by approximately 5.5% and reduces the l/c/d by approximately 23 l/c/d. The estimated water balances increase the national figures, and it is highly unlikely that the NRW in reporting municipalities would be lower than in non-reporting municipalities.

7.1.8 Recommendations

The following recommendations are made to build on the progress made with reporting and the implementation of WC/WDM in the municipal environment:

- All Provincial Offices should establish reporting templates, schedule meetings with municipalities to confirm targets, analyse the water balance information, and provide feedback. The reporting structures in well-performing Provinces are now well-established and managed by the provinces, and most municipalities are reporting quarterly. The initiative was supported by Regulations and sending directives to municipalities that did not respond. A similar approach could be followed for all Provinces to improve communication and water balance reporting.
- One of the key challenges with gathering the information is the poor communication channels with municipalities, which include staff turnover and the common use of private e-mails. Often municipalities are unwilling to provide the information as it reflects badly on them, or they feel that the information has already been submitted through the WSDP and various questionnaires. Government should reconsider effective communication channels with municipalities. Communication should be more formal, avoid duplication, and target senior management in the organisation. Currently, the circulars from the National Treasury provide clear guidelines to municipalities and communications are only with the mayor, municipal manager, and CFO.
- Monitoring and reporting on water balances by municipalities could become more self-regulatory if a policy is implemented that no new infrastructure projects will be funded unless the municipality can provide actual consumption figures and proof that their water losses are under control. The IWA water balance should become the backbone of all water related management and decision support systems, especially grant application and awarding processes.
- Maintenance of the reconciliation strategies must continue and should be used to monitor the progress made with the implementation of WC/WDM. Too many local municipalities are not aware of the reconciliation strategies or expect DWS to provide the necessary funding to implement these strategies. Municipalities must be reminded of their responsibilities in terms of the Water Services Act and actively participate, budget through the Integrated Development Planning process, and implement the results from the reconciliation strategies.
- Ongoing monitoring and reporting of municipal NRW and water loss performance by DWS against determined targets and baselines are critical. DWS Provincial Offices / Catchment Management Agencies / Water Boards must increase their skills and capacity to provide WC/WDM support to municipalities, for monitoring and reporting.
- Budgets are allocated towards new infrastructure projects through Water Service Infrastructure Grant (WSIG), Regional Bulk Infrastructure Grant (RBIG), Municipal Infrastructure Grant (MIG), and other funding programmes, but the management of these funds is fragmented, with emphasis on new infrastructure and insufficient focus on WC/WDM.
- The No Drop incentive-based regulation programme should be rolled-out as planned, alongside the other Drop programmes, to elevate WC/WDM regulation in the municipal environment. DWS should also enforce its regulatory mandate to penalise municipalities that do not comply.
- DWS should consider a policy whereby water services institutions are compelled to either measure and control or fix leaks on private properties, as government cannot continue to fund new infrastructure projects to supplement leakage. DWS is already encouraging the fixing of leaks through various programmes.
- Municipalities should encourage consumers to appreciate the value of water and enforce the user pays principle, through on-going awareness programmes.
- The recommendations of the National Water and Sanitation Master Plan concerning WC/WDM, should be implemented as a matter of urgency.

