

August 2023



MONTHLY STATE OF WATER BULLETIN

WATER IS LIFE - SANITATION IS DIGNITY



water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA



Overview

Most parts of the country receive rainfall during the warm summer months - October to March, while the rain in August is primarily concentrated in the winter rainfall region along the Western and Eastern Cape coastlines. Some parts of the Western Cape received more than 120 mm of rainfall in August 2023. The SAWS multi-model rainfall forecast predicts above-normal rainfall for most of the country during early spring, with below-normal rain expected over the western parts of the country during mid-spring and late spring. SAWS also forecast above-normal minimum and maximum temperatures during this period.

As of 31 August 2023, 32% of dams were either full or spilling (above 100% of FSC), while 1%, which included the Middle Letaba Dam in Limpopo and the Nuwejaars Dam in the Eastern Cape were at critically low levels. The Algoa WSS storage level had been critically low in the previous months; winter rainfalls have significantly improved storage in the system, and as of 31 August 2023, storage in the system had progressively improved to 48.5% of FSC at the end of August, up from 40.1% in the previous month. The comparison of dam storage levels for August 2022 and August 2023 demonstrates that all provinces have storage levels equal to or greater than the previous year's at the same time of reporting.

Water quality in the three WMAs of the Integrated Vaal River System (IVRS) is deteriorating at an alarming rate, with the primary challenges identified being salinity impacts from Acid Mine Drainage or mine-impacted water and eutrophication. The Department and Stakeholders in the IVRS are engaged in a programme of developing and implementing water quality management action plans as one of the intervention measures.

Rainfall

The distribution of total monthly rainfall across the country from April to August 2023 is presented in Figure 1. The country is experiencing a rainfall season in the Western parts of the country, with reasonable amounts of rain falling along the coastlines of the Eastern and Northern Cape Provinces. Areas that recorded rainfall amounts of >120 mm for the month include parts of the Western Cape.

The monthly rainfall anomalies expressed as a percentage of normal rainfall are presented in Figure 2. Above-normal rainfalls for August were experienced in North West and Limpopo Provinces. The multi-model rainfall forecast indicates above-normal rainfall for most parts of the country during early spring (Aug-Sep-Oct), with below-normal rainfall predicted over the western parts during mid-spring (Sep-Oct-Nov) and late spring (Oct-Nov-Dec) (SAWS, 2023). Minimum and maximum temperatures are expected to be mostly above normal countrywide for the forecast period. The below-normal rainfall predicted over the western parts is expected to significantly impact surface water storage. This will require multiple interventions, which will include water consumption behavioural change.

