January 2023

MONTHLY STATE OF WATER BULLETIN

WATER IS LIFE - SANITATION IS DIGNITY

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

2030 NDP

Overview

Most of the country's rainfall occurs during the warm summer months from October through March. The summer rains have started for most parts of the country that receives summer rainfalls. High (above average) rainfall was reported for January 2023.

Moderate to extreme drought conditions continue in isolated parts of the country in Limpopo, Western Cape, Eastern Cape, Mpumalanga, and Northern Cape Provinces, affecting Eight District Municipalities (DM).

The high rainfall status from October to January resulted in an increase in national dam storage over this period compared to the moderately high rainfall received during the same period in 2022/2023. The Algoa Water Supply System (WSS) in the Eastern Cape Province remains with water restrictions in response to the low surface water storage levels. Some domestic water restrictions have been applied to manage the Polokwane and Bloemfontein Water Supply Systems.

Rainfall

The distribution of total monthly rainfall across the country for October, November, December and January is presented in Figure 1. Good widespread rain occurred in January 2023 in most of the country except some isolated parts in Western Cape and Northern Cape Province, with higher totals recorded in Gauteng, Mpumalanga, and KwaZulu -Natal. The most significant contribution to this rainfall occurred during the 1st week of the month.

The monthly rainfall anomalies expressed as a percentage of normal rainfall are presented in Figure 2. Generally, October through March is a wet season for the country's eastern half, which receives summer rainfall. Above-normal rainfall for January 2023 was experienced mainly in the Western Cape, Mpumalanga, Free State, Kwazulu Natal, Northern Cape, and some Isolated parts of the Gauteng and Western Cape.

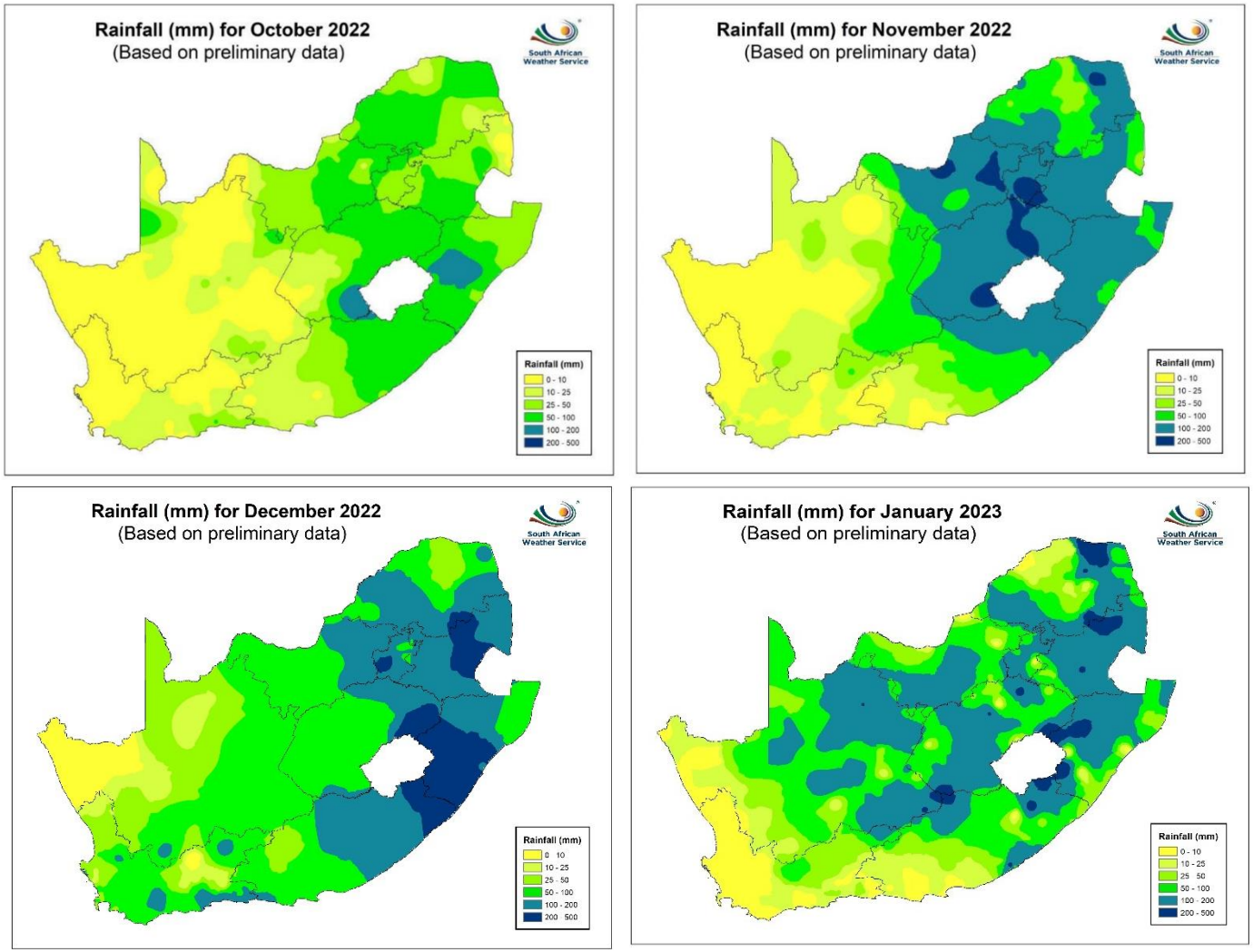


Figure 1: Rainfall distribution October, November, December 2022 and January 2023 (Source: SAWS https://www.weathersa.co.za/home/historicalrain)