- Municipalities should increase their efforts to reduce NRW and the negative impact it has on their ability to generate income and operate a viable water service.
- Municipalities should resolve metering and billing issues to increase payment levels, encourage consumer fixing of leaks, prosecute illegal water connections, and reduce theft of water.
- Municipalities should resolve intermittent supply as it is a prerequisite for an effective WC/WDM programme. Intermittent supply is ineffective (consumers adapt), corrupts meter readings and billing data, expensive to operate, damage pipe seals with subsequent increased leakage and is disruptive.
- The recommendations of the Second Edition of the National Water Resource Strategy (DWA, June 2013) must be implemented, including the call for greater emphasis on meeting specific targets to reduce water loss. WC/WDM measures will have multiple benefits in terms of the postponement of infrastructure augmentation, mitigation against climate change, support for economic growth, and ensuring that adequate water is available for equitable allocation.
- Closer involvement and collaboration with National Treasury are critical to ensure issues related to funding of WC/WDM programmes, and metering, reading and billing are resolved with municipal finance departments.
- Greater involvement of the private sector through public-private partnership, stewardship, and performance-based contracts should be encouraged to improve service delivery and expedite the implementation of WC/WDM interventions. National Treasury should review the procurement of these contracts to eliminate bottlenecks and attract private investment.
- On-going provision of mentorship to municipalities through the DWS Provincial Offices, Department of Cooperative Governance and Traditional Affairs (CoGTA), the South African Local Government Association (SALGA) and other institutions is critical.
- Closer involvement and collaboration with CoGTA and SALGA are critical to ensure issues related to human resources skills and capacity in municipalities, payment for services, and unauthorised water use are resolved.
- Closer collaboration is required with other national, provincial, and local government departments that are big water users. These include Departments of Education, Correctional Services, Health, Public Works, and Housing, to ensure leakages and wastage are brought under control.
- Human right to food and water comes with a responsibility and every citizen must use water sparingly, pay for water services, fix household leaks, report municipal leaks, and promote water use efficiency at home, work, and public facilities.

7.2 Water Resources Development

Water resource development mainly addresses issues such as socio-economic uplifting and development, ensuring the availability of safe water supplies to communities, and meeting the water requirements for industries and other sectors critical for economic growth. The Department has been involved in the development of water resources infrastructure to augment the water supply and safeguard future water security. Estimated funding of at least R126 billion is required to finance key water resource development projects in the next ten years.

Furthermore, the list of prioritised water resource development per water supply system is given in Table 7-2.

Table 7-2 Current Prioritised Water Resource Development

Water Resource (WR) System	Current Prioritized Water Resource Development Option and Estimated Date of Water Delivery		
	2020 – 2030	2031 - 2040	2041 – 2050
Integrated Vaal River System	Phase 2 of Lesotho Highlands Water Project by 2025 (R32.6 billion)	Use of Acid Mine Drainage	Thukela Water Project (Jana & Millietuin Dams)
Orange River System	Gariep Pipeline by 2024 (R8 billion), Vioolsdrift Dam in the Lower Orange (R6 billion)	Dam at Verbeeldingskraal in the Upper Orange River	
Crocodile West River System	Mokolo Crocodile (West) Water Augmentation Project (MCWAP) by 2024 (R15 billion)	Re-Use of Effluent	Re-Use of Effluent
Olifants River System	Olifants River Water Resource Development Project (ORWRDP) Phases 2B (R6.6 billion), 2D (R1.8 Billion), 2E (R0.5 Billion) & 2F (R2.3 billion) Exploitation of the Malmani Dolomitic Groundwater Aquifer	Re-Use of Effluent	Olifants Dam (Possibly Rooipoort Dam)
Mgeni Water Supply System	Phase 1 of uMkhomazi Water Project by 2026 (Dam at Smithfield, 33km transfer tunnel and Associated Works) (R18.5 billion)	Re-Use of Effluent	Phase 2 of uMkhomazi Dam (Dam at Impendle and Associated Works)
Algoa Water Supply System	Lower Coerny Balancing Dam Ground Water Development Scheme	Re-Use of Effluent	Kouga Dam Augmentation Scheme
Western Cape Water Supply System	Berg River – Voelvllei Augmentation Scheme (BRVAS) by 2021 (R0.9 billion) Table Mountain Group Aquifer Scheme	Breede-Berg River Augmentation Scheme (Mitchell's Pass Diversion & Raising of Voelvllei Dam)	Raising of Lower Steenbras Dam Desalination of Sea Water
Eastern Cape Water Schemes	Mzimvubu Water Project (R17.9 billion), Koonap River Development Project (Foxwood Dam) (R3 billion), Lusikisiki Water Project (Zalu Dam) (R2 billion)	Groundwater Development	Phase 2 of Mzimvubu Water Project
Letaba Water Supply System	Groot Letaba Water Augmentation Project (GLEWAP) (Nwamitwa Dam (R1.7 billion) & Raising of Tzaneen Dam wall)	Groundwater Development	Water Re-Use
Olifants-Doorn Water Scheme	Clanwilliam Dam Raising (R 3.3 billion) Phase of Conveyance System from the Raised Clanwilliam Dam (R6 billion)	Phase of Conveyance System from the Raised Clanwilliam Dam	Groundwater Development

7.2.1 Augmentation Projects

Water infrastructure is ageing and becoming dysfunctional. Aged infrastructure results in huge water losses and water supply backlogs. Infrastructure renewal lies in the responsibility of the Infrastructure Management Branch within the Department, which is also responsible for the management of Government Water Schemes (GWSs). Table 7-3 reports the progress made on augmentation projects that the Chief Directorate is implementing: Infrastructure Development for the period up to the end of September 2022.