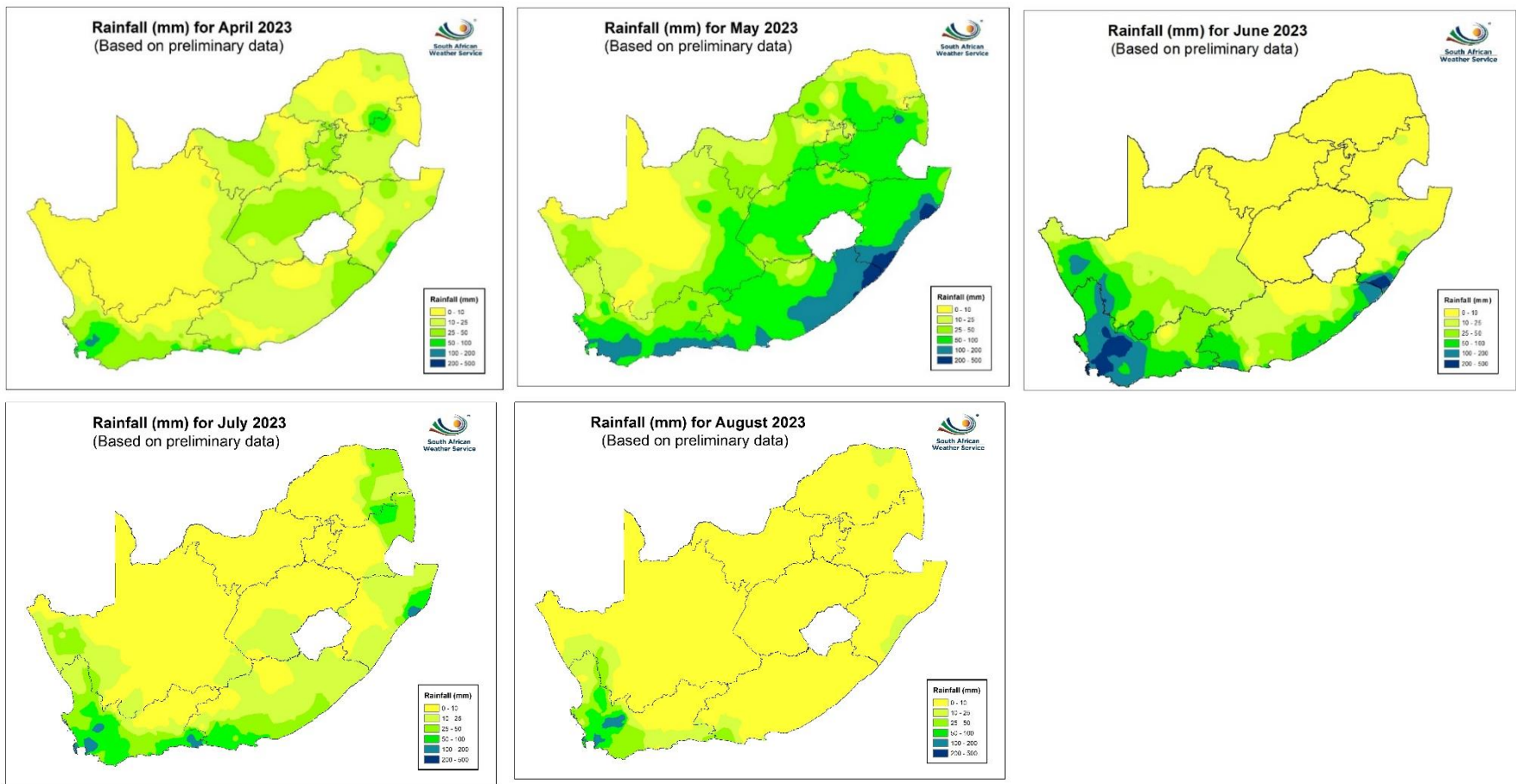


Figure 1: Winter season monthly rainfall distribution from April to August 2023 (Source: SAWS <https://www.weathersa.co.za/home/historicalrain>)

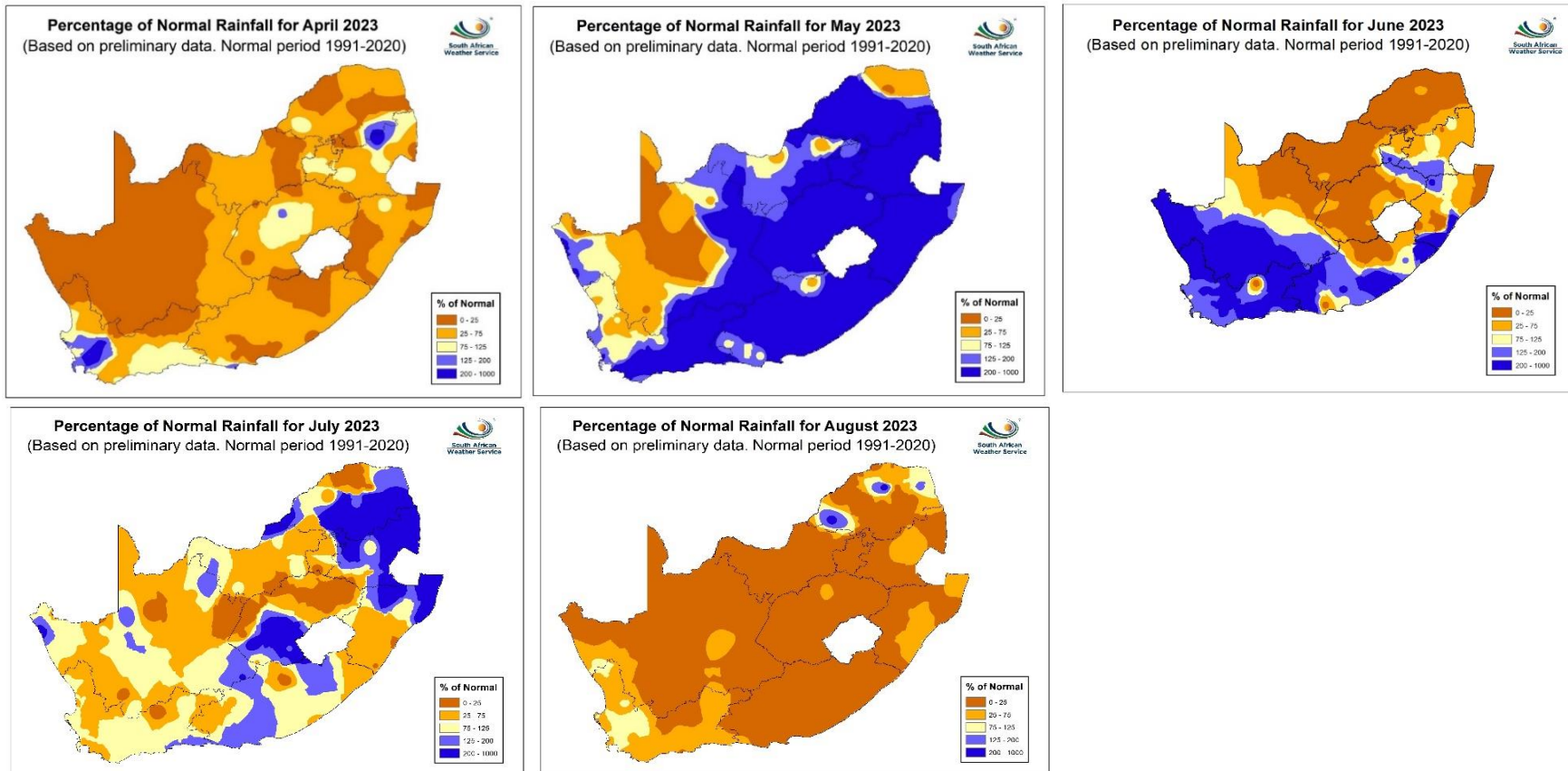


Figure 2: Winter season Percentage of normal rainfall from April to August 2023. Blue shades are indicative of above-normal rain, and the darker yellow shades of below-normal rainfall (Source: SAWS <https://www.weathersa.co.za/home/historicalrain>)

National Dam Water Storage

The 24-month (long-term) Standardised Precipitation Index (SPI) for July 2023 is presented in Figure 3. Based on the SPI, the two Cape Provinces (Eastern Cape and Northern Cape) have been affected by drought in the last 24 months. The Northern Cape Province is the only province with areas experiencing extreme drought, while the Eastern Cape Province is moderately impacted.