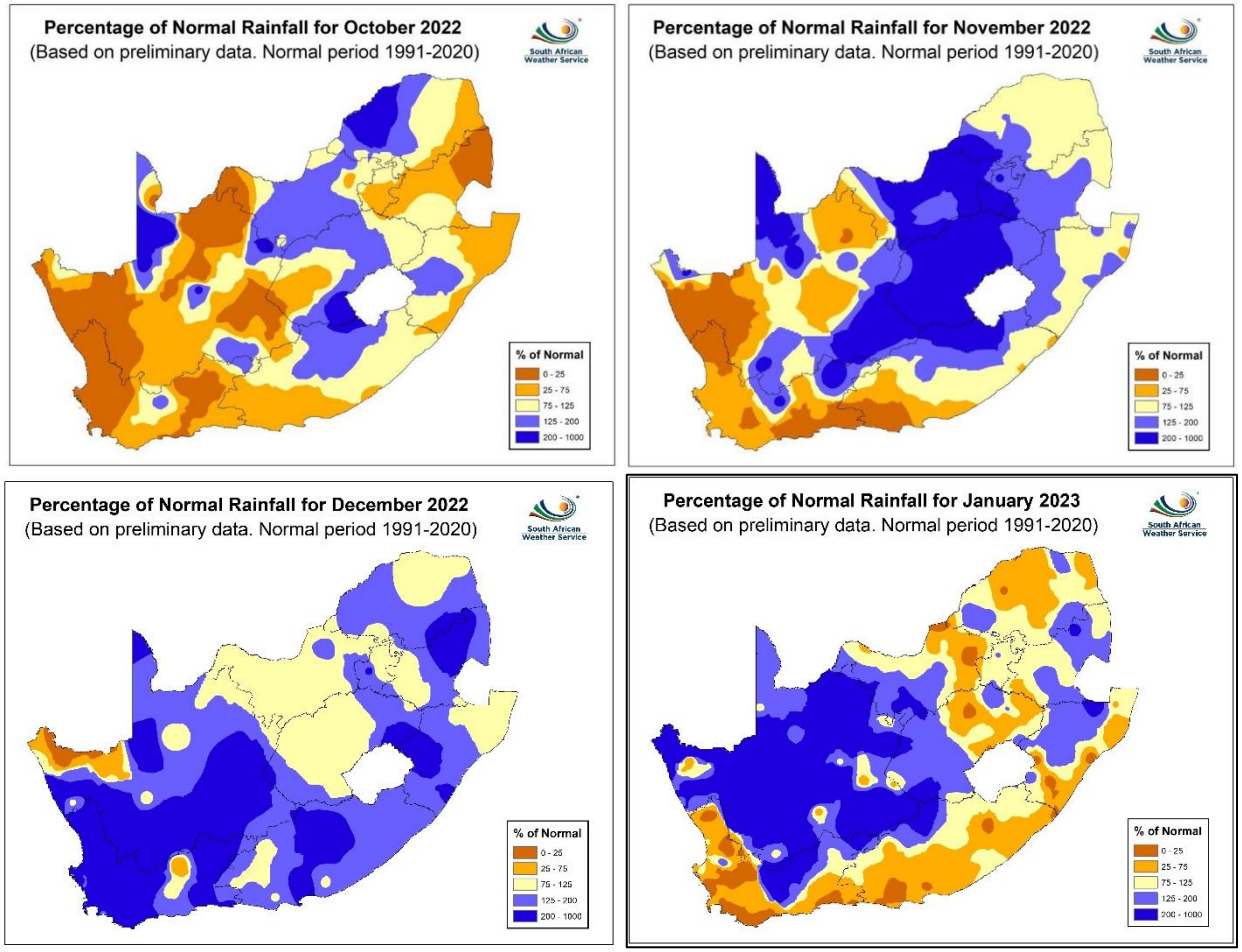


Figure 2: Percentage of normal rainfall in October, November, December 2022 and January 2023. Blue shades are indicative of above-normal rain, and the darker yellow shades of below-normal rainfall (Source: SAWS https://www.weathersa.co.za/home/historicalrain)

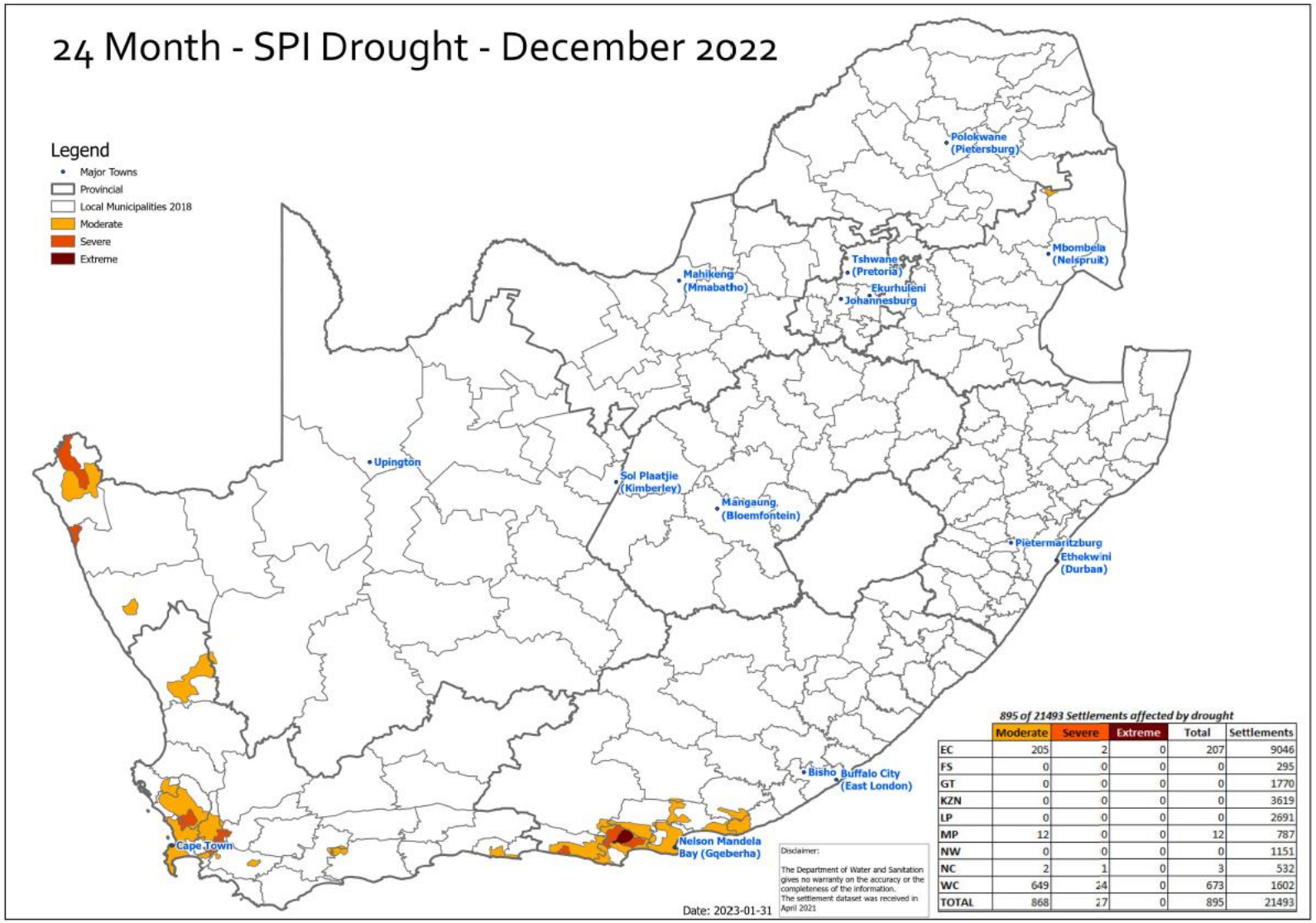
Indications of Drought

The 24-months (long-term) Standardized Precipitation Index (SPI) for December 2022 is presented in Figure 3. Based on the SPI, 4 Provinces have been affected by drought in the last 24 months. Table 1 lists drought-affected Provinces, District Municipalities, and Local Municipalities.