Table 7-3 Progress of augmentation projects across the country

Province	Project Description	Projects status	Other
Limpopo	Nandoni Dam	Giyani water services project, including the pipeline from Nandoni Dam on progress.	Nandoni water purification upgrade, including possible waste-water treatment plant
	Phase 2 of the Olifants River Water Resources Development Project (ORWRDP – 2) involves the development of additional water resource infrastructure consisting of the De Hoop Dam on the Steelpoort River	The amended fence and security drawings were presented at the second security technical meeting with further amendments required before finalisation.	
Western Cape	The project for the Raising of Clanwilliam Dam is aimed to provide additional water to improve the assurance of supply for agriculture, provide for water allocations to resource-poor farmers and to address dam safety aspects. The scope of the work includes the raising of the existing dam wall by 13 metres, the relocation of a section of the N7 directly affected by the raised dam wall and the raising of the secondary provincial roads affected by the Full Supply Level	The civil design is complete. Most of the construction drawings are complete and have been formally issued to the Contractor. Construction progress is at 12% completion. The procurement process for the appointment of the PSP and APP was finalised, the PSP is rendering engineering services as of September 2023.	Upgrade of Greater Brandvlei Dam Scheme
Gauteng	Lesotho Highlands Phase 2	Lesotho Highlands Phase 2 is in progress.	
KZN	uMkhomazi Water Project	To date, 73 anchors have been installed and stressed.	

	<p>Raising of Hazelmere Dam. The project for the Raising of Hazelmere Dam is aimed to augment the water supply to the KZN North Coast by raising the dam wall by 7 metres to increase the yield of the dam for medium-term supply. The scope of the work includes the construction of a piano key weir on the spillway, the installation of rock anchors, foundation grouting and other minor works</p>	<p>Progress on the dam wall construction is at 97% completion.</p> <p>Work on the intake tower and the left and right flank training wall is complete, and work on the NOC screed and training wall is in progress.</p> <p>The appointment of a private contractor for the construction of the permanent houses is in progress.</p>	
Eastern Cape	<p>Ncwabeni off-channel storage dam</p> <p>The project involves the construction of a new concrete faced zoned rockfill dam on the Ncwabeni River, with a multi-level intake tower, an abstraction weir on the Umzimkhulu River and a pump station and pipeline to pump water into the off-channel storage dam</p>	<p>Civil and mechanical designs independent of geotechnical investigations and surveys are continuing. The preliminary design is 85% complete, the detailed design is 25% complete, and tender documentation is 8% complete. The procurement of environmental engineering, geotechnical engineering and surveying services required to advance the design work is being hindered by the lack of funding for the project.</p>	

7.3 Wetlands Rehabilitation

The protection and rehabilitation of wetlands are vital in addressing water security in the country. Wetlands are natural assets and natural infrastructure that can provide a variety of free products, functions, and services. Despite being valuable ecosystems, wetlands make up only 2.4% of the country's area (DFFE, 2021). However, studies have found that wetlands are among the most threatened ecosystems in South Africa and are currently in poor ecological condition. According to the 2011 National Biodiversity Assessment, 65% of wetland types were threatened (48% critically endangered, 12% endangered, and 5% vulnerable). Only 11% of wetland ecosystem types were found to be well protected, with the remaining 71% unprotected (SANBI, 2011).

In the 1970s, governments around the world, including South Africa, offered farmers incentives to convert their wetlands to agriculture. Over the years, these activities have had a significant impact on and altered the landscapes of South Africa. According to SANBI (2011), between 35% and 60% of South Africa's wetlands have already been

lost or severely degraded. Figure 7.14 shows the South African Wetlands Map (SANBI, 2020).