In terms of the national surface water storage, **32%** of the dams are either full or spilling (**above 100% of FSC**), while **1%** are at critically low storage volumes. The country's five largest dams were between 84.3% FSC (Pongolapoort Dam) and 102.2% FSC (Bloemhof Dam) for the last week of August 2023.

Dams at critically low storage levels (<10% of FSC) are given in Table 1. These dams are within the Eastern Cape and Limpopo Provinces.

Table 1: Dams below 10% Full Supply Capacity (August 2023)

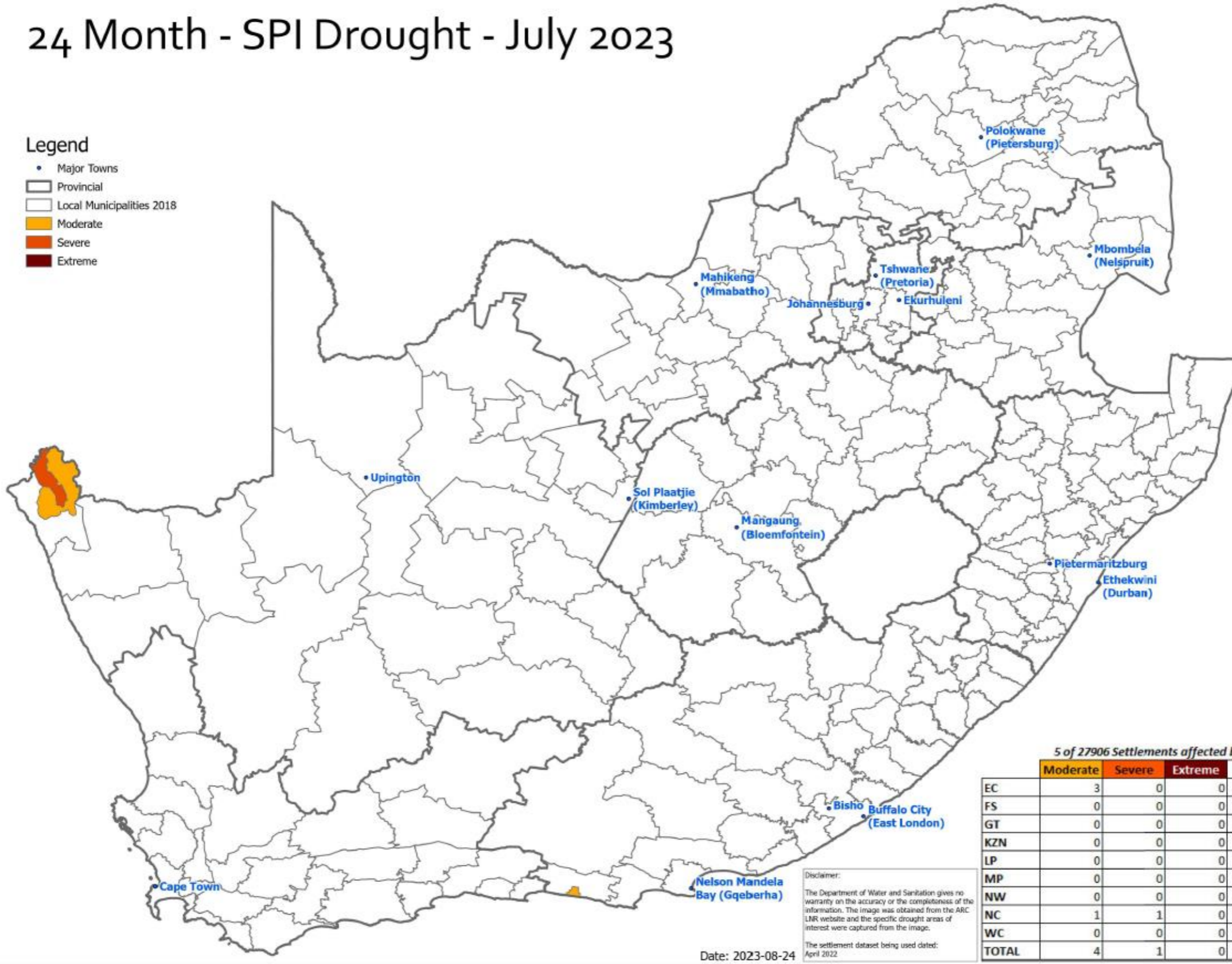
Reservoir	River	Province	28 August 2023 (% FSC)
Middle-Letaba Dam	Middle-Letaba River	Limpopo	4.2
Nuwejaars Dam	Nuwejaarspruit River	Eastern Cape	4.3

The Sarah Baartman (44.8%) is the only District Municipality with below 50% FSC for 31 August 2023. Figure 4 illustrates the dam storage's spatial distribution and status for 28 August 2023.

