

December 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 South Africa receive rainfall from October to April during the warm summer months, except for the southwestern parts, which receive most rain from March to October. Above-normal rainfall was experienced for most parts of the country in December. Much below-normal rainfall was received in isolated parts of the Western Cape and Northern Cape Provinces. The South African Weather Service (SAWS) multi-model rainfall forecast indicates mostly below-normal rainfall over most of the country during Jan-Feb-Mar (JFM), Feb-Mar-Apr (FMA), and Mar-Apr-May (MAM), except for the central and eastern coastal areas indicating higher likelihood of above-normal rainfall.

At the end of December, 25% of the 221 dams monitored nationally were either full or spilling (above 100% of Full Storage Capacity - FSC), while 1%, which consists of the Middle Letaba Dam and Glen Alpine Dam in Limpopo, remained at critically low levels (<10% of FSC). The comparison of dam storage levels in December 2022 and December 2023 indicates that dam storage levels in seven of the nine provinces declined when compared to the previous year. The three provinces with improved dam storage levels were Eastern Cape (+7.2%) and Western Cape (+20.6%).

Most parts of the country received sufficient rainfall to improve surface water storage in December. However, the rainfall caused widespread havoc in KwaZulu-Natal, resulting in floods. The province received accumulated rainfall ranging from 100 to 200mm in most areas, with the north-western parts receiving 200 to 500mm in December 2023. The uThukela District was severely impacted, with 23 deaths reported during floods that hit Ladysmith on 24 December, by 31 December, the death toll from extreme weather conditions in KZN had risen to 31 with over 600 households destroyed.

## Rainfall

The distribution of total monthly rainfall across the country for October to December 2023 is presented in Figure 1. The La Niña weather conditions continued to cause above-normal rainfall over the country. Widespread rainfalls, primarily concentrated in the country's eastern half, were received during December. High volumes (>200 mm) were observed over parts of Limpopo, Free State, Mpumalanga, and KwaZulu-Natal.

The monthly rainfall anomalies expressed as a percentage of normal rainfall are presented in Figure 2. Above-normal rainfall was experienced for most parts of the country in December 2023. Much-below-normal rainfall was received in isolated parts of the Western Cape, Northern Cape, and North West Provinces.

The South African Weather Service (SAWS) multi-model rainfall forecast indicates mostly below-normal rainfall over most of the country during Jan-Feb-Mar (JFM), Feb-Mar-Apr (FMA), and Mar-Apr-May (MAM) with the exception of the central and eastern coastal areas indicating higher likelihood of above-normal rainfall. Minimum and maximum temperatures are expected to be mostly above-normal countrywide for the forecast period.