Table 1: Drought Affected Areas December 2023

Province	Affected District Municipalities	Affected Local Municipalities	Number of Affected Settlements
Eastern Cape	Nelson Mandela Bay	Nelson Mandela Bay Local Municipality	192
	Sarah Baartman	Kouga Local Municipality	1
	Sarah Baartman	Kou-Kamma Local Municipality	10
	Sarah Baartman	Makana Local Municipality	1
	Sarah Baartman	Ndlambe Local Municipality	3
Mpumalanga	Ehlanzeni	Bushbuckridge Local Municipality	12
Northern Cape	Namakwa	Kamiesberg Local Municipality	1
	Namakwa	Richtersveld Local Municipality	2
Western Cape	Cape Winelands	Breede Valley Local Municipality	1
	Cape Winelands	Drakenstein Local Municipality	78
	Cape Winelands	Stellenbosch Local Municipality	23
	City of Cape Town	City of Cape Town Local Municipality	490
	Eden	Bitou Local Municipality	4
	Eden	Knysna Local Municipality	48
	Overberg	Swellendam Local Municipality	1
	Overberg	Theewaterskloof Local Municipality	1
	West Coast	Matzikama Local Municipality	12
	West Coast	Saldanha Bay Local Municipality	2
	West Coast	Swartland Local Municipality	13

Figure 4 presents a 24-month SPI which shows dry areas and parts of the country experiencing wet conditions. Wet conditions were observed in central and western parts of the country, covering the Free State, Northern Cape, southern parts of the North West, Western side of Eastern Cape, and KwaZulu Natal province. Moderate to severe drought conditions continue to be experienced in isolated parts of Limpopo Province, Eastern Cape, and Western Cape Province. During the reporting period, Cape Winelands in Western Cape and Sekhukhune in Limpopo Province is severely affected by drought.



	Moderate	Severe	Extreme	Total	Settlements
EC	205	2	0	207	9046
FS	0	0	0	0	295
GT	0	0	0	0	1770
KZN	0	0	0	0	3619
LP	0	0	0	0	2691
MP	12	0	0	12	787
NW	0	0	0	0	1151
NC	2	1	0	3	532
WC	649	24	0	673	1602
TOTAL	868	27	0	895	21493

Figure 3: 24-months Spatial Precipitation Index – December 2022 (DWS - NIWIS - Disaster Management - (dwa.gov.za)

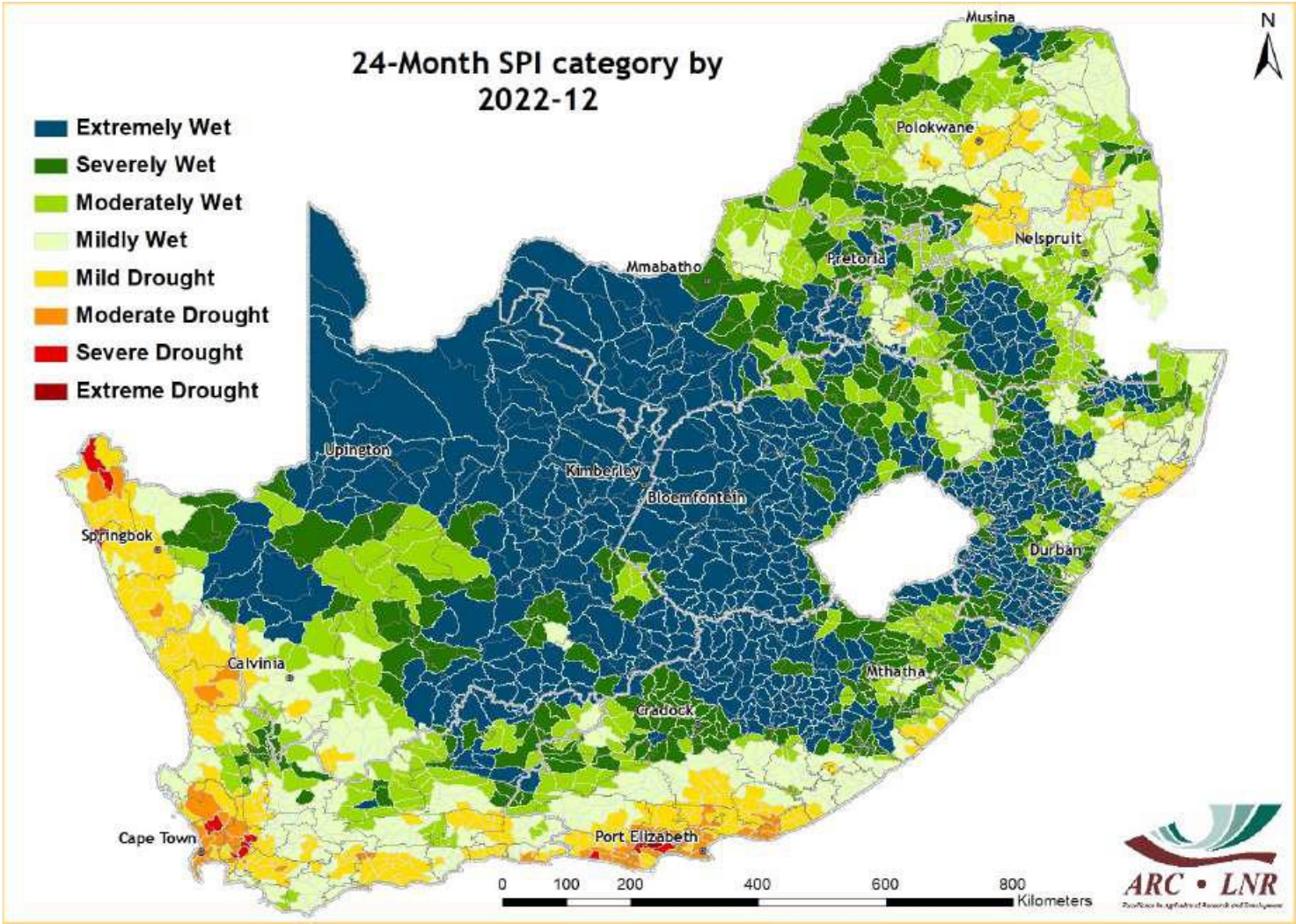


Figure 4: 24-months SPI category November 2022 (Source: Agricultural Research Council)

Dam water storage

Figure 5 presents the spatial layout of dam storage levels in four storage level categories depicted with color codes. **43%** of the dams are either full or spilling **(above 100% of FSC),** while **4%** are at critically low storage volumes, the majority of which are in the Western and Eastern Cape provinces as of 30 January 2023. The country's five largest dams were between 86.2% FSC (Pongolapoort Dam) and 102.2% FSC (Vanderkloof Dam) for the last week of January.

Dams at critical low storage levels (<10% of FSC) are given in Table 2. These are predominately within the Eastern Cape and Western Cape Provinces.