24 Month - SPI Drought - July 2023

Legend

- Major Towns
- Provincial
- Local Municipalities 2018
- Moderate
- Severe
- Extreme



5 of 27906 Settlements affected by drought

	Moderate	Severe	Extreme	Total	Settlements
EC	3	0	0	3	9088
FS	0	0	0	0	319
GT	0	0	0	0	2515
KZN	0	0	0	0	9465
LP	0	0	0	0	2675
MP	0	0	0	0	735
NW	0	0	0	0	1042
NC	1	1	0	2	545
WC	0	0	0	0	1522
TOTAL	4	1	0	5	27906

Disclaimer:
The Department of Water and Sanitation gives no warranty on the accuracy or the completeness of the information. The image was obtained from the ARC LNR website and the specific drought areas of interest were captured from the image.
The settlement dataset being used dated: April 2022

Date: 2023-08-24

Figure 3: 24-months Spatial Precipitation Index – July 2023 (DWS - NIWIS - Disaster Management - (dwa.gov.za))

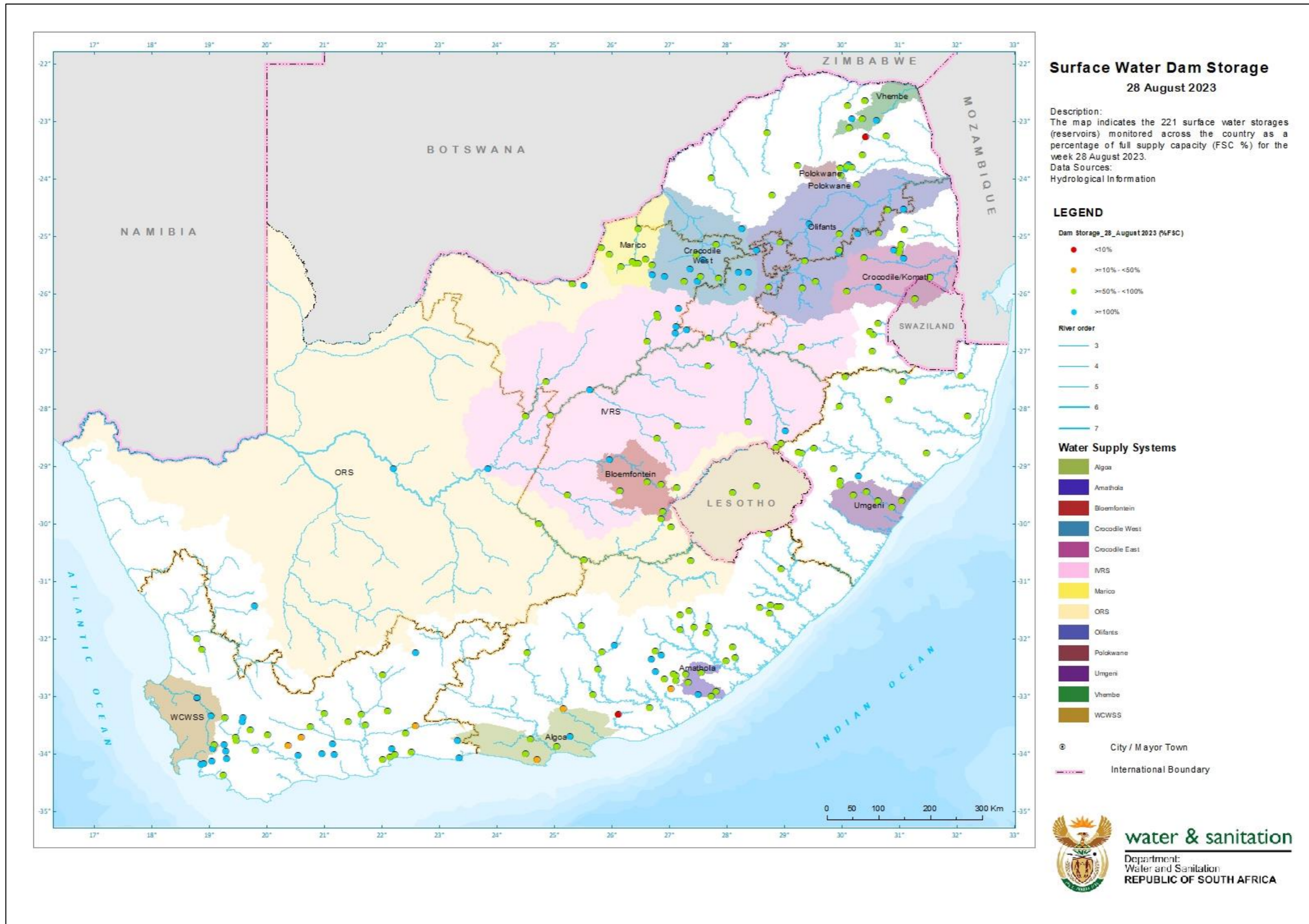


Figure 4: Water Supply System and dam storage – end of August 2023

The comparison of dam storage levels for August 2022 and August 2023 is presented in Figure 5 below. Most Provinces are experiencing storage levels equal to or greater than last year at the same time of the reporting period.