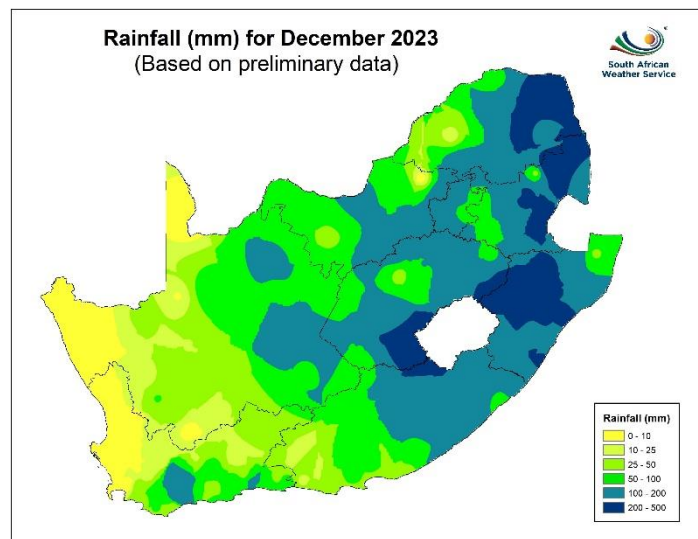
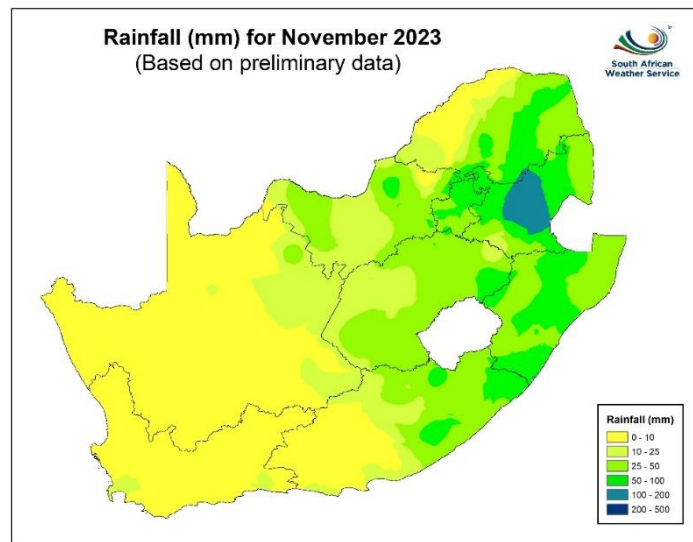
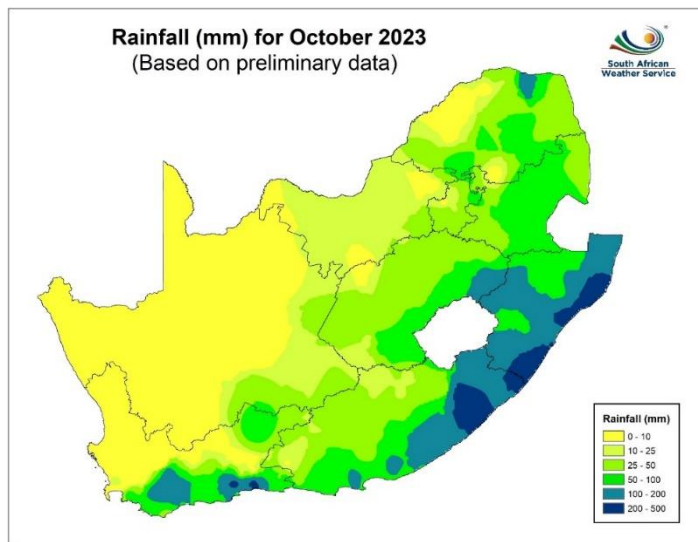
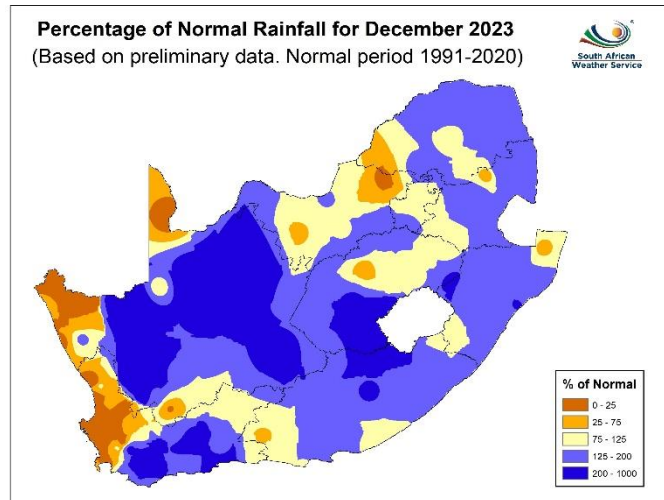
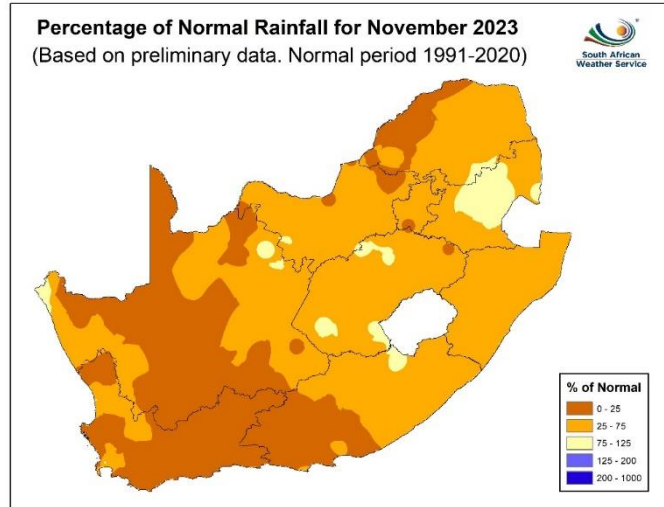
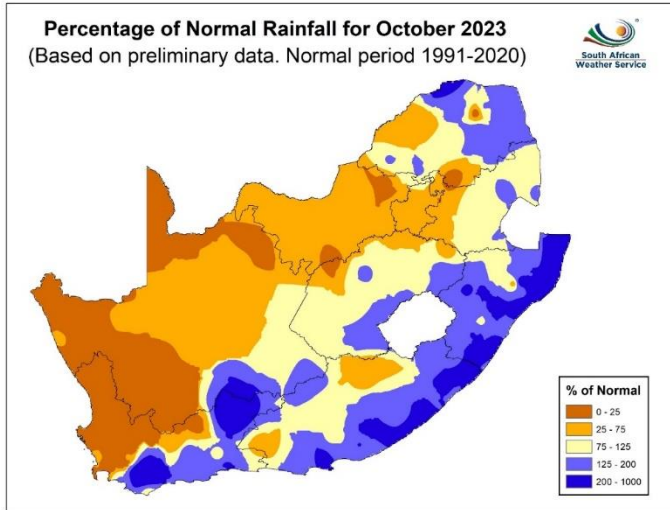


Figure 1: Summer season monthly rainfall distribution for October to December 2023 (Source: SAWS <https://www.weathersa.co.za/home/historicalrain>)



*Figure 2: Summer season Percentage of normal rainfall for October to December 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 levels

Approximately **25%** of the national dams are either full or spilling (**above 100% of FSC**), and **67%** have storage ranging between 50 and 100% of FSC, while **1%** are at critically low storage volumes. The country's five largest dam storage ranges between 65.8 and 94.6% of full supply capacity (Table 1). There are two dams with critically low storage levels (<10% of FSC) nationally (Table 2). The spatial distribution of the dams and a classified range of their storage levels on 25 December 2023 is presented in Figure 3.