Table 2: Dams below 10% Full Supply Capacity (30 January 2022)

Reservoir	River	Province/Country	30 January 2023 (% FSC)
Middel-Letaba Dam	Middel-Letaba River	Limpopo	0.7
Nuwejaars Dam	Nuwejaarspruit River	Eastern Cape	3.8
Poortjieskloof Dam	Groot River	Western Cape - Winter Rainfall	6.8
Bellair Dam	Brak River	Western Cape - Other Rainfall	2
Hartebeestkuil Dam	Hartenbos River	Western Cape - Other Rainfall	5.1
Kammanassie Dam	Kammanassie River	Western Cape - Other Rainfall	3.4
Impofu Dam	Krom River	Eastern Cape	6.9
Karee Dam	Karee River	Western Cape	0

Four of the 43 District Municipalities experienced below 50% FSC for 30 January 2023, namely: West Coast (46.5%), Sarah Baartman (27.9%), Mopani (47.7%), Garden Route (45.7%), and Namakwa (0%). Figure 5 and Figure 6 illustrate the spatial distribution and status of dam storage in the last week of January 2023, overlain with the December 2022 SPI and Water supply systems, respectively.

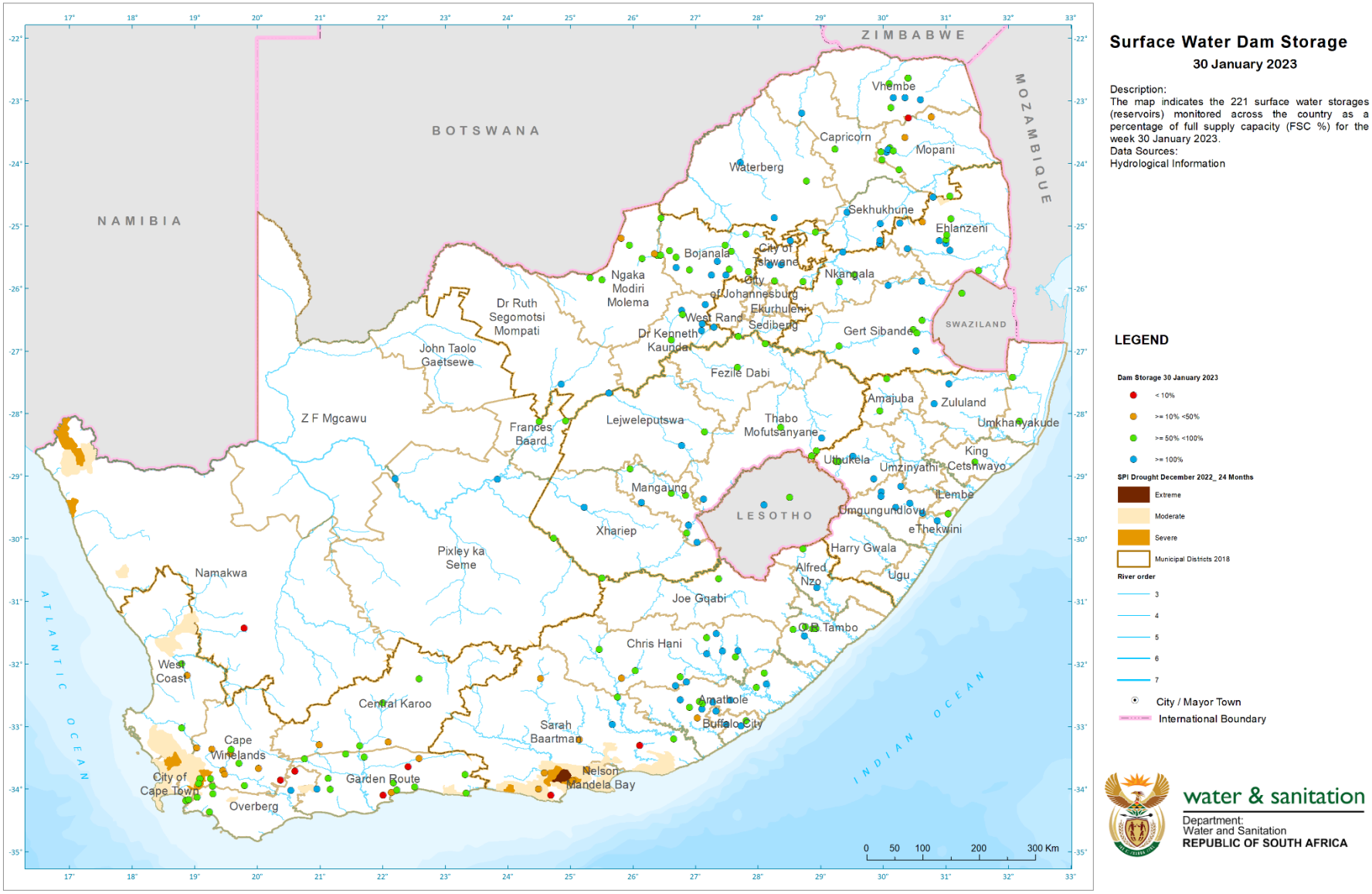


Figure 5: SPI for December 2022 and dam storage for the end of January 2023

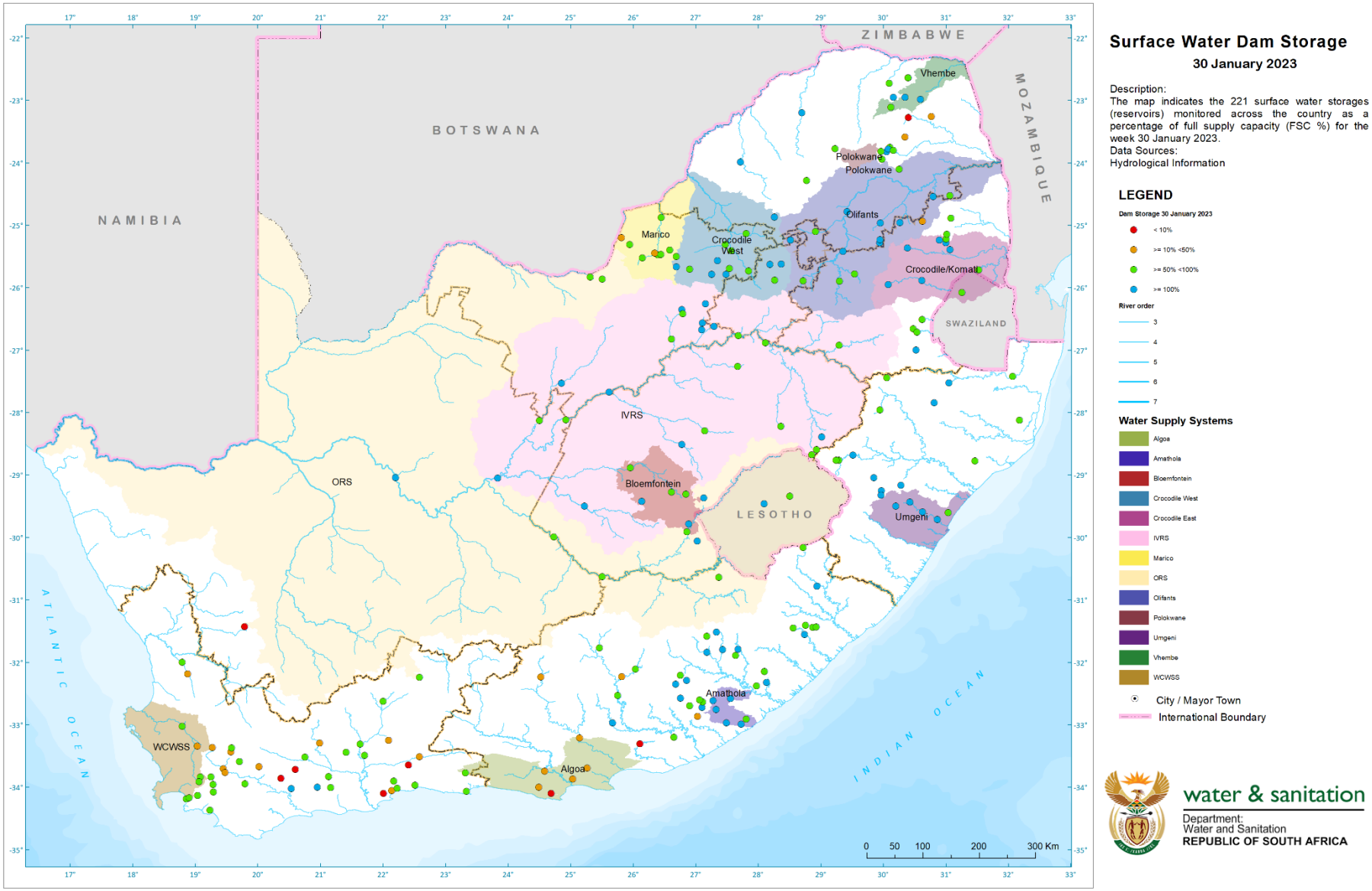
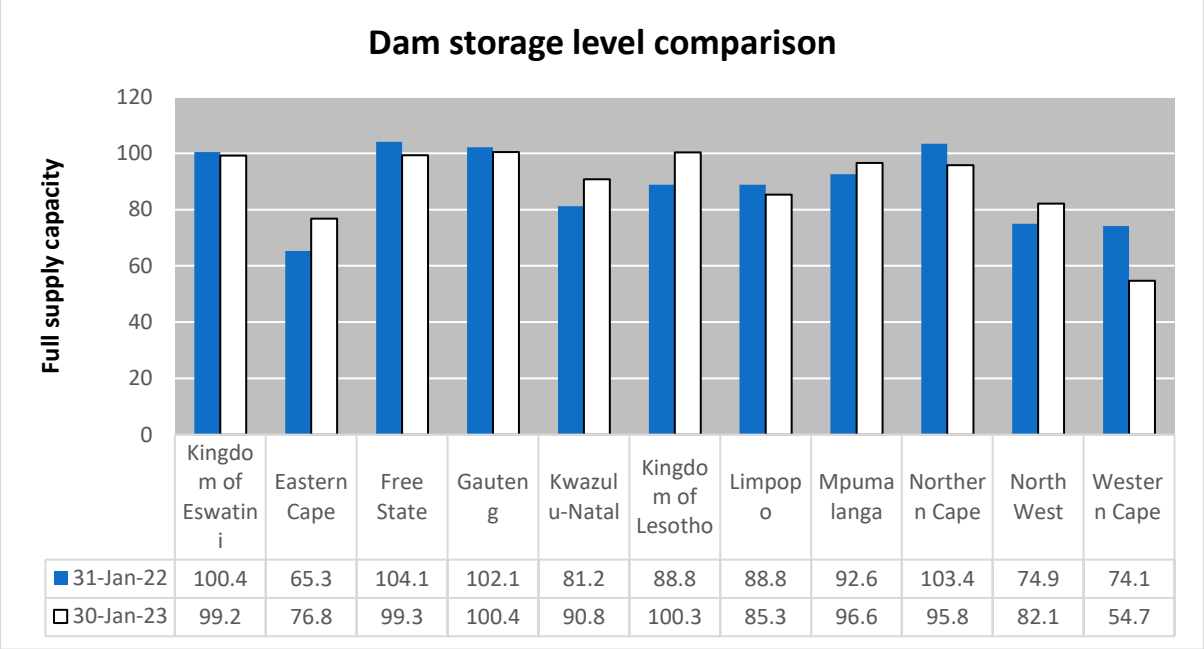


Figure 6: Water Supply System and dam storage – end January 2023

The comparison of dam storage levels for January 2022 and January 2023 is presented in Figure 7 below. Generally, most Provinces are experiencing storage levels equal to or greater than last year's reporting period.