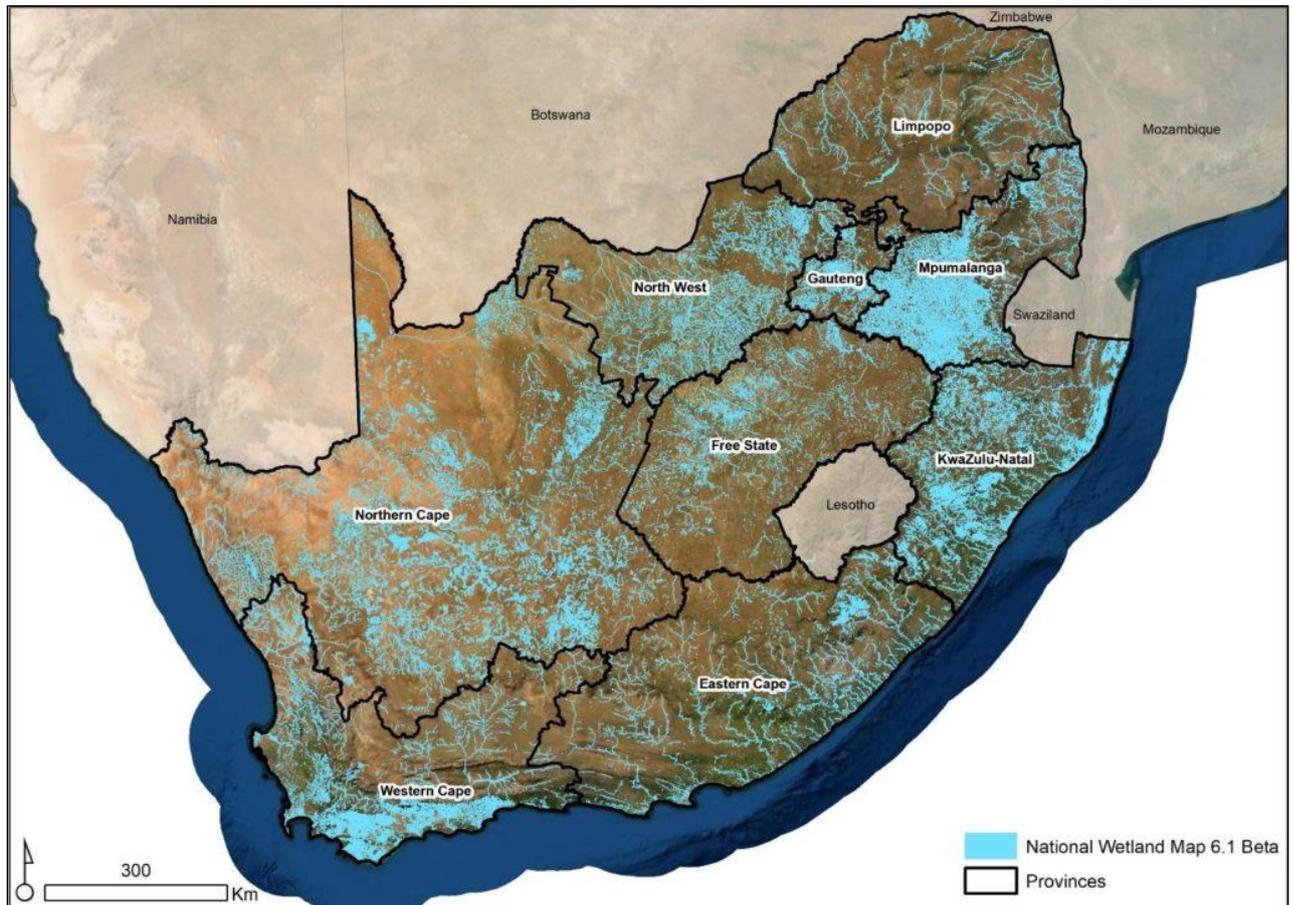


Figure 7.14: SA Wetlands Map (Source: SANBI, 2020).