The 24-month Standardised Precipitation Index (SPI) for November is presented in Figure 4. The SPI shows that in the last 24 months, moderate to severe drought has affected 7 settlements, of which two settlements are in the Northern Cape and five in the Eastern Cape.

*Table 1: Storage Levels for Five Largest Dams(by volume)*

Reservoir	River	Province	25 December 2023 (% FSC)
Bloemhof Dam	Vaal	Free State	81.8
Vaal Dam	Vaal	Free State	65.8
Gariiep Dam	Orange	Free State	94.6
Vanderkloof Dam	Orange	Free State	83.9
Pongolapoort Dam	Pongola-Mtamvuna	KwaZulu Natal	73.0

*Table 2: Dams below 10% of Full Storage Capacity*

Reservoir	River	Province	25 December 2023 (% FSC)
Middle-Letaba Dam	Middle-Letaba	Limpopo	3.1
Glen Alpine Dam	Mogalakwena	Limpopo	5.2

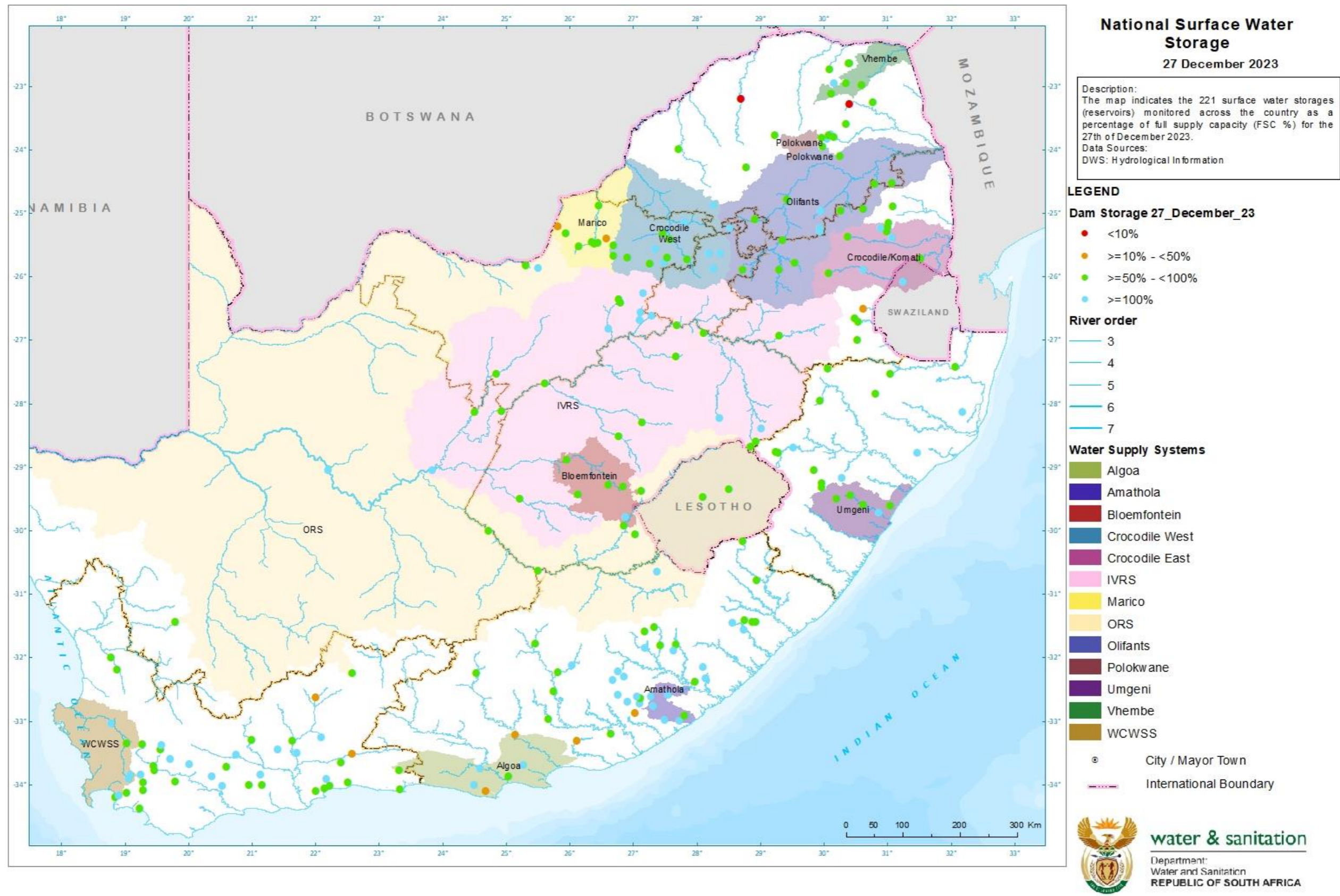


Figure 3: Surface Water Storage Levels – December 2023

# 24 Month - SPI Drought - November 2023

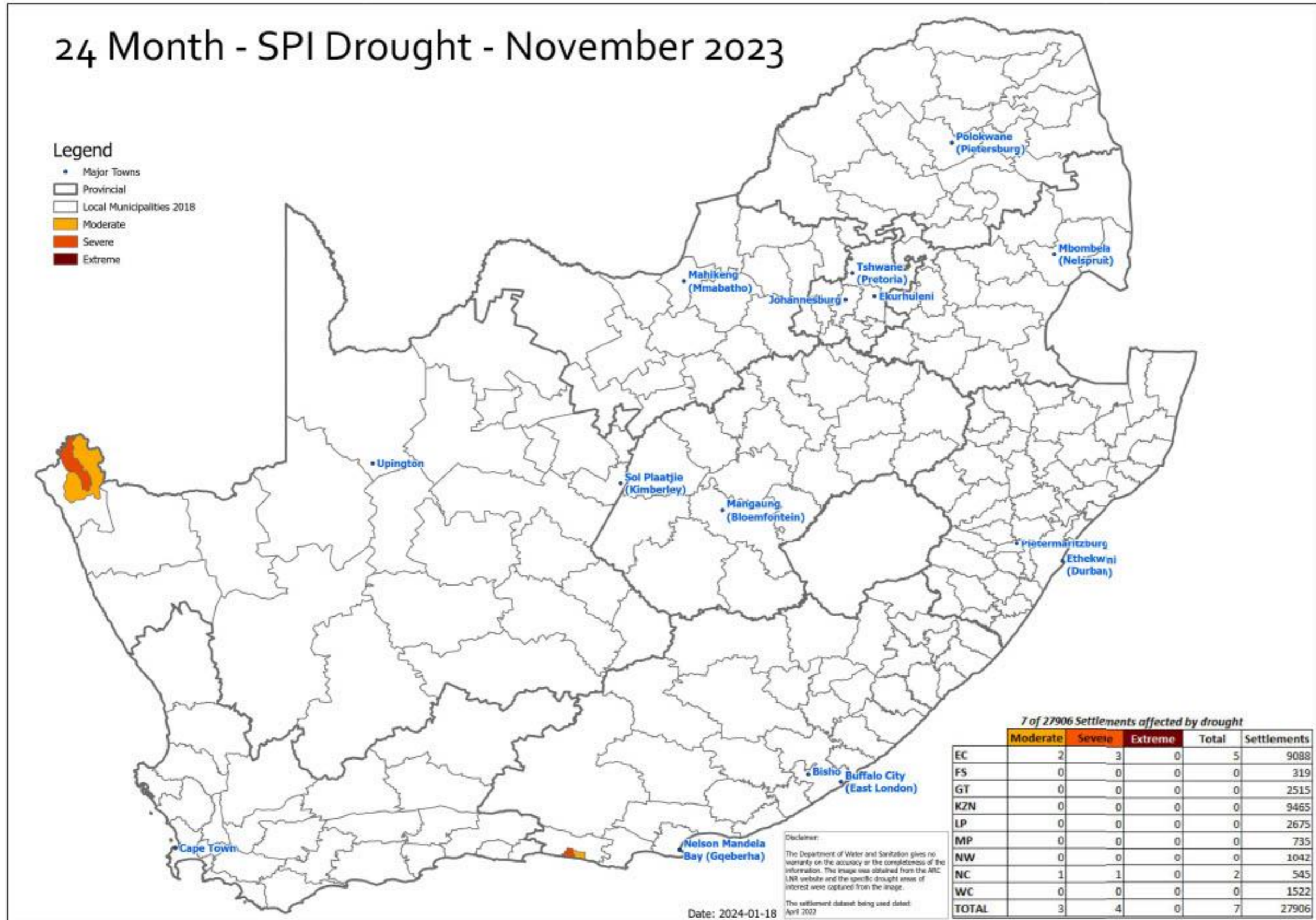
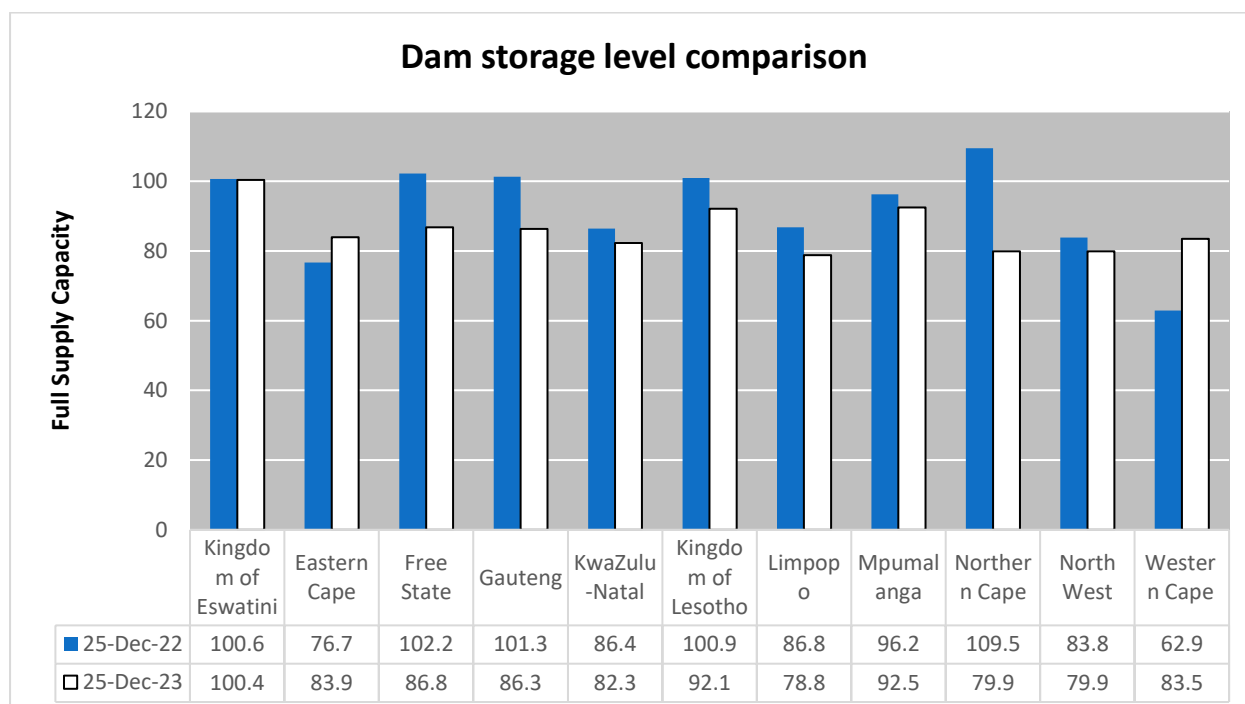