	Kingdom of Eswatini	Eastern Cape	Free State	Gauteng	Kwazulu-Natal	Kingdom of Lesotho	Limpopo	Mpumalanga	Northern Cape	North West	Western Cape
31-Jan-22	100.4	65.3	104.1	102.1	81.2	88.8	88.8	92.6	103.4	74.9	74.1
30-Jan-23	99.2	76.8	99.3	100.4	90.8	100.3	85.3	96.6	95.8	82.1	54.7

Figure 7: Water Storage Levels per Province/Country 2022 vs. 2023

The water storage level comparison per District Municipality is presented in Figure 8. The Uthukela DM, Amathole DM, and Buffalo City DM have experienced a significant increase compared to last year. In contrast, the Cape Winelands DM, West Coast DM, City of Cape Town DM, Overberg DM, OR Tambo DM, Mopani DM, and Vhembe DM have experienced the worst decline in Dam levels compared to last year.

The Dam storage levels in water supply systems and applicable restrictions are presented in Table 3 below. The Algoa Water supply systems (WSS) remain with water restrictions in response to the low water storage levels. Notably, restrictions have been lifted for the Amathole WSS as the system recovered reasonably well since the rainfall event in February/March 2022. Due to infrastructure limitations, permanent restrictions are applicable for the Polokwane and Bloemfontein systems.

Table 3 presents the Water Supply Systems' storage levels and applicable restrictions.