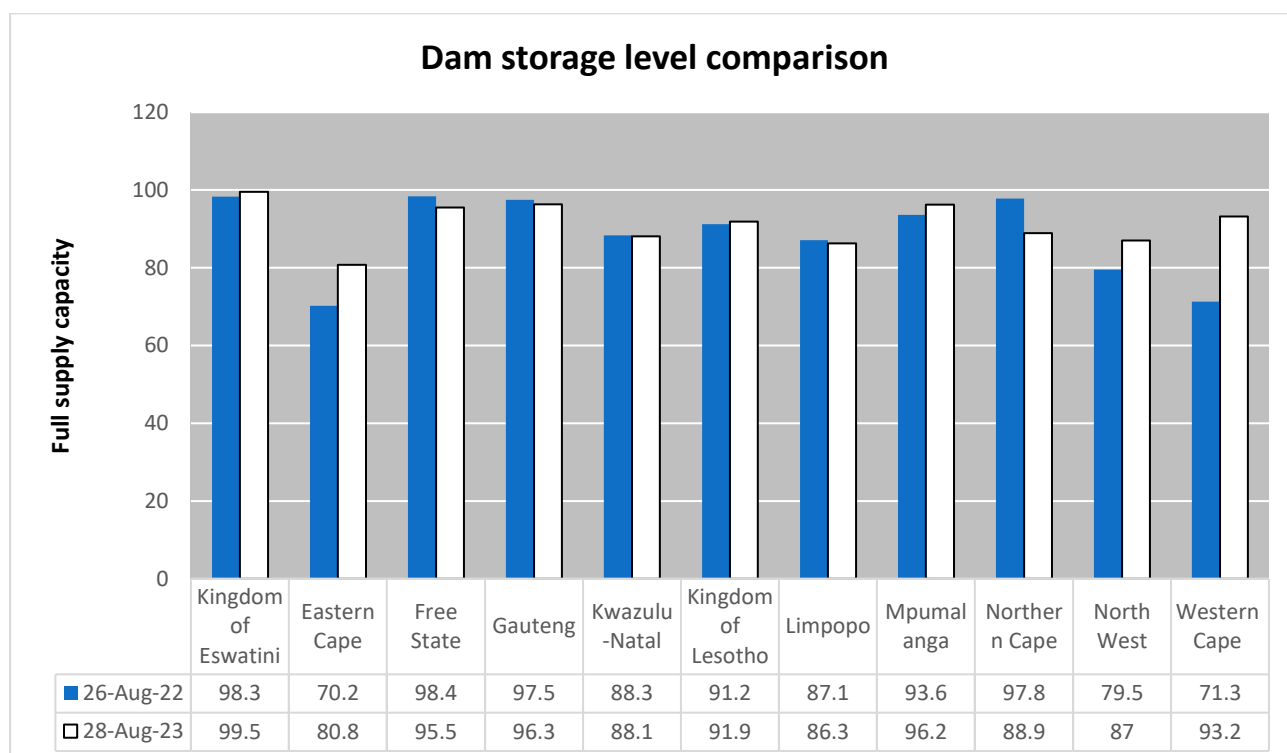


Figure 5: Water Storage Levels per Province/Country August 2022 vs. August 2023.

The water storage levels comparison per District Municipalities (DM) is presented in Figure 6. Namakwa DM, Sarah Baartman DM, Central Karoo DM, Garden Route, Central Karoo DM, Cape Winelands DM, West Coast DM, and Overberg DM have experienced a significant increase compared to last year. In contrast, the Umgundlovu DM, Lejweleputswa DM, Sedibeng DM, Gert Sibande DM, Amajuba DM, Fezile Dabi DM, Capricon DM. Pixley ka Seme DM and Francis Baard DM 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 2. The Algoa Water Supply System remains with water restrictions in response to the low surface water storage levels. Notably, restrictions have been lifted for the Amatole Water Supply System as it had recovered well after the rainfall events in February/March 2023. **Due to infrastructure limitations, permanent restrictions are applicable for the Polokwane and Bloemfontein Water Supply Systems.**

