

November 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, from October to April, except for the southwestern parts, which receive most of its rain from March to October. Below-normal rainfall was experienced for most parts of the country in November. Much-below-normal rainfall was received in the Western Cape, Northern Cape, and northwestern parts of Limpopo Province. The South African Weather Service (SAWS) multi-model rainfall forecast indicates above-normal rainfall for the north-east of the country during Nov-Dec-Jan (NDJ), Dec-Jan-Feb (DJF), and Jan-Feb-Mar (JFM) with below normal rainfall predicted for the central and southwestern parts of the country.

As of 27 November 2023, 22% of the dams being monitored were either full or spilling (above 100% of Full Storage Capacity - FSC), while 1%, which included the Middle Letaba Dam in Limpopo, remained at critically low levels. The Algoa Water Supply System (WSS) storage level had been critically low in the previous months; winter rainfalls have significantly improved storage in the system, and as of 27 November 2023, storage in the system had progressively improved to 78.5% of FSC, up from 61.9% in the previous year. The comparison of dam storage levels for November 2022 and November 2023 demonstrates that all provinces have storage levels equal to or greater than the previous year's at the same reporting time.

Rainfall

The distribution of total monthly rainfall across the country for October to November 2023 is presented in Figure 1. Rainfall occurred mainly in the western side of the country during the reporting period. Over Mpumalanga province, rainfall totals exceeded 100 mm in various locations, while rainfall in the KwaZulu Natal, North-West, Gauteng, and Limpopo ranged between 50 mm to about 100 mm.

The monthly rainfall anomalies expressed as a percentage of normal rainfall are presented in Figure 2. Below-normal rainfall was experienced for most parts of the country in November. Much-below-normal rainfall was received in the Western Cape, Northern Cape, side of the country, and northwestern parts of Limpopo Province.

The South African Weather Service (SAWS) multi-model rainfall forecast indicates above-normal rainfall for the north-east of the country during Nov-Dec-Jan (NDJ), Dec-Jan-Feb (DJF), and Jan-Feb-Mar (JFM) with below normal rainfall predicted for the central and southwestern parts of the country. Predictions still favour above-normal rainfall conditions over the northeastern parts of the country, even with an El Niño in place. Minimum and maximum temperatures are expected to be mostly above-normal countrywide for the forecast period.

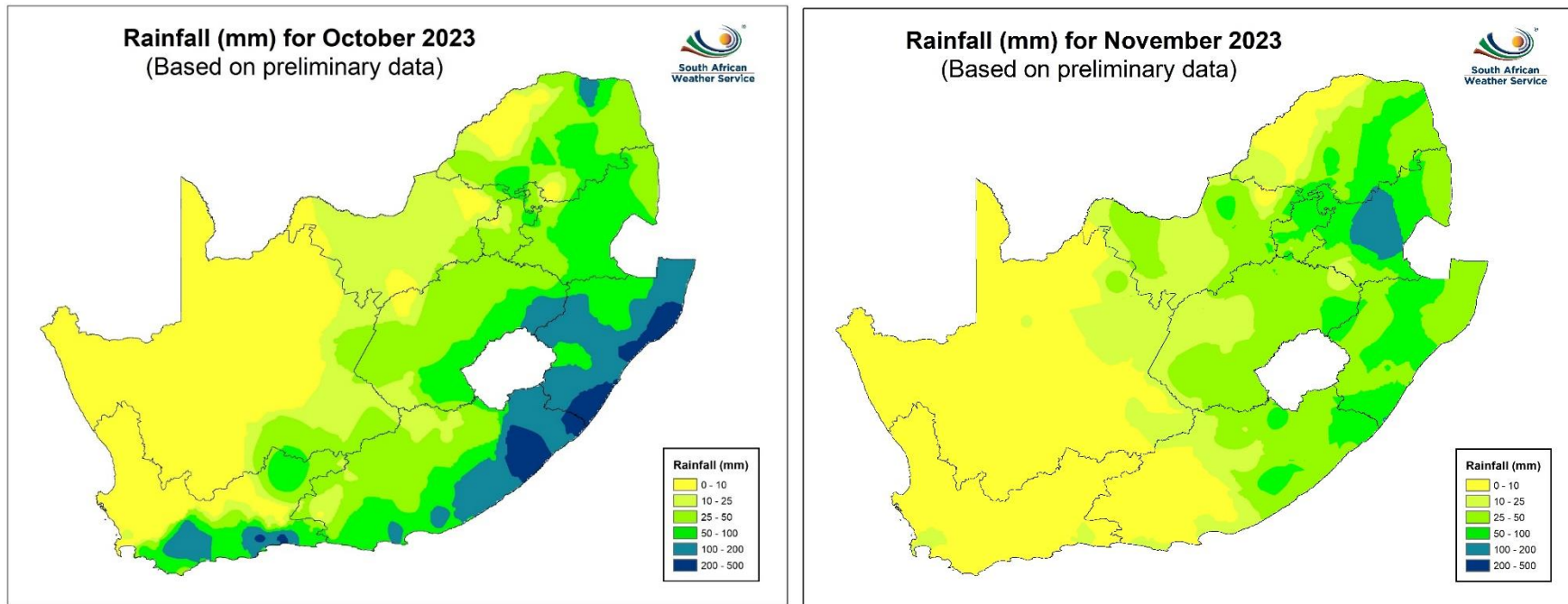


Figure 1: Summer season monthly rainfall distribution for October to November 2023 (Source: SAWS <https://www.weathersa.co.za/home/historicalrain>)