Figure 4: 24-months Spatial Precipitation Index – November 2023 (DWS - NIWIS - Disaster Management – [www.dwa.gov.za](http://www.dwa.gov.za))

Figure 5 compares the storage levels per Province and International areas for December 2023 to the same time of reporting last year. Seven of the nine Provinces presented a decline in dam storage levels compared to the previous year. The three Provinces with increased dam storage levels were Eastern Cape (+7.2%) and Western Cape (+20.6%).



*Figure 5: Water Storage Levels December 2022 vs. December 2023.*

### District Municipalities

The comparison of water storage levels per District Municipality (DM) is presented in Figure 6. Sarah Baartman DM, Overberg DM, Garden Route DM and Namakwa DM experienced a significant increase (>20%) in dam storage levels compared to last year. In contrast, Lejweleputswa DM, Capricorn DM, Sedibeng DM, Pixley ka Seme DM and Francis Baard DM experienced significant declines (>-20%) in dam levels compared to last year.

The dam storage levels in water supply systems (WSSs) and applicable restrictions are in Tables 3. 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 1 November 2023 to 31 October 2024. These restrictions are yet to be gazetted.

Notably, restrictions have been lifted for the Amatole WSS as it recovered well after the rainfall events in February/March 2023.

***Due to infrastructure limitations, permanent restrictions are applicable for the Polokwane and Bloemfontein WSSs.***



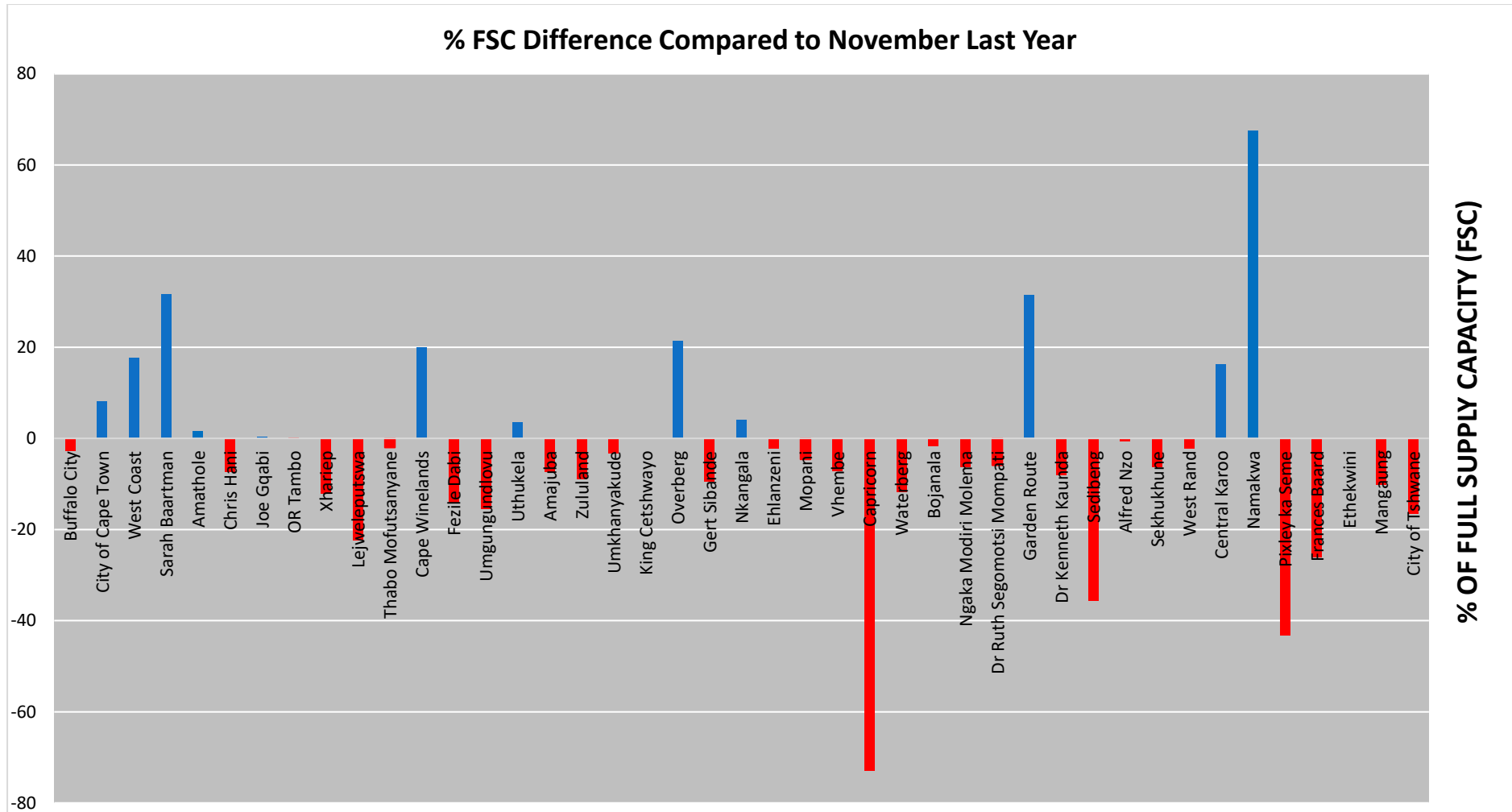


Figure 6: Difference in Water Storage Levels per District Municipality December 2022 vs December 2023

*Table 3: Water Supply Systems storage levels and applicable restrictions*

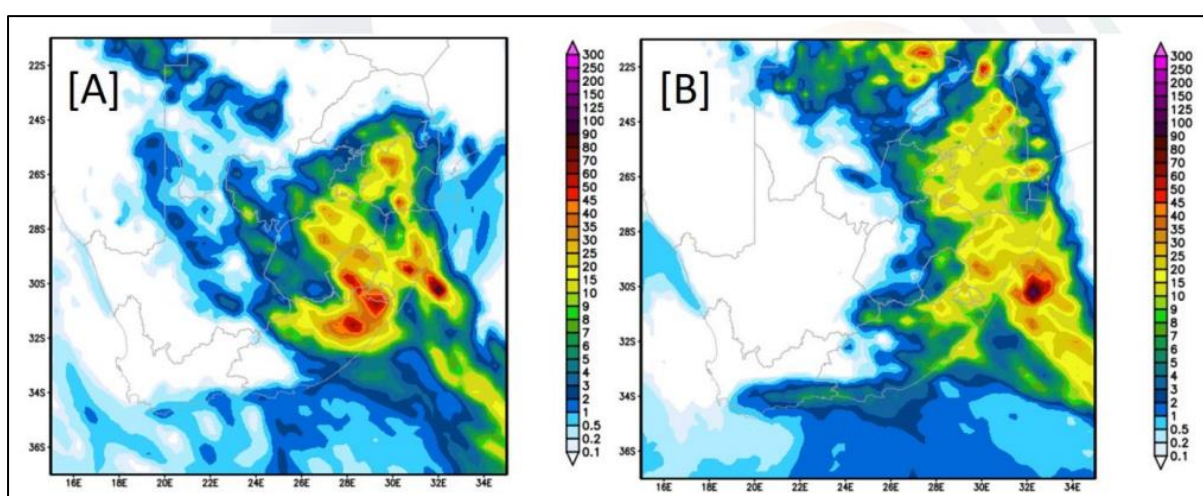
Water Supply Systems/clusters	Cap in 10 <sup>6</sup> m <sup>3</sup>	18 December 2022 (% FSC)	11 December 2023 (% FSC)	18 December 2023 (% FSC)	Comments (systems below 50% in red)