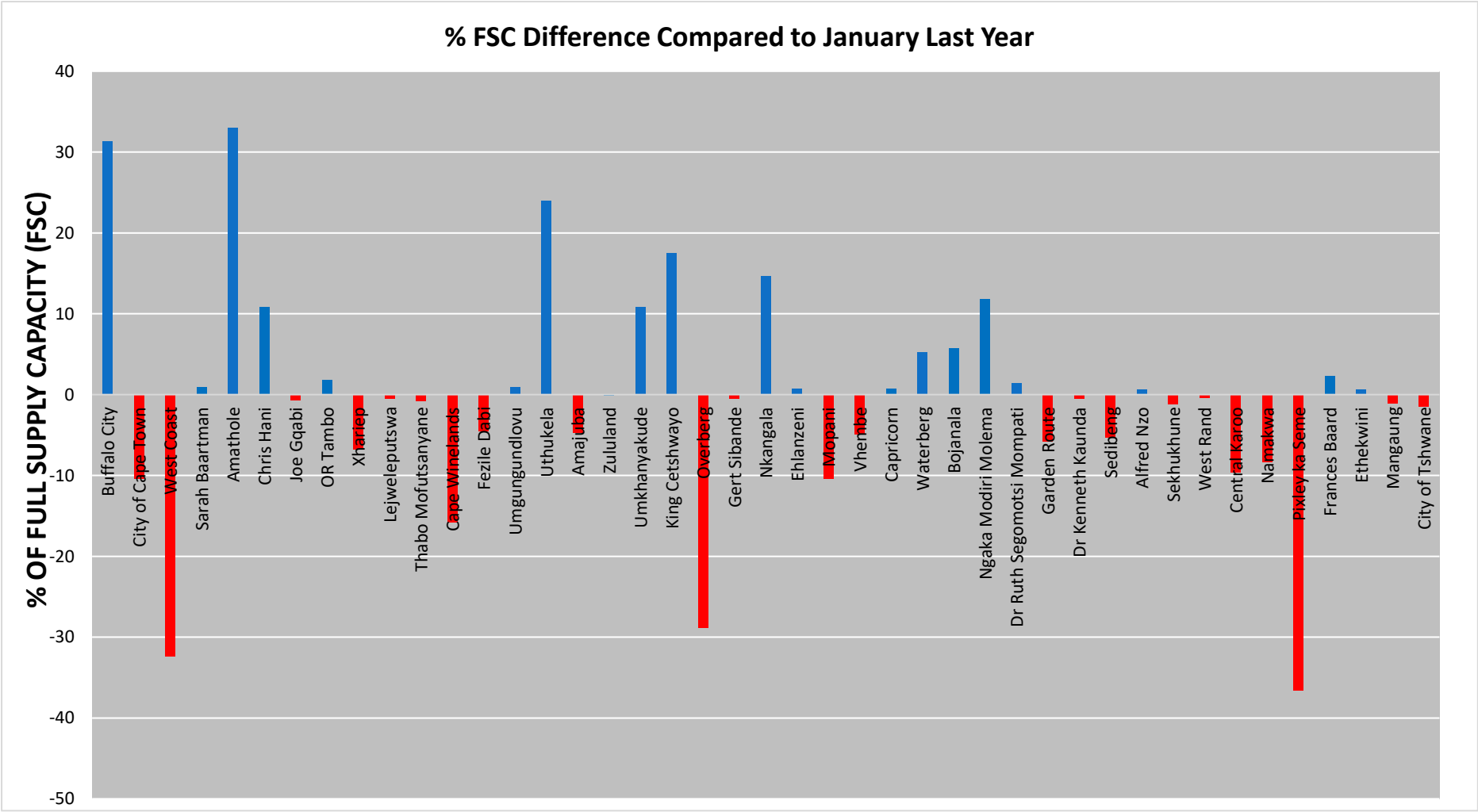


Figure 8: Difference in Water Storage Levels per District Municipality January 2022 vs January 2023

Table 3 : Water Supply Systems storage levels and applicable restrictions

Water Supply Systems/clusters	Cap in $10^6 m^3$ (% FSC)	31 January 2022 (% FSC)	23 January 2023 (% FSC)	30 January 2023 (% FSC)	Comments (systems below 50% in red)
Algoa System	282	18	14.1	13.6	System of 5 dams for Nelson Mandela Bay Metro, Sarah Baartman (SB) DM, Kouga LM and Gamtoos Irrigation: 40% domestic & industrial restrictions (no compliance), 80% irrigation restrictions (Good compliance by Gamtoos IB); Varying levels of restrictions were also recommended for groundwater abstractions – restrictions are generally accepted by water users and were signed off on the 1st June 2022, but yet to be gazetted in the Government Gazette
Amathole System	241	54.5	102.1	100.6	System of 6 dams for Bisho & Buffalo City, East London: No restrictions for 2022/2023, the system recovered reasonably well since the February/March flooding event. Notice yet to be gazetted.
Klipplaat System	57	87	100.3	100.3	System of 3 dams for Queenstown (Chris Hani DM, Enoch Ngijima LM): 10% for domestic and 50% for irrigation use. Restrictions were gazetted on 17 December 2021

Water Supply Systems/clusters	Cap in $10^6 m^3$ (% FSC)	31 January 2022 (% FSC)	23 January 2023 (% FSC)	30 January 2023 (% FSC)	Comments (systems below 50% in red)
Butterworth System	14	51.3	100.1	100.1	Xilinxa Dam and Gcuwa weirs for Butterworth: Domestic restrictions of 20% still in place (Covid and community frustration occurring, further interventions like augmenting river flows from upstream Dams)
Integrated Vaal River System	10 546	97.3	100.4	99.9	System of 14 dams serving Gauteng, Sasol, and ESKOM: No restrictions, the system recovered reasonably well since the February/March flooding event
Polokwane	254	103	100.8	100	System of 7 dams serving Polokwane and surroundings: 20% restrictions on Domestic and Industries
Crocodile West	444	90.7	93.9	91.3	6 dams for Tshwane up to Rustenburg: No restrictions
Luvuvhu	225	102	100.8	100.5	System of 3 dams for Thohoyandou etc: No restrictions
Umgeni System	923	100.5	101.2	101.3	System of 5 dams serving Ethekwini, iLembe & Msunduzi: No restrictions
Cape Town System	889	86.6	63.4	62	System of 6 dams for the City of Cape Town: No restrictions

Water Supply Systems/clusters	Cap in $10^6 m^3$ (% FSC)	31 January 2022 (% FSC)	23 January 2023 (% FSC)	30 January 2023 (% FSC)	Comments (systems below 50% in red)
Bloemfontein	219	100.2	98.8	99.2	System of 3 dams serving Bloemfontein, Botshabelo and Thaba Nchu: A 15% restriction has been recommended on Domestic and Industrial water supply when the system drops below 95%, notice yet to be gazetted.
Crocodile East	159	101	100.5	100.5	Kwena Dam supplies Nelspruit, Kanyamazane, Matsulu, Malelane and Komatipoort areas & Surroundings:No Restrictions
Orange	7 996	105.1	98.8	98.3	Two dams serving parts of the Freestate, Northern and Eastern Cape Provinces: No restrictions
uMhlathuze	301	82.3	99.8	99.8	Goedertrouw Dam supplies Richards Bay, Empangeni Towns, small towns, surrounding rural areas, industries and irrigators, supported by lakes and transfer from Thukela River: No restrictions

The Middle Letaba Dam

The Middle Letaba Dam (capacity 184.2 million m^3) is in Letaba Catchment (Letaba Supply System), on the Middle Letaba River (Limpopo Province). It was commissioned by DWAF in 1984 with the purpose of supplying water for irrigation, domestic, stock water demands and to serve as a support for the Nsami Dam. The domestic supply component from this dam was 11.7 million m^3/a, at a 1 in 50-year assurance and 41 million m^3/a for 4 555 ha of the irrigation at a 1 in 20-year assurance (DWA, 2015). However, the domestic/urban demand has grown to 13.3 million m^3/a, while there has been no irrigation allocation since 2008 due to the low level of water supply assurance (DWA, 2015: DWS, 2021). The dam supplies water to 3 Water Treatment Plants (WTPs) (Mapuve WTP, Middle Letaba WTP and Nsami WTP) which all supply water to Giyani, but due to persistent low dam levels, submersible pumps are now used to pump water from the dam into the canals feeding the WTPs, the combined demand for WTPs and the actual supply is shown in Figure 9.