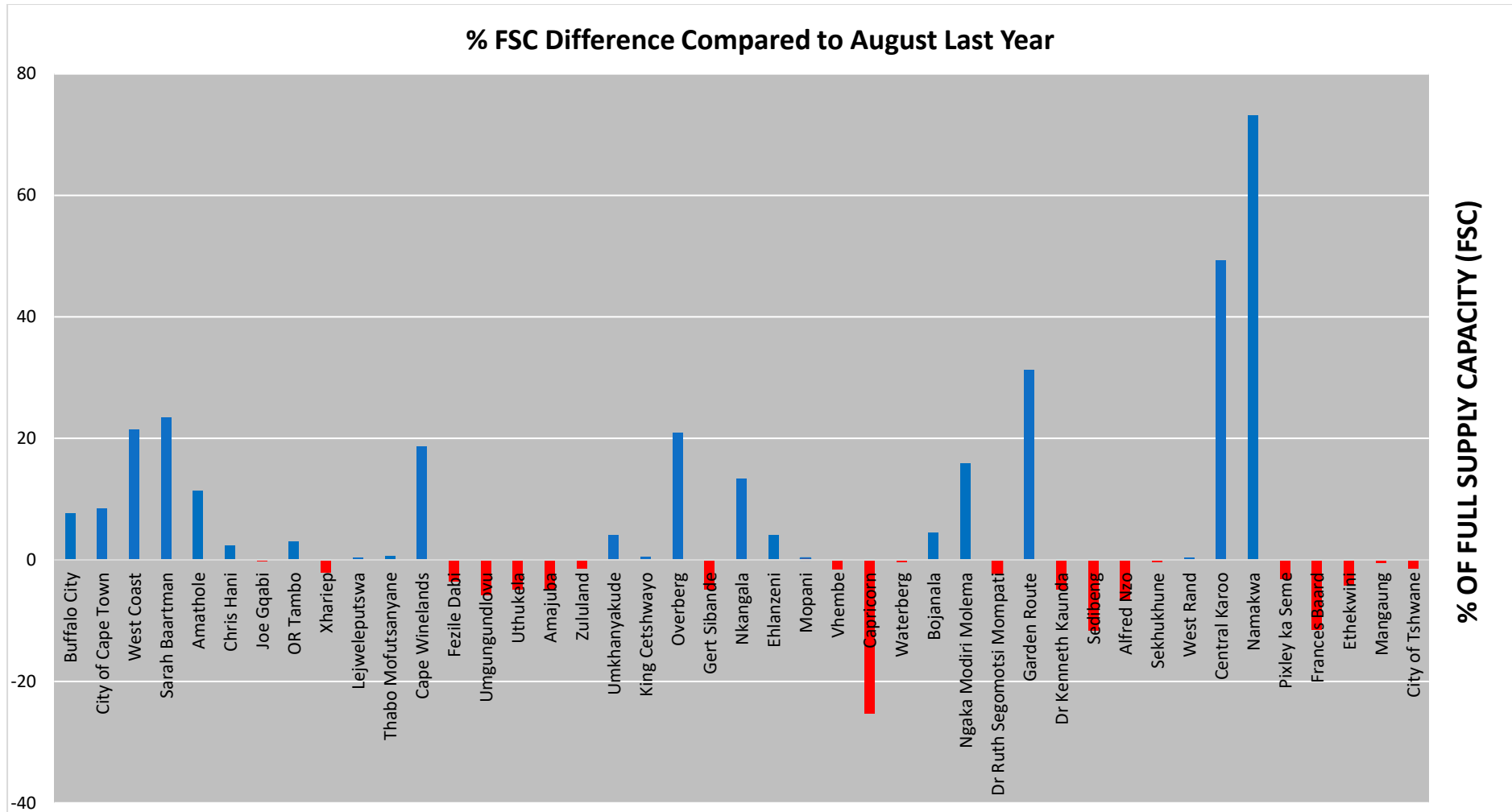


Figure 6: Difference in Water Storage Levels per District Municipality August 2022 vs August 2023

Table 2: Water Supply Systems storage levels and applicable restrictions

Water Supply Systems/clusters	Cap in 10 ⁶ m ³ (% FSC)	28 August 2022 (% FSC)	21 August 2023 (% FSC)	28 August 2023 (% FSC)	Comments (systems below 50% in red)
Algoa System	282	16.3	47.7	48.5	<u>System of 5 dams for Nelson Mandela Bay Metro, Sarah Baartman (SB) DM, Kouga LM and Gamtoos Irrigation:</u> 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 1 June 2022, but yet to be gazetted in the Government Gazette
Amatole System	241	81.3	98.8	98.3	<u>System of 6 dams for Bisho & Buffalo City, East London:</u> No restrictions for 2022/2023, the system recovered reasonably well since the February/March flooding event. Notice yet to be gazetted.
Klipplaat System	57	99.9	100.2	100.1	<u>System of 3 dams for Queenstown (Chris Hani DM, Enoch Ngijima LM):</u> 10% for domestic and 50% for irrigation use. Restrictions were gazetted on 17 December 2021
Butterworth System	14	98.9	98	97.8	<u>Xilinx Dam and Gcuwa weirs for Butterworth:</u> 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	97.5	94.7	94.2	<u>System of 14 dams serving Gauteng, Sasol, and ESKOM:</u> No restrictions, the system recovered reasonably well since the February/March flooding event

Water Supply Systems/clusters	Cap in 10 ⁶ m ³ (% FSC)	28 August 2022 (% FSC)	21 August 2023 (% FSC)	28 August 2023 (% FSC)	Comments (systems below 50% in red)
Polokwane	254	100.3	99.5	99.6	<u>System of 7 dams serving Polokwane and surroundings:</u> 20% restrictions on Domestic and Industries
Crocodile West	444	96.6	99.2	98.4	<u>6 dams for Tshwane up to Rustenburg:</u> No restrictions
Luvuvhu	225	100.9	100.1	99.9	<u>System of 3 dams for Thohoyandou etc:</u> No restrictions
Umgeni System	923	97.1	91.7	91	<u>System of 5 dams serving Ethekwini, iLembe & Msunduzi:</u> No restrictions
Cape Town System	889	83.9	99.7	103.4	<u>System of 6 dams for the City of Cape Town:</u> No restrictions
Bloemfontein	219	97.1	97.1	96.6	<u>System of 3 dams serving Bloemfontein, Botshabelo and Thaba Nchu:</u> 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	99.3	99.5	99	<u>Kwena Dam supplies Nelspruit, Kanyamazane, Matsulu, Malelane and Komatipoort areas & Surroundings:</u> No Restrictions
Orange	7 996	97.6	96.5	95.5	<u>Two dams serving parts of the Freestate, Northern and Eastern Cape Provinces:</u> No restrictions
uMhlathuze	301	99.2	99.8	99.7	<u>Goedertrouw Dam supplies Richards Bay, Empangeni Towns, small towns, surrounding rural areas, industries and irrigators, supported by lakes and transfer from Thukela River:</u> No restrictions

A Synopsis of Water Quality Challenges in the Integrated Vaal River System (IVRS)

The IVRS is located at the headwaters of the Orange-Vaal River Basin and, therefore, is important to shared water resources as the basin is shared with Lesotho, Namibia, and Botswana (Figure 7). The IVRS comprises the primary drainage region C within the water management drainage regions of South Africa and spans three water management areas (WMAs): the Upper, Middle and parts of Lower Vaal. Water quality is declining at an alarming rate in the three IVRS WMAs due to catchment water use, as presented in Figure 7. The primary issues have been identified as **Salinity Impacts** resulting from Acid Mine Drainage (AMD) caused mainly by mining activities.