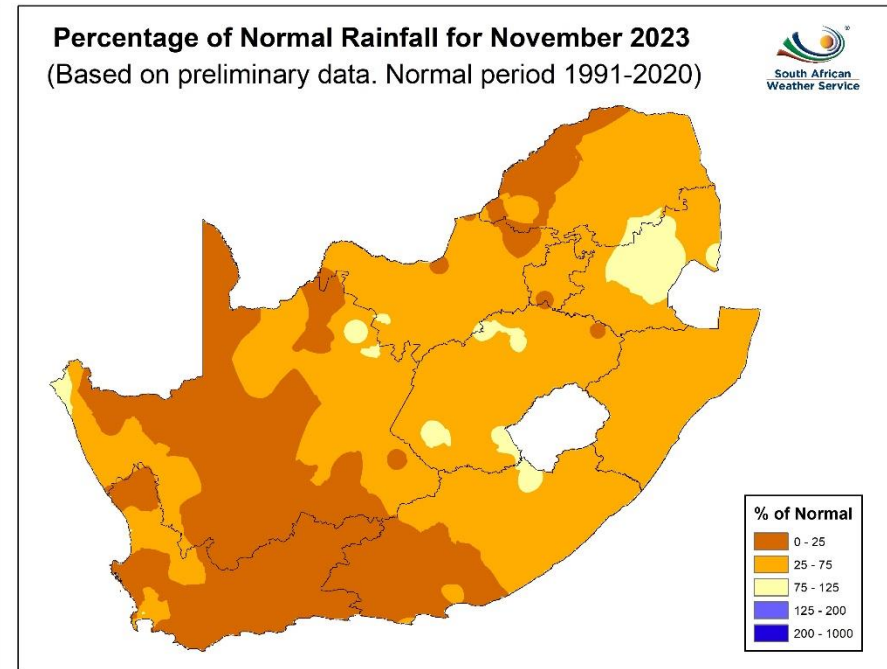
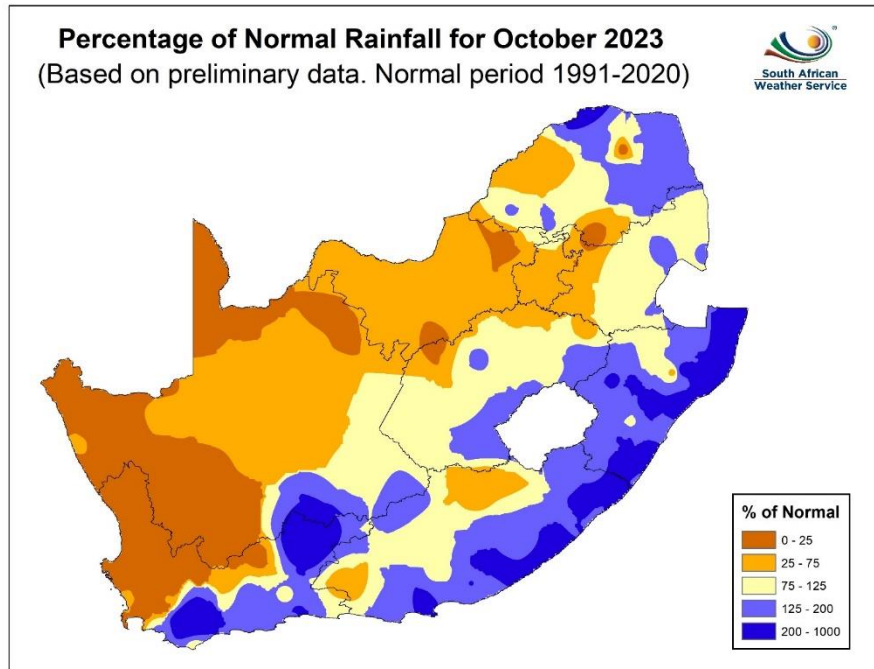


Figure 2: Summer season Percentage of normal rainfall for October to November 2023. Blue shades are indicative of above-normal rain, and the darker yellow shades of below-normal rainfall (Source: SAWS <https://www.weathersa.co.za/home/historicalrain>)

National Dam Water Storage

The 24-month (long-term) Standardised Precipitation Index (SPI) for October is presented in Figure 3. Based on the SPI, the Northern Cape has been affected by drought in the last 24 months, with some areas in the province experiencing severe drought.

The dam storage's spatial distribution and status for 27 November 2023, presented in Figure 4, shows that **22%** of the national dams are either full or spilling (**above 100% of FSC**), and **72%** have storage ranging between 50 and 100% of FSC, while **1%** are at critically low storage volumes. The country's five largest dams storage were the Bloemhof Dam (86%), Vaal Dam (69.9%), Gariep Dam (88.3 %), Vanderkloof Dam (89.5%), and Pongolapoort Dam (72.2%) for the last week of November 2023. The national dams at critically low storage levels (<10% of FSC) are given in Table 1.