Algoa System	282	15.6	78.1	77.8	System of 5 dams for Nelson Mandela Bay Metro, Sarah Baartman (SB) DM, Kouga LM and Gamtoos Irrigation: Decision date was changed from 1 June to 1 November, therefore new AOA were conducted and water restrictions imposed as from 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	102.9	100	99.9	System of 6 dams for Bisho & Buffalo City, East London: No restrictions for 2023/2024
Klipplaat System	57	100.4	99.5	99.3	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
Butterworth System	14	100.5	98.8	98.2	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	102.5	85.6	86.1	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 <sup>6</sup> m <sup>3</sup>	18 December 2022 (% FSC)	18 December 2023 (% FSC)	18 December 2023 (% FSC)	Comments (systems below 50% in red)
Polokwane	254	105.9	89.8	89.8	<u>System of 7 dams serving Polokwane and surroundings:</u> 20% restrictions on Domestic and Industries
Crocodile West	444	93.2	92.0	94.4	<u>6 dams for Tshwane up to Rustenburg:</u> No restrictions
Luvuvhu	225	100.8	94.6	95.7	<u>System of 3 dams for Thohoyandou etc:</u> No restrictions
uMgeni System	923	103.8	87.9	89.9	<u>System of 5 dams serving Ethekeini, iLembe &amp; Msunduzi:</u> No restrictions
Cape Town System	889	71.5	93.1	92.4	<u>System of 6 dams for the City of Cape Town:</u> No restrictions
Bloemfontein	219	100.7	92.1	92.8	<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	96.2	80.8	82	<u>Kwena Dam supplies Nelspruit, Kanyamazane, Matsulu, Malelane and Komatipoort areas &amp; Surroundings:</u> No Restrictions
Orange	7 996	99.9	86.8	88.8	<u>Two dams serving parts of the Freestate, Northern and Eastern Cape Provinces:</u> No restrictions
uMhlathuze	301	99.4	99.8	100.2	<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