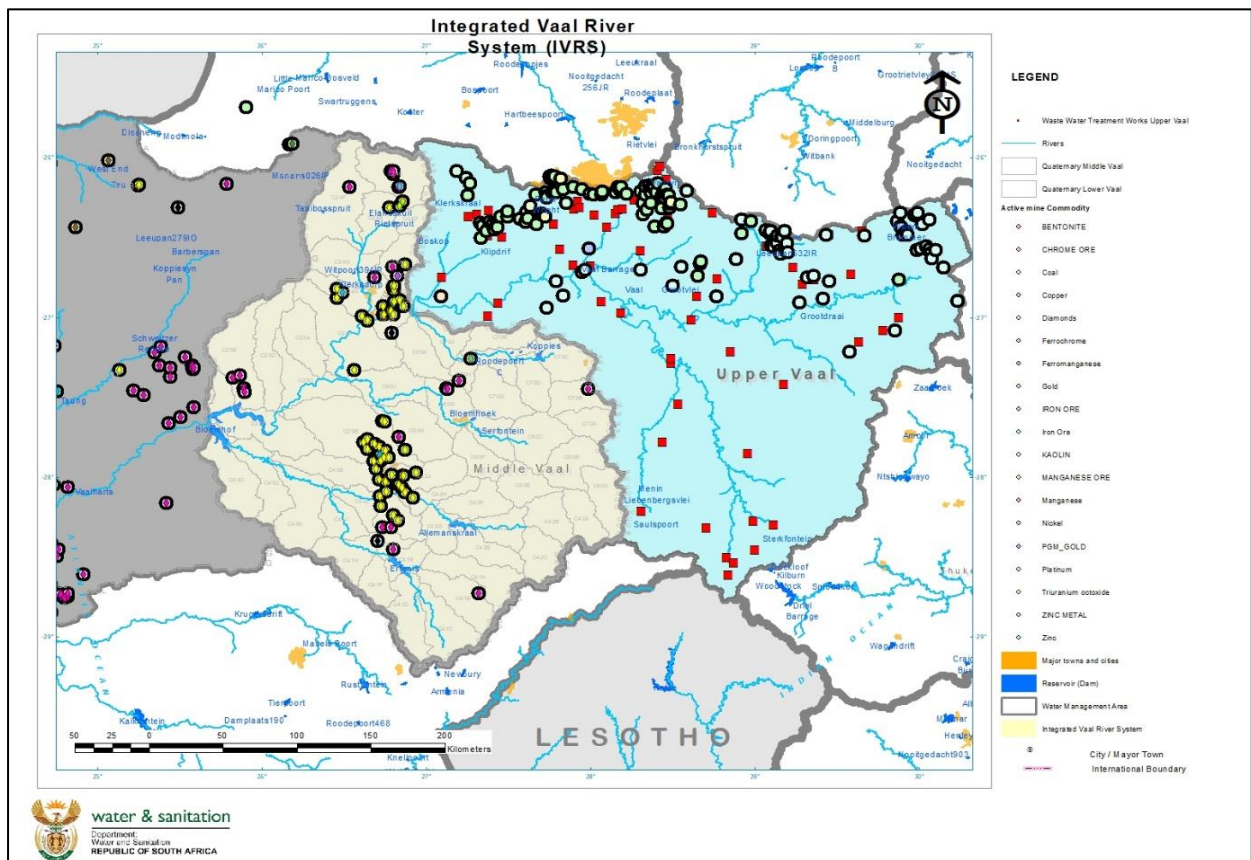


Figure 7: Integrated Vaal River System water uses.

The effects of salt loading in the IVRS are visible at the Vaal Barrage, where Dissolved Major salt concentrations are managed through dilution releases from the Vaal Dam. The Department operates the Vaal River System to dilute water at the Vaal Barrage to ensure that water at the Vaal Barrage does not exceed a TDS concentration of 600 mg/L. The Barrage receives highly saline mine-impacted water discharges into the Klip and Suikerbosrand Rivers from the Central and Eastern Basins neutralisation plants, respectively. Dilution entails releasing low TDS concentration water from the Vaal Dam into the Barrage to dilute mine water discharges, ensuring that the TDS concentration at the Barrage fulfils the concentration criteria. Figure 8 shows the TDS concentration at the Vaal Barrage outflow weir as of 31 August 2023.