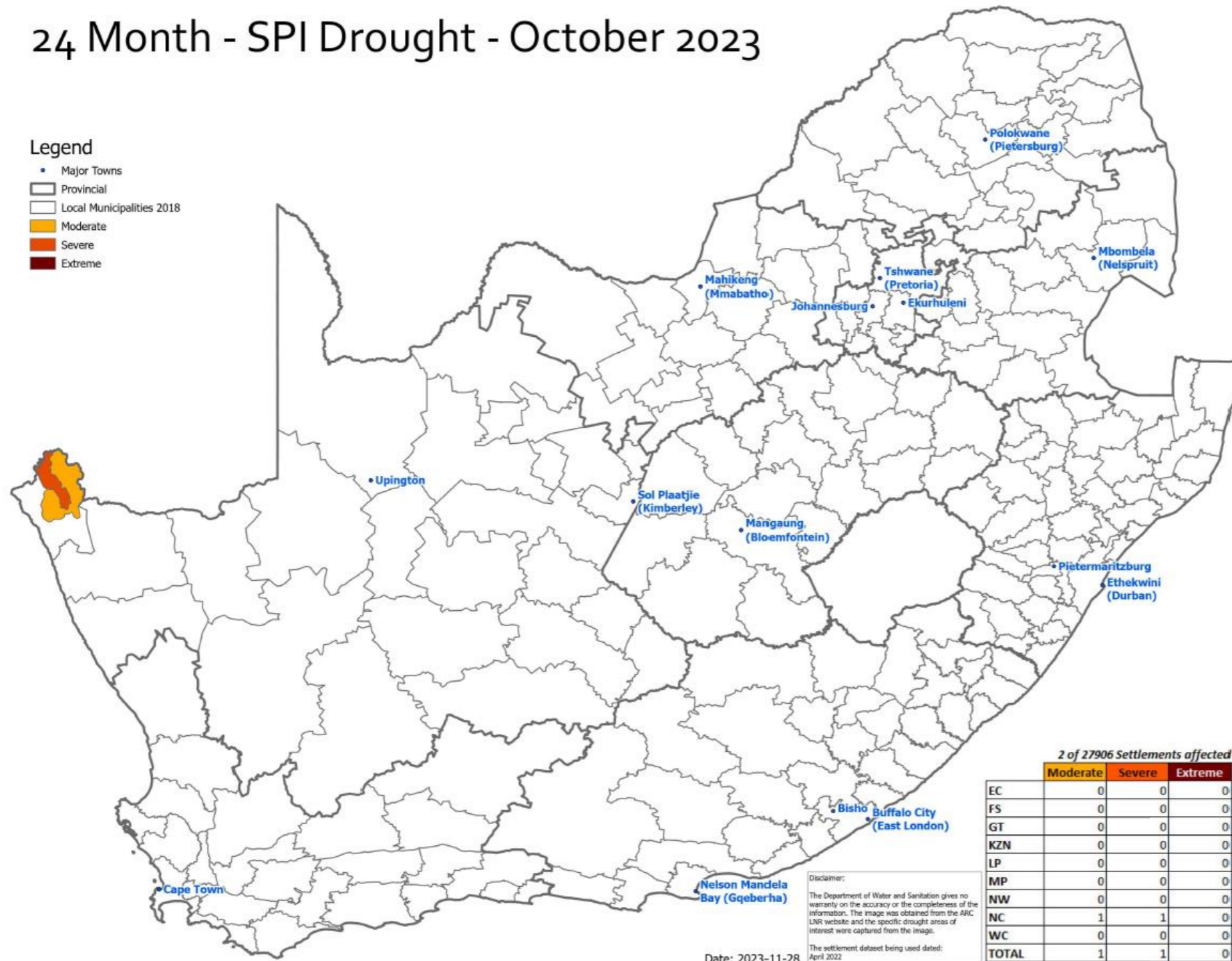
Table 1: Dams below 10% Full Storage Capacity (November 2023)

| Reservoir | River | Province | 27 November 2023 (% FSC) |
|-------------------|---------------------|----------|--------------------------|
| Middle-Letaba Dam | Middle-Letaba River | Limpopo | 3.2 |
| Glen Alpine Dam | Mogalakwena River | Limpopo | 7 |

24 Month - SPI Drought - October 2023

Legend

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



2 of 27906 Settlements affected by drought

| | Moderate | Severe | Extreme | Total | Settlements |
|--------------|----------|----------|----------|----------|--------------|
| EC | 0 | 0 | 0 | 0 | 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 | 1 | 1 | 0 | 2 | 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 ABC LNR website and the specific drought areas of interest were captured from the image.
The settlement dataset being used dated: April 2022

Date: 2023-11-28

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

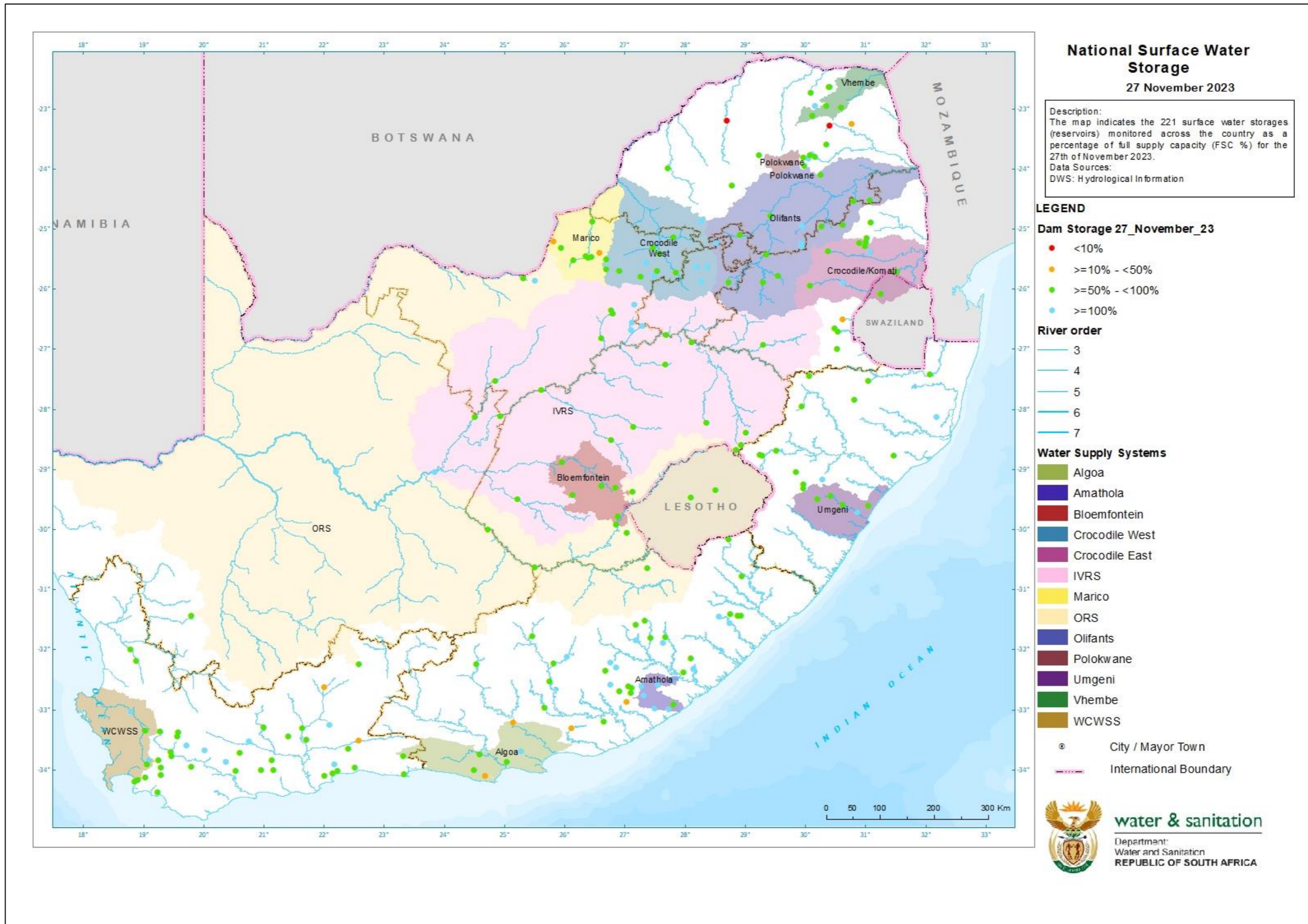


Figure 4: Water Supply System and Dam Storage – end of November 2023

The comparison of dam storage levels for November 2022 and November 2023 is presented in Figure 5 below. Most Provinces are experiencing storage levels lower than last year during the same reporting period, while the Eastern Cape, North-West, and Western Cape Provinces had higher surface storage than last year during the same reporting period.