7.3.1 Legislative background on wetlands protection

The South African government policy reflects the recognition that, in order to be truly effective, wetland conservation strategies must include both proactive measures for maintaining healthy wetlands and actions to reverse past degradation. The latter aspect is central to a government-led wetlands program. The protection of wetlands in South Africa is promoted by the following policies:

- Section 24 of the South African Constitution states that "everyone has the right to an environment that is not harmful to their health or well-being; and the right to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that prevent pollution and ecological degradation; promote conservation; and secure ecologically sustainable development and use of natural resources while promoting justifiable economic growth."

- The 1984 Conservation of Agricultural Resources Act became the first substantial legal instrument for protecting wetlands and remains in force to this day.
- The National Environmental Management Act (NEMA, Act No. 107 of 1998) and the National Water Act (NWA, Act No. 36 of 1998) and the environmental provisions of the Mineral and Petroleum Resources Development Act 28 of 2002 (MPRDA) ensure that urban and commercial developments do not affect or alter the natural state of wetlands.
- Principles such as the 'duty of care', enshrined in Section 28 of the NEMA, require that landowners take reasonable measures to prevent, minimise and rectify environmental degradation on their properties.

7.3.2 Benefits of Wetlands Rehabilitation

According to the 2018 National Biodiversity Assessment, rivers, wetlands, and catchment areas are critical ecological infrastructure for water security, often supplementing built infrastructure; however, the benefits of some of these ecosystems are currently jeopardized due to their poor ecological condition, (SANBI, 2018). Water security can be enhanced through integrated natural resource management in Strategic Water Source Areas (SWSAs) and other critical catchments. SWSAs account for only 10% of South Africa's land area but supply 50% of all surface water, supporting half of the country's population and nearly two-thirds of its economy.

Moreover, with climate change expected to alter rainfall patterns, wetlands will play a greater role in mitigating the effects of floods and droughts. All rehabilitation interventions aim to improve the condition and functioning of wetland ecosystems, addressing both causes and effects of degradation.

7.3.3 Ecological Infrastructure Rehabilitation and Restoration Projects

Several wetlands in South Africa have been rehabilitated and restored by different institutions such as the Water Research Commission (WRC), South African National Biodiversity Institute (SANBI), and the Working for Wetlands programme. DWS, in collaboration with the City of Ekurhuleni, the Gauteng Department of Agriculture, Rural Development, and Environment (GDARDE), is currently working to rehabilitate a wetland along the Blesbokspruit River, which, once completed, will contribute to cleaner and better-managed water for the Vaal Water Management Area (VWMA). The project is detailed in the case study below.

CASE STUDY: BLESBOKSPRUIT RAMSAR SITE REHABILITATION PROJECT

Background

The Blesbokspruit wetland is located along the Blesbokspruit River, a large tributary of the Vaal River. It is one of 26 RAMSAR sites in South Africa, and forms part of the Convention on Wetlands of International Importance. The wetland covers 1858 ha, and habitats more than 250+ bird species including species listed in the South African (SA) Red Data Book of Birds.

The surface water quality of the Blesbokspruit wetland deteriorated over the past ten years due to impacts from municipalities, industries, mining, lack of reed management, and the invasion of the water hyacinth. The challenges with the reed management make the wetland impenetrable and cause anoxic conditions in some parts of the wetland. The few open bodies of water that are present have become overgrown with the invasive alien species water hyacinth (*Eichhornia crassipes*). The thick decks of water hyacinth decrease the habitat for water fowl and cause more anoxic conditions in some parts of the wetland.

Project Progress:

The following has been achieved thus far:

- Spraying and removal of reeds and water hyacinths.
- Setting up biocontrol successfully at the site. Insects are used to slow down the growth of the water hyacinth together with DEFF and Rhodes University.
- Training of women of the local community to craft sustainable products out of the water hyacinth that has been removed.
- Setting up a project management structure with water quality, economic development, Ecological restoration, Compliance and Mining commissions.

Project Partners

DWS Gauteng, GDRARD and the City of Ekurhuleni. Stakeholders include DEFF, Rhodes University, Grootvaly Blesbokspruit Conservation Trust, the Blesbokspruit forum and NGO Thegka.