## KwaZulu-Natal Floods - December 2023

In December 2023, most parts of the country received rainfall, which was sufficient to improve surface water storage in some areas. However, the rainfall caused widespread havoc in KwaZulu-Natal, resulting in flooding. On 22 December 2023, the South African Weather Service (SAWS) issued a warning of an upper-air system that was expected to cause scattered to widespread showers and thundershowers in the Free State, North-West, KwaZulu-Natal, Gauteng, Mpumalanga, and Limpopo from Sunday (24 December) onwards, with the possibility of local heavy rainfall and cooler conditions.

According to the report, while isolated severe thunderstorms were expected over the central and south-eastern interior on Sunday (24 December 2023) and possibly into Monday (25 December 2023), the atmosphere was expected to eventually become tropical, allowing for locally heavier and widespread rainfall (SAWS, 2023). SAWS numerical weather models predicted 15-30 mm of rainfall across much of the eastern country from Sunday to Monday (Figure 7).



*Figure 7: 24-hour rainfall accumulation (mm) for Sunday, 24 December 2023 (A), Monday, 25 December 2023, as predicted by the Global Forecast System (GFS) (Source, SAWS).*

SAWS later issued a yellow level 2 warning for severe thunderstorms and disruptive rain for the Province on the 24<sup>th</sup> and 26<sup>th</sup> of December, 2023, respectively (Figure 8). On Christmas Eve (24 December 2023), heavy rains and severe thunderstorms intensified, causing flash floods in the northwestern parts of the Province. Figure 9 shows that the Province received accumulated rainfall ranging from 100 to 200mm in most areas, with the northwestern parts receiving 200 to 500mm in December 2023.

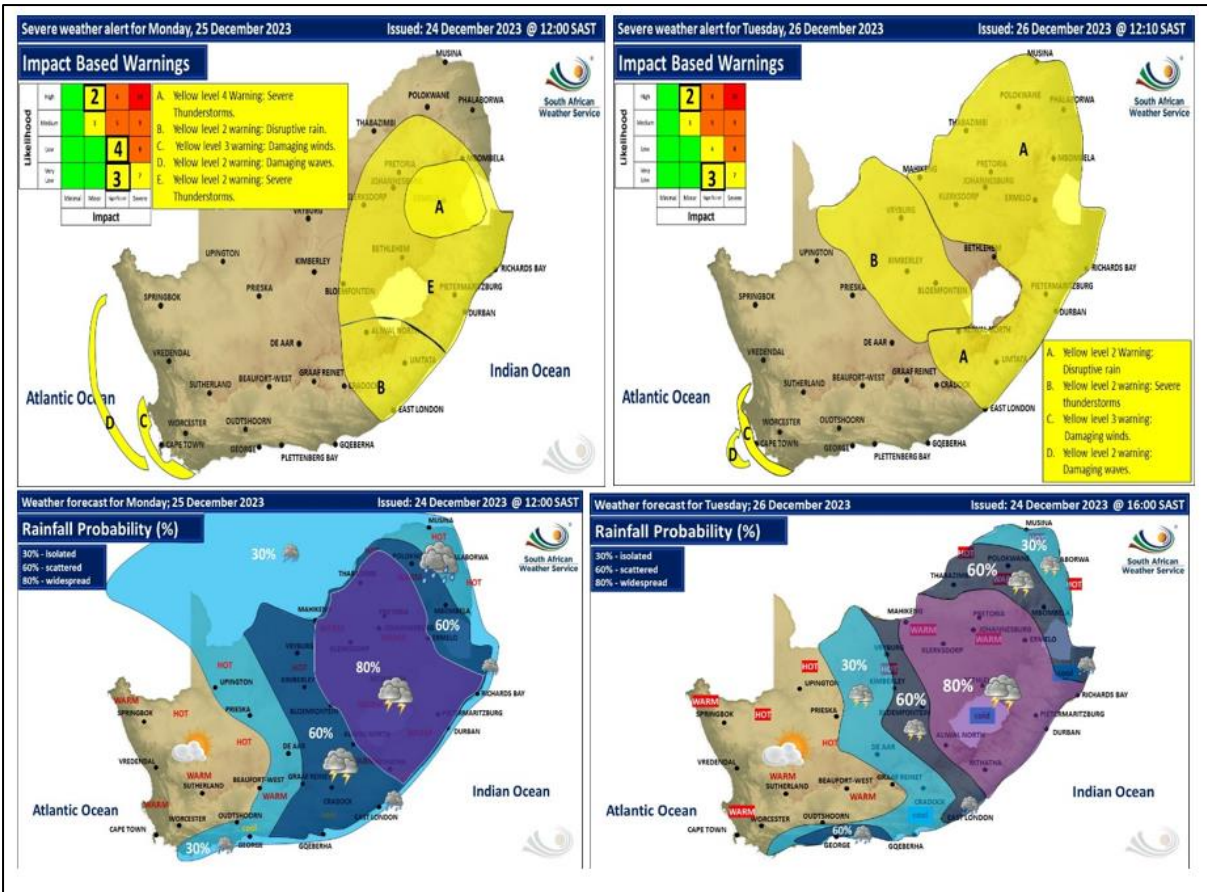


Figure 8: Severe weather warnings and rainfall predictions for 25 and 26 December 2023. (Source: SAWS)