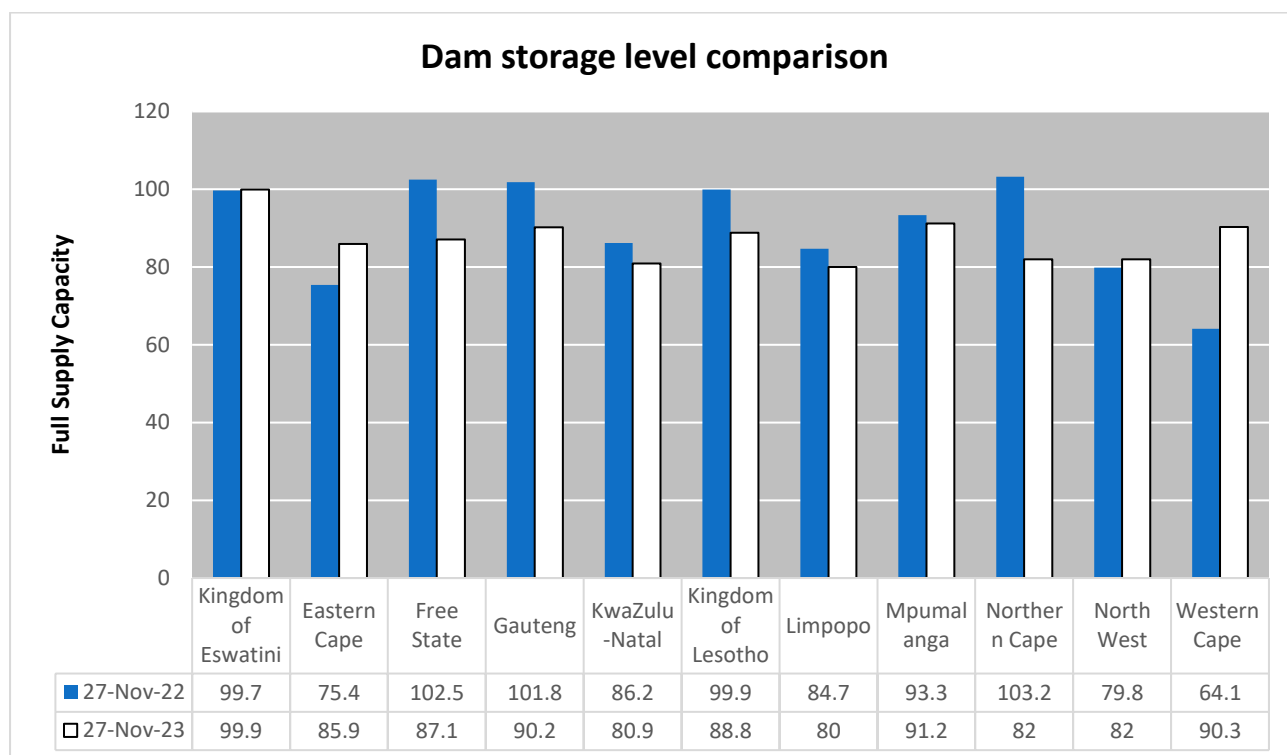


Figure 5: Water Storage Levels per Province/Country November 2022 vs. November 2023.

The comparison of water storage levels per District Municipality (DM) is presented in Figure 6. Namakwa DM, Sarah Baartman DM, Central Karoo DM, and Garden Route DM have experienced a significant increase compared to last year. In contrast, the uMgungundlovu DM, Zululand DM, Sedibeng DM, Alfred Nzo DM, Amajuba DM, Capricorn DM, Fezile Dabi DM, City of Tshwane DM, Vhembe DM, Pixley ka Seme DM and Francis Baard DM experienced a decline in dam levels compared to last year.

The Dam storage levels in water supply systems and applicable restrictions are given in Table 2. The Algoa WSS decision date was changed from 1 June to 1 November, and a new annual operating analysis for the decision date was performed, resulting in an update of water restrictions that will be in effect from 01 November 2023 to 31 October 2024. These restrictions are yet to be gazetted.

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.