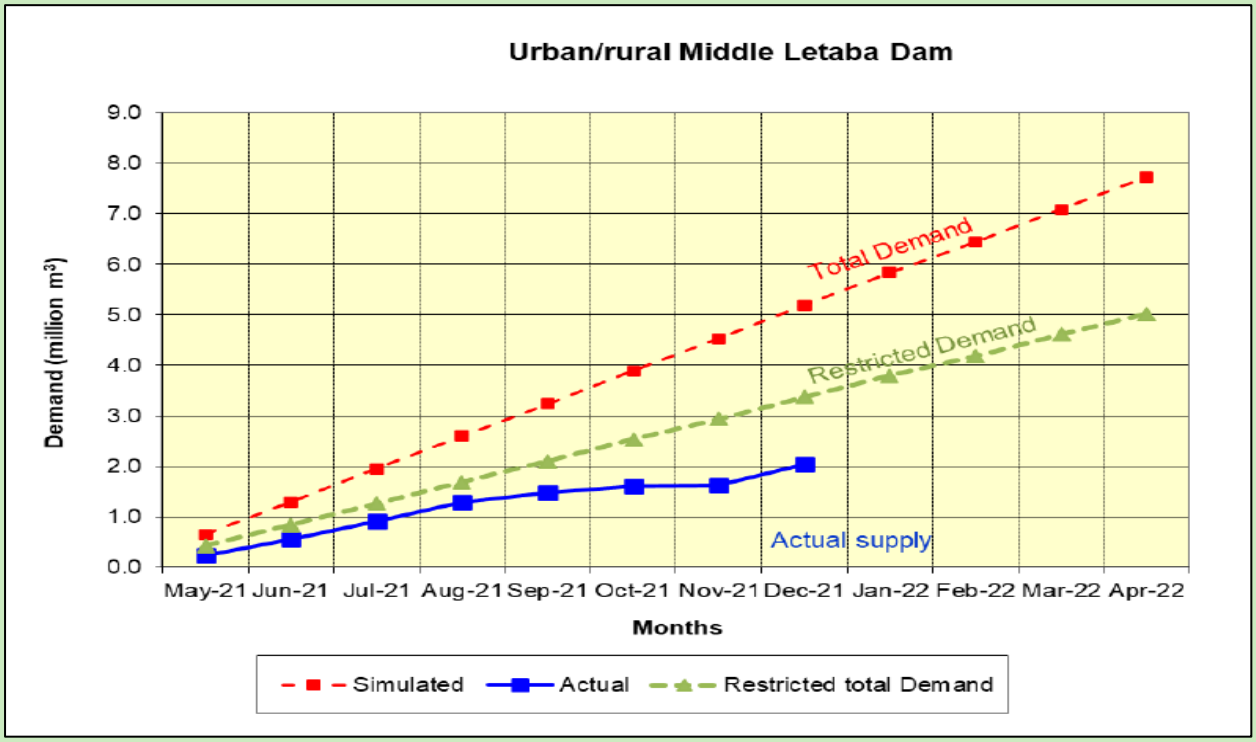


Figure 9: Middle Letaba Dam WTP 2021/22 water use.

The Middle Letaba Dam has failed on several occasions reaching a dead pool level i.e. (1992 (0.69%), 1994/95 (0.69%) and 2012 (0.64%)) as displayed in Figure 10 below. However, in all instances, the dam managed to recover within a short period i.e. (03/12/2012 (**0.69**); 31/01/2013 (49.2)). The Dam is currently critically low with a volume of surface water in storage at **0.7%** of FSC (as of 31 January 2023). The long-term dam storage data (1986-2023) (Figure 10) shows that the dam last reached a 100% storage volume on the ***20th of March 2000*** where the observed storage volume was 116%**.** The storage volume of the dam has been below 30% since ***17/11/2015*** and the storage volume data (Figure 10) demonstrates that a continuous decline in storage began in ***July 2014.***

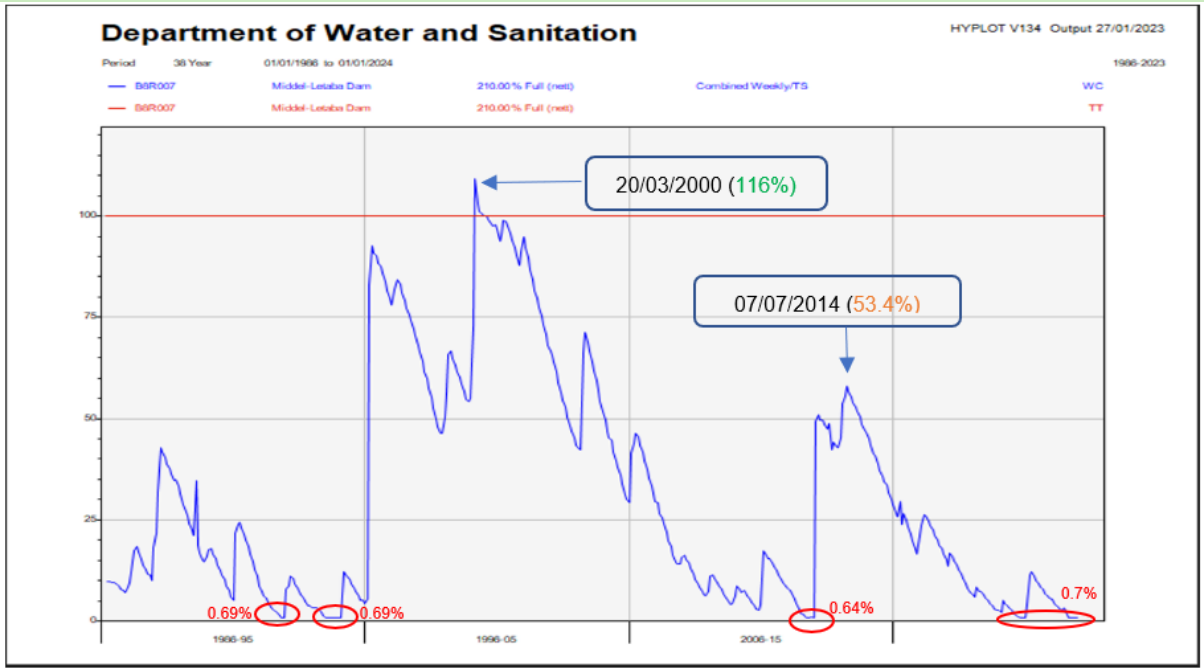


Figure 10: Middle Letaba Dam monthly time series graph for the period (January 1986- January 2023).