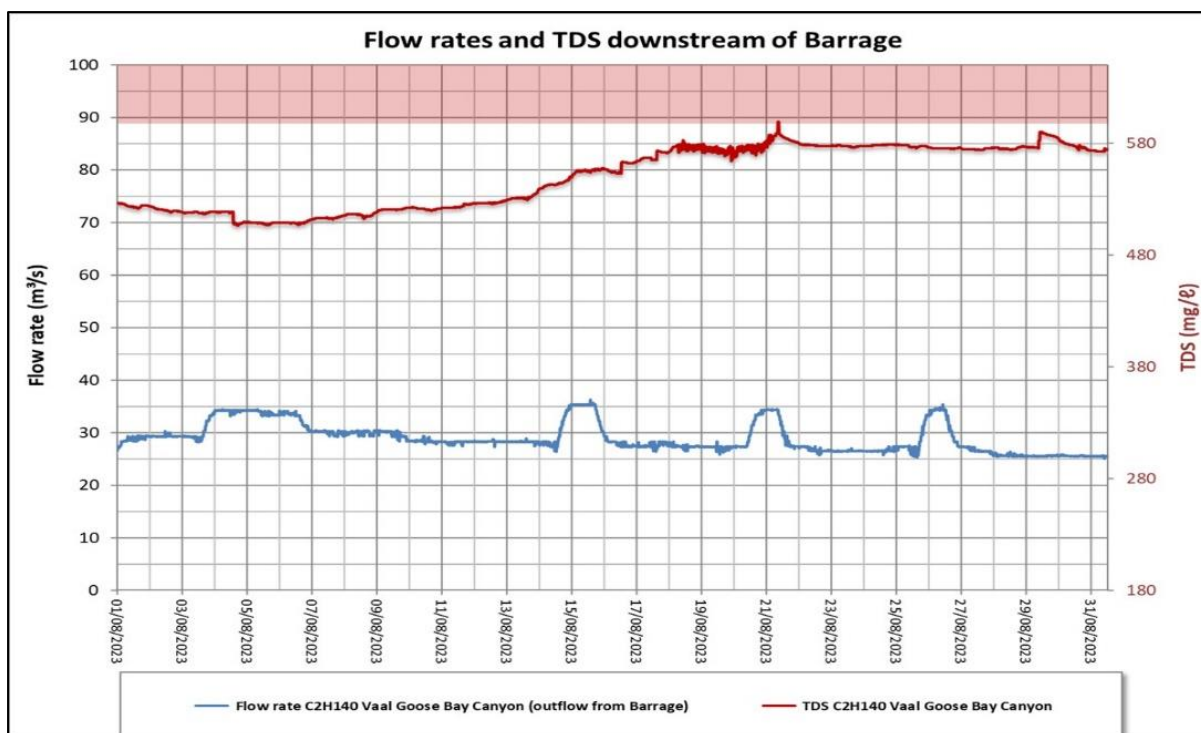


Figure 8: TDS concentration and flow volume at Vaal Barrage as of 31 August 2023.

The WMAs in the IVRS have also been reported to be experiencing eutrophication. This is due to nutrients in the river system from poorly treated sewage treatment effluents, industrial effluents, and agricultural runoff. DWS (2023a) reported that based on Total Phosphates data from 2022, the Bloemhof and Vaal Dams were eutrophic (Figure 9). The Grootdraai Dam was the only mesotrophic dam, with an annual median TP of 0.029 mg/L in 2022. Peaks in TP were commonly observed for all dams in late summer, corresponding with significant rainfall and thus transportation of non-point pollution into the water resource, and in mid-winter, which may imply lower pollution dilution (DWS, 2023a). **The Department and stakeholders are currently developing water quality management action plans to address the water quality challenges in the system.**

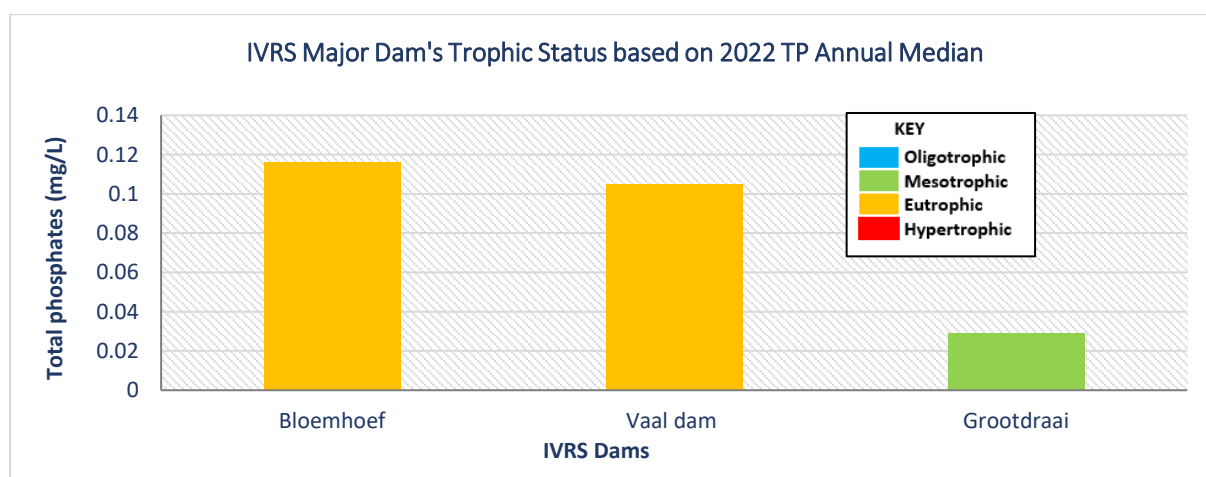


Figure 9: Trophic Status of the 3 major Dams of IVRS based on 50th percentile of observed TP in 2022.

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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
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)
Climate Variability	A prominent aspect of our climate is its variability. This variability ranges over many time and space scales and includes phenomena such as El Niño/La Niña, droughts, multi-year, multi-decade, and even multi-century changes in temperature and precipitation patterns.
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
MAP	Mean Annual Precipitation
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 and Sanitation (DWS), 2023a. The Development and Implementation of Water Quality Management Action Plans for the Integrated Vaal River System: Status Quo Analysis Report. Report No. IVRSWQMAP 30/06/23/002. Pretoria, South Africa.

Department of Water and Sanitation (DWS), 2023b. Analytical Services Quality Policy Manual, Revision 21, Functional Analysis of RQIS Sub-directorates: Resource Quality Monitoring. PowerPoint presentation by Elijah Mogakabe, 11 November 2022.