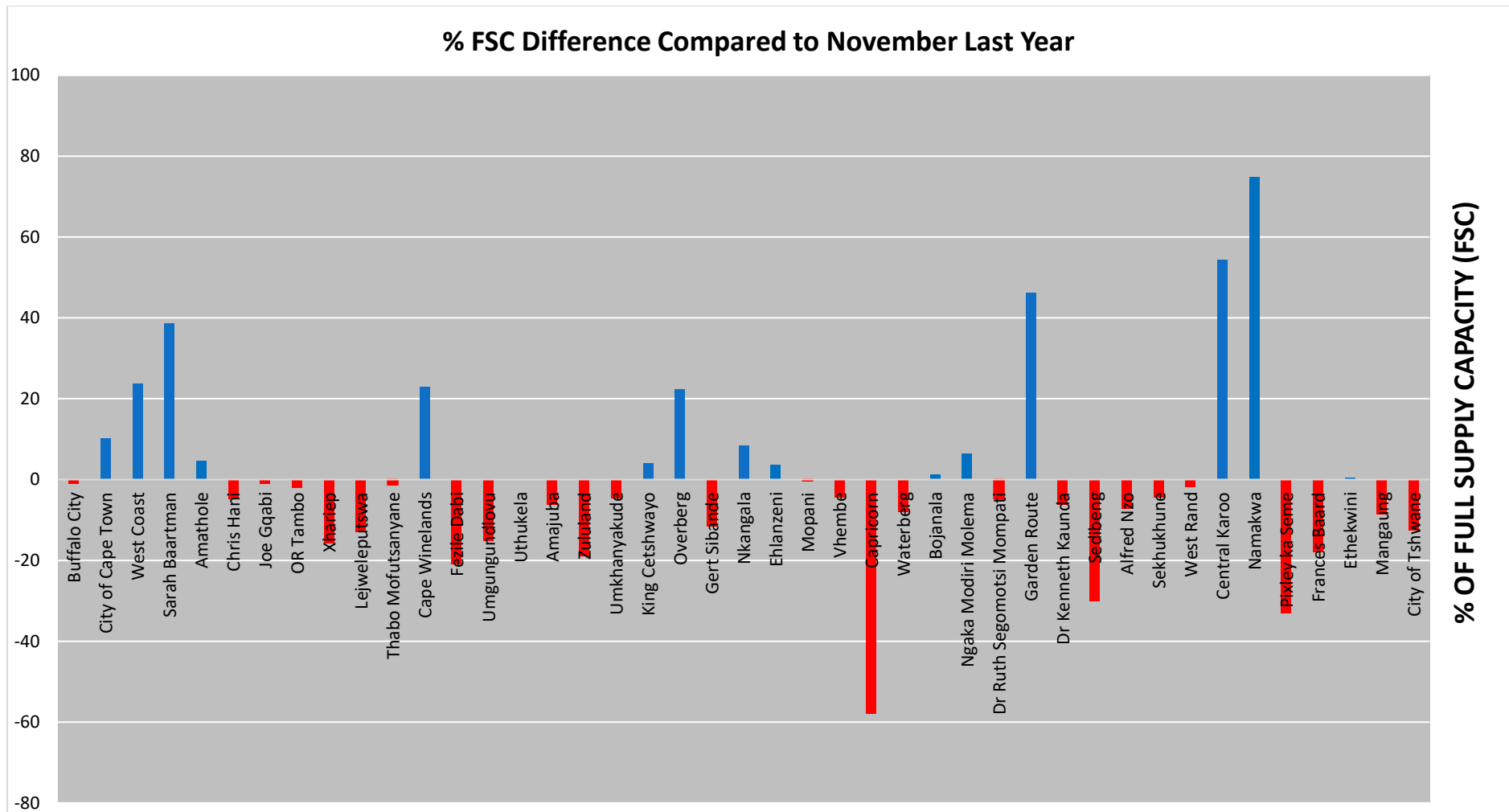


Figure 6: Difference in Water Storage Levels per District Municipality November 2022 vs November 2023

Table 2: Water Supply Systems storage levels and applicable restrictions

| Water Supply Systems/clusters | Cap in 10 m ^{6 3} (% FSC) | 27 November 2022 (% FSC) | 20 November 2023 (% FSC) | 27 November 2023 (% FSC) | Comments (systems below 50% in red) |
|-------------------------------|------------------------------------|--------------------------|--------------------------|--------------------------|---|
| Algoa System | 282 | 17.1 | 79.2 | 79 | System of 5 dams for Nelson Mandela Bay Metro, Sarah Baartman (SB) DM, Kouga LM and Gamtoos Irrigation: Water restrictions imposed as of 1 November 2023, Urban (Domestic and Industrial) = 5%, Irrigation = 15% for Kouga Subsystem and Urban (Domestic and Industrial) = 40%, Irrigation = 50% for the Kromme Subsystem, these are yet to be gazetted |
| Amatole System | 241 | 96.4 | 101.1 | 100.7 | System of 6 dams for Bisho & Buffalo City, East London: No restrictions for 2023/2024 |
| Klipplaat System | 57 | 100.3 | 100.3 | 100.2 | 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 |
| Butterworth System | 14 | 100.2 | 99.9 | 99.5 | Xilinx 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 | 99.4 | 86.6 | 86.4 | System of 14 dams serving Gauteng, Sasol, and ESKOM: No restrictions, the system recovered reasonably well since the February/March flooding event |

| Water Supply Systems/Clusters | Cap in 10 ⁶ m ³ (% FSC) | 20 November 2022 (% FSC) | 13 November 2023 (% FSC) | 20 November 2023 (% FSC) | Comments (systems below 50% in red) |
|-------------------------------|---|--------------------------|--------------------------|--------------------------|---|
| Polokwane | 254 | 101.4 | 92.1 | 91.6 | <u>System of 7 dams serving Polokwane and surroundings:</u> 20% restrictions on Domestic and Industries |
| Crocodile West | 444 | 93.1 | 95.7 | 95.5 | <u>6 dams for Tshwane up to Rustenburg:</u> No restrictions |
| Luvuvhu | 225 | 99.5 | 95.8 | 95.3 | <u>System of 3 dams for Thohoyandou etc:</u> No restrictions |
| Umgeni System | 923 | 99.3 | 87.7 | 87.3 | <u>System of 5 dams serving Ethekwini, iLembe & Msunduzi:</u> No restrictions |
| Cape Town System | 889 | 74.8 | 97.2 | 96 | <u>System of 6 dams for the City of Cape Town:</u> No restrictions |
| Bloemfontein | 219 | 99.6 | 92.9 | 92.4 | <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 | 88 | 83.6 | 82.9 | <u>Kwena Dam supplies Nelspruit, Kanyamazane, Matsulu, Malelane and Komatipoort areas & Surroundings:</u> No Restrictions |
| Orange | 7 996 | 104.9 | 89.5 | 88.7 | <u>Two dams serving parts of the Freestate, Northern and Eastern Cape Provinces:</u> No restrictions |
| uMhlathuze | 301 | 95.7 | 100.2 | 99.8 | <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 Extreme Weather Conditions

KZN Floods- October 2023

On 21-22 October 2023, the KwaZulu-Natal Province experienced heavy rainfall that was caused by a cut-off low-pressure system (the equatorward displacement of a low-pressure system at high altitudes) that developed over the southern Atlantic Ocean, south-west of the Western Cape. The system evolved quickly and was encroaching on the Western Cape's west coast as early as the evening of 20 October 2023. The system later intensified and moved to the Eastern Cape and KwaZulu-Natal, where heavy rainfall caused a flood. SAWS had issued an orange level six warning for heavy and disruptive rainfall along the KZN coast and adjacent interior, with a special watch for the southern coast and a level 2 warning for severe thunderstorms in parts of the province (Figure 7).