Several intervention plans have been implemented to reduce the demand on the dam, which included using Nandoni Dam located in Livuvhu Catchment, to supply areas that were previously supplied through the Middle Letaba Dam as well as constructing a pipeline from Nandoni Dam which conveys raw water from Nandoni Dam to the treatment plant at Nsami Dam, which replaced that which conveyed water from the Middle Letaba Dam.

A case of unlawful water use upstream of the dam, which is affecting the Middle Letaba River flow and consequently the inflow of water into the dam is currently being investigated and handled by DWS (Limpopo) office.

Acid Mine Drainage (AMD)

AMD occurs when abandoned mines are exposed to water, especially due to inundation by groundwater that then fills up the voids left by mining operations and liberates sulphate and metals from the exposed rock into the water. If the water levels rise and reach the surface, the polluted water can decant into the surface water resources, reducing the pH levels of the receiving water and contaminating it with high levels of sulphate and metals.

In the past, it was a common practice to abandon mines without implementing adequate pollution control measures after mineral extraction was no longer financially viable. There was little concern for the environment since mine closures before the promulgation of the Water Act of 1956 were not subject to legislative closure requirements. The possible risks of AMD include contamination of shallow groundwater and surface water if mines decant contaminated water. This can affect the suitability of the water resources required for domestic, agricultural and other uses. Sulphate in combination with low pH (acidic) conditions are used as indicators of Acid Mine Drainage (AMD).

The Development of the Rehabilitation Management Guidelines for South African Water Resources

The Department is currently developing the Rehabilitation Management Guidelines (RMG) for South African Water Resources. The development of RMG draws from policies and strategies within the Department such as the National Water Resource Strategy (NWRS), National Water and Sanitation Master Plan (NWSMP), Integrated Water Quality Management Policy and Strategy (IWQM) and Disaster Management which all call for proactive measures to mitigate water resource quality degradation and promote rehabilitation and restoration to maintain water ecosystem function.

Five themes for the Rehabilitation Guidelines have been identified and categorized into Rivers, Wetlands, Estuaries, Dams and Lakes, and Groundwater as per the Act. The development of the RMG for Estuaries and Groundwater is currently underway. The progress of the RMG development is illustrated in Figure 11 below.

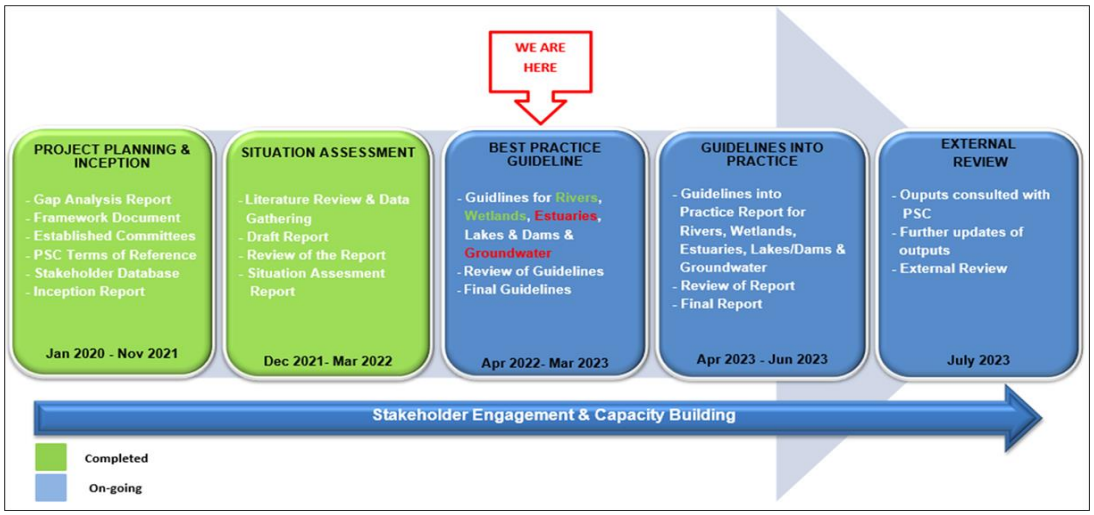


Figure 11: Progress on the development of Rehabilitation Management Guidelines.

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National State of Water Report:
www.dws.gov.za/Projects/National%20State%20of%20Water%20Report/default.aspx

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Glossary

Term	Definition
Acid Mine Drainage	The formation and movement of highly acidic water rich in heavy metals. This acidic water forms through the chemical reaction of surface water and shallow subsurface water with rocks that contain sulfur-bearing minerals, resulting in sulfuric acid.
Areal average rainfall	The estimated average depth of rainfall over a defined area. Expressed in depth of water (mm).
Cumecs	Cubic metres per second (m^3/s)
Effective rainfall	The rainfall available to percolate into the soil or produce river flow. Expressed in depth of water (mm).
FSC	Full Storage Capacity
Flood Alert/Flood Warning	Three levels of warnings may be issued by the South African Weather Service and the Department of Water and Sanitation. Flood Alerts indicate flooding is possible. Flood Warnings indicate flooding is expected. Severe Flood Warnings indicate severe flooding.
Groundwater	The water found in an aquifer below the ground.
Reservoir gross capacity	The total capacity of a reservoir.
Reservoir live capacity	The capacity of the reservoir that is normally usable for storage to meet established reservoir operating requirements. This excludes any capacity not available for use (e.g. storage held back for emergency services, operating agreements or physical restrictions). May also be referred to as 'net' or 'deployable' capacity.
SPI	Standardized Precipitation Index (SPI) is a widely used index to characterise meteorological drought on a range of timescales. On short timescales, the SPI is closely related to soil moisture, while at longer timescales, the SPI can be related to groundwater and reservoir storage.
Water Supply System	A typical town/city water supply system constitutes of a gravity/pumping based transmission and distribution system from local/distant water source with needed water treatment system.

References

Department of Water Affairs (DWA), 2015. Development of Reconciliation Strategy for the Luvuvhu and Letaba Water Supply System: Final Reconciliation Strategy. Department of Water Affairs, Pretoria, South Africa.

Department of Water and Sanitation (DWS), 2021. The development of operating rules for water supply and drought management for stand-alone dams/schemes (Northern Cluster): *Luvuvhu/Letaba Water Supply – January 2022 System Performance Review***.** Department of Water and Sanitation, Pretoria, South Africa.