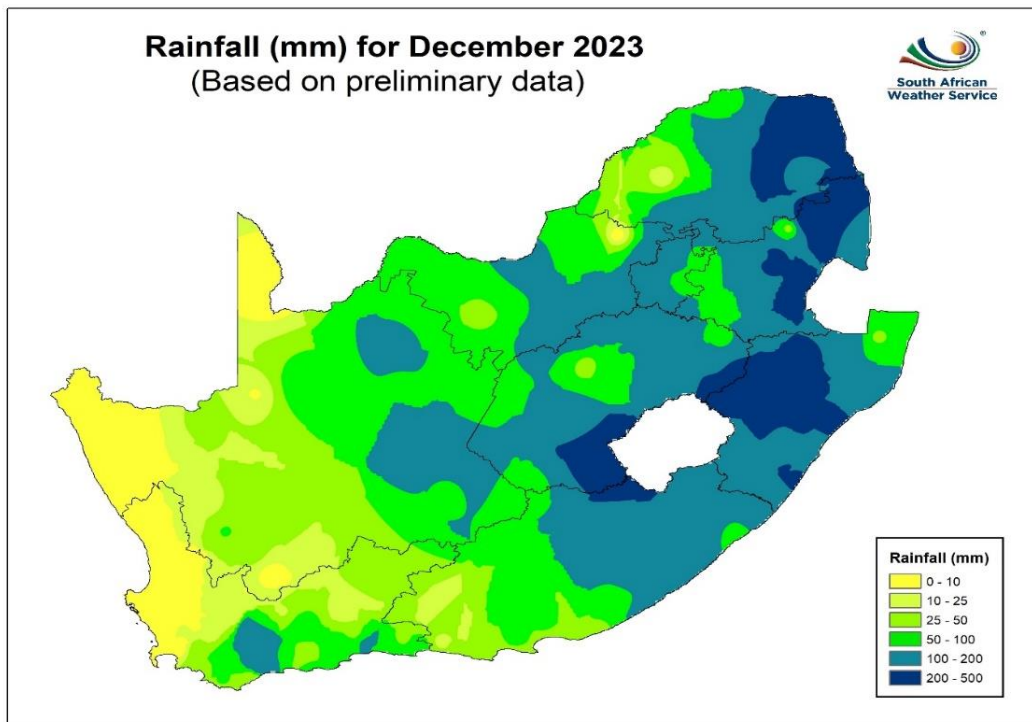


Figure 9: Rainfall map for December 2023 (Source: SAWS)

These heavy rains caused widespread destruction, affecting households, businesses, and public infrastructure such as schools, roads, and bridges (Figure 10). The UThukela District was severely affected, with 23 deaths reported during floods that hit Ladysmith on 24 December 2023 and more than 100 houses damaged.

On 24 December 2023, weather stations in the Ladysmith area reported approximately 60mm of rain within an hour, with approximately 80mm of rain falling over three hours. Strong winds also damaged over 40 homes in King Cetshwayo District, destroying several businesses in the Eshowe industrial area. By 31 December 2023, the number of fatalities from extreme weather conditions in KZN had risen to 31, with three people still missing. COGTA reported that over 600 households and over 140 dwellings were destroyed (COGTA, 2023).



*Figure 10: Destruction caused by floods in Ladysmith, KZN. (Source: SABC News)*

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National State of Water Reporting Web page:

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

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## Glossary

Term	Definition
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.
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 consists of a gravity or pumping-based transmission and distribution system from a local or distant water source with needed water treatment system



## References

Department of Co-Operative Governance and Traditional Affairs (COGTA), (2023). Media Release- *Ladysmith floods update: Search and rescue teams recovers four bodies of people who had been missing after devastating floods*. COGTA, KwaZulu Natal, South Africa.

SABC News, (2023). *News Update 30 December 2023: Ladysmith floods death toll rises to 21*. (<https://www.sabcnews.com/sabcnews/906265-2/>, Accessed on 22 December 2024)

South African Weather Services (SAWS), 2023. Media Release for 22 December 2023: *Stormy weather possible over central and eastern South Africa this festive weekend into Christmas and Day of Goodwill 23 to 26 December 2023*. ([https://www.weathersa.co.za/Documents/Corporate/Medrel\\_22\\_December\\_2023\\_22122023142909.pdf](https://www.weathersa.co.za/Documents/Corporate/Medrel_22_December_2023_22122023142909.pdf), Accessed 22 January 2024)