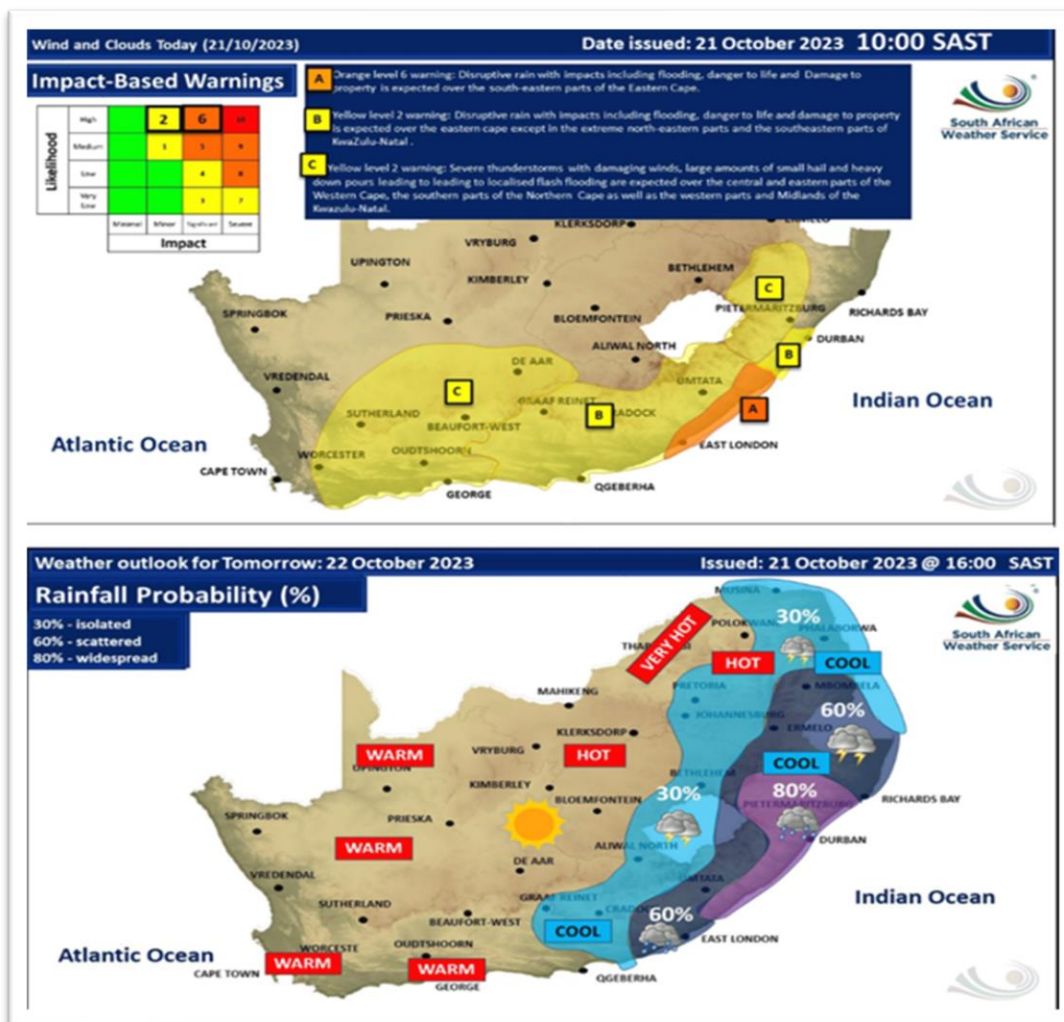


Figure 7: SAWS Impact Based Warnings for 21 October 2023, and the weather outlook for 22 October 2023 (Source: SAWS)

The Numerical Weather Prediction Model by SAWS also predicted that some areas may receive >100mm of rainfall in 24 hours (Figure 8).

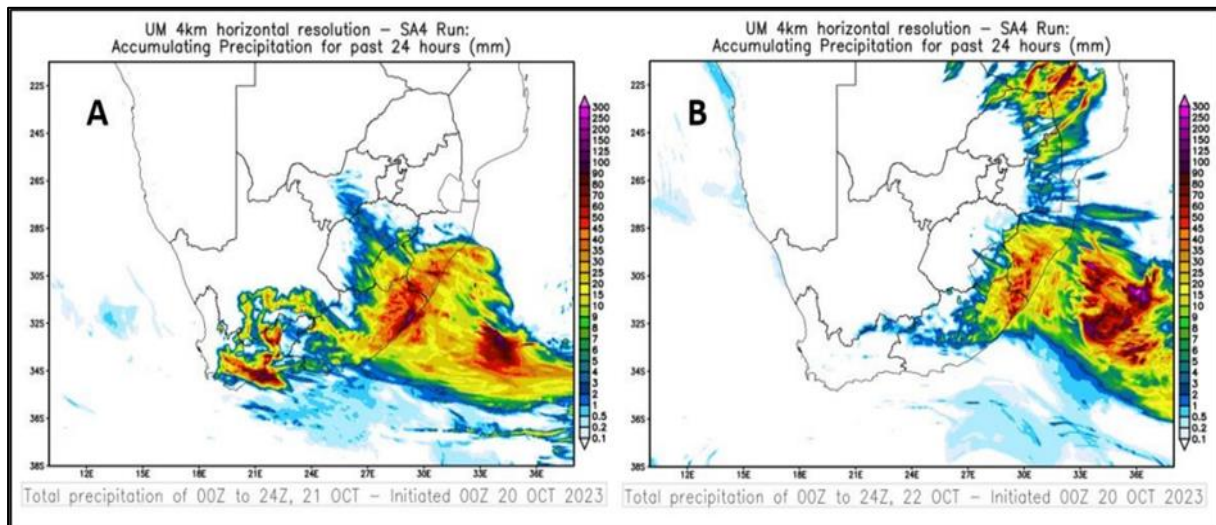


Figure 8: Numerical weather prediction data indicating 24-hour accumulated rainfall for (A) Saturday, 21 October 2023 and (B) Sunday, 22 October 2023. (Source: SAWS Unified Model)

This weather system and extreme events resulted in casualties and damages. According to the report from the provincial Department of Cooperative Governance and Traditional Affairs (CoGTA), at least four people from Mtubatuba lost their lives due to a thunderstorm accompanied by strong winds, while over 70 houses were destroyed, and several roads and bridges were damaged across Mtubatuba Town, Greater Kokstad, and Umzimkhulu Municipalities.

Heatwave

Extreme heatwave conditions, with persistently high temperatures, prevailed in the northeastern part of the country from 19-28 November 2023. This was a result of a high-pressure system that was assisted by a convergence loft. The South African Weather Services issued heat wave weather advisories over the Central and Eastern parts of the Free State, the North West Province, the northeastern parts of Northern Cape, Gauteng, Limpopo and Mpumalanga, including the southern parts of the Free State on 22 November 2023 (Figure 9).

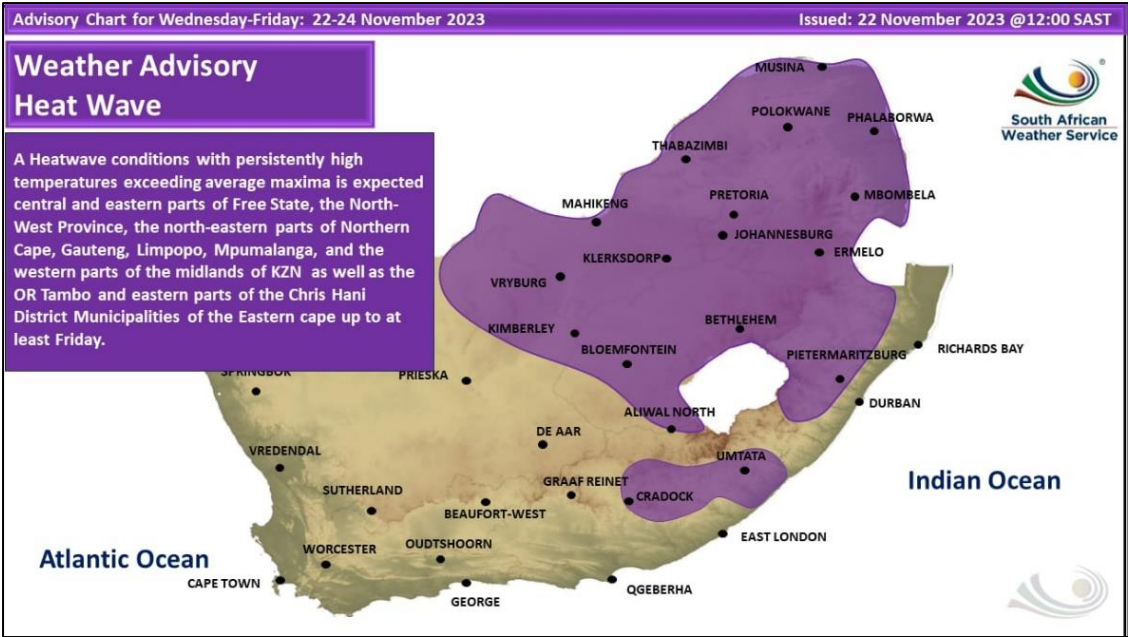


Figure 9: Weather advisory chart for heatwave (Source: SAWS)

On 24 November, SAWS issued another warning of very hot to extremely hot temperatures, which were expected to continue until 28 November 2023 across Gauteng, Limpopo and Mpumalanga. The statement reported that some weather stations were expected to reach (or even exceed) their heat wave thresholds. The heatwave broke temperature records for November, with the highest temperature recorded at **Augrabies Falls at 46,7°C** on 27 November 2023. Figure 10 presents the spatial variation of the daily maximum temperatures for 27 November 2023.

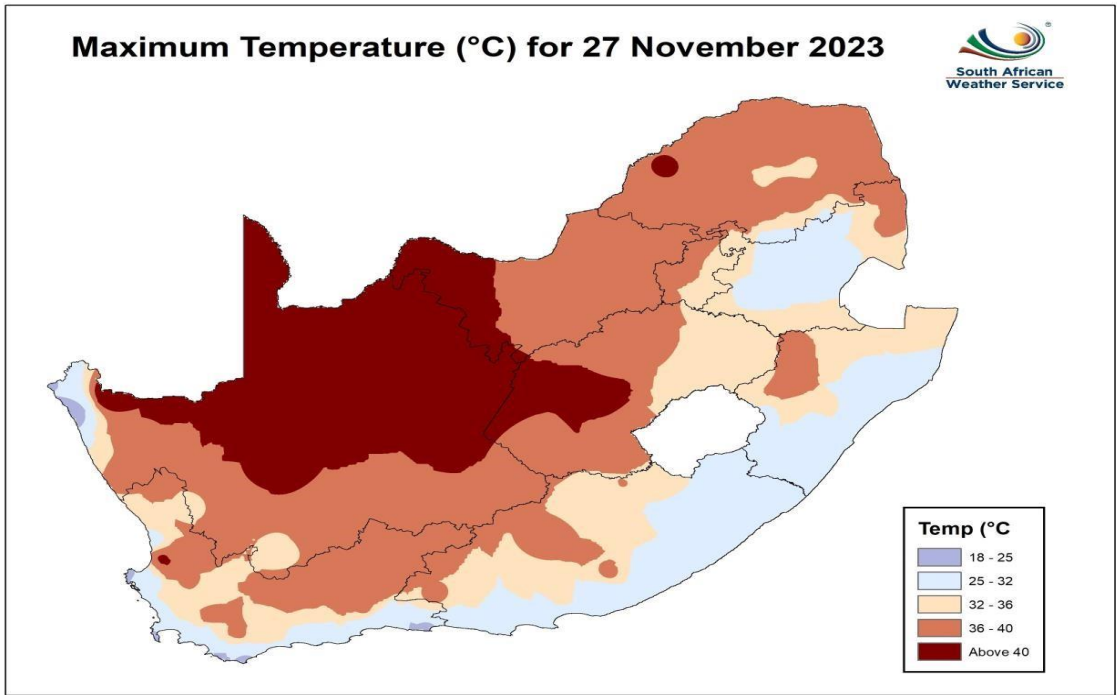


Figure 10: Maximum temperatures for 27 November 2023 (Source: SAWS)

Severe Thunderstorms

Severe thunderstorms wreaked havoc over the northeastern parts of the country on 13 November 2023. An extension of a low-pressure area was positioned over the central parts of the country, with a high pressure to the east. This setup allowed for low-level moisture to be advected into the northeastern parts of the country, supporting the development of thunderstorms. Thunderstorms started developing over the south-eastern North West Province and the northern Free State, moving north-eastwards towards Gauteng and southwestern Mpumalanga (Figure 11).

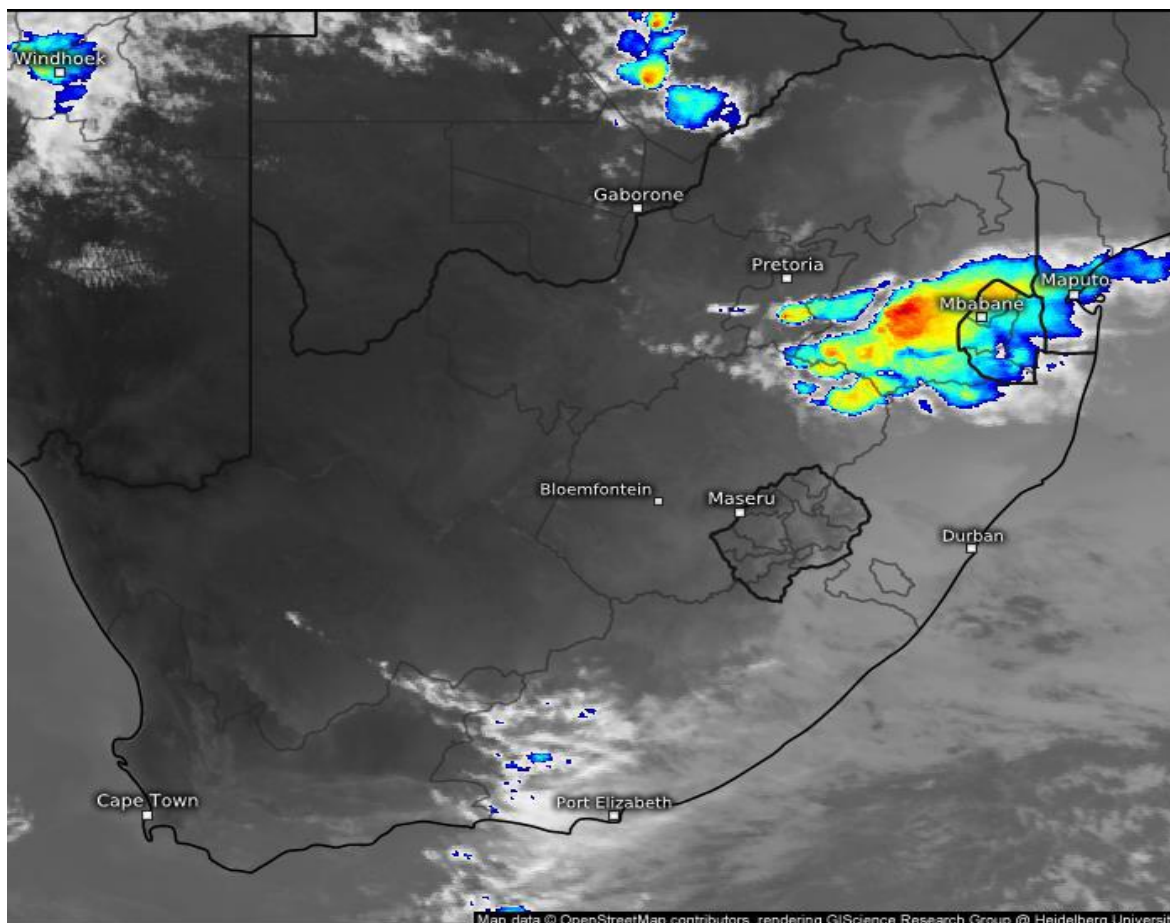


Figure 11: Satellite image showing severe thunderstorms in the northeastern part of the country on 13 November 2023 (Source: SAWS)

The isolated thunderstorms in Gauteng caused extensive damage to property and infrastructure due to the large hail. Hailstorms occurred in areas of the City of Johannesburg, with the most severe occurring in the suburbs of Midrand (Figure 12). A tornado was also spotted in the Lekwa Local Municipality in Mpumalanga, which caused damage to electrical infrastructure, including a substation. Furthermore, it uprooted trees that fell onto power lines and fences.



Figure 12: Images of hail and damages caused in Gauteng (Source: SAWS)

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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. |
| 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 |
| SDG | Sustainable Development Goals were established in 2015 by the United Nations. South Africa is a signatory to all 17 goals, including SDG 6 which is about ensuring access to clean water and sanitation for all. |
| Water Supply System | A typical town/city water supply system consists of a gravity/pumping-based transmission and distribution system from a local/distant water source with needed water treatment system |

References

South African Weather Services (SAWS), 2023. Media Release for 14 November 2023: *Severe thunderstorms wreak havoc over the northeastern areas of the country.*

(https://www.weathersa.co.za/Documents/Corporate/Med_rel_14_November_2023_14112023150516, Accessed 30 November 2023)

South African Weather Services (SAWS), 2023. Media Release for 20 November 2023: *Heatwave conditions break records in places over South Africa.*

(https://www.weathersa.co.za/Documents/Corporate/Medrel30Nov_extreme_temperatures_on_29_November_2023_30112023093003, Accessed 30 November 2023)