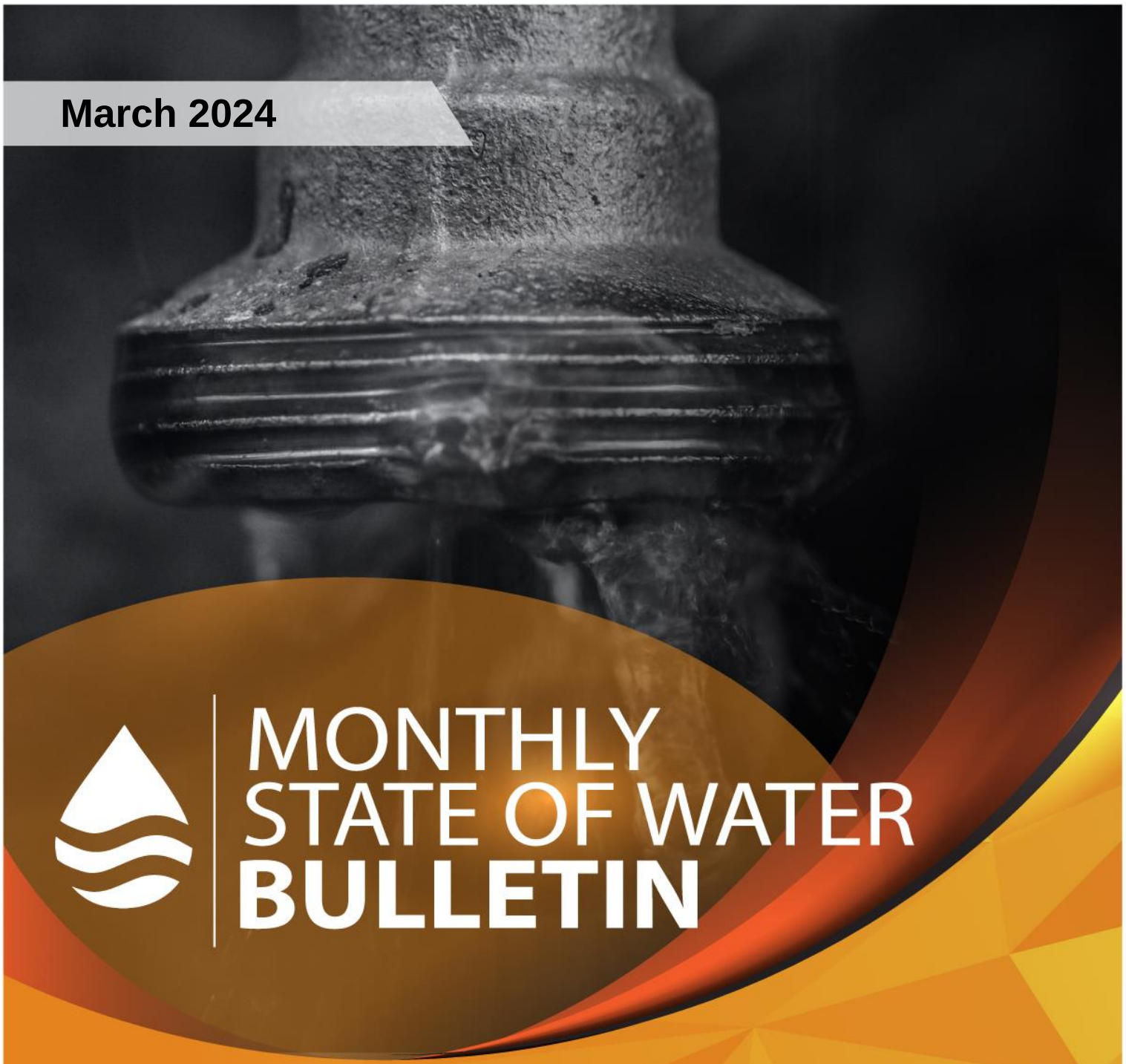
March 2024



MONTHLY STATE OF WATER BULLETIN

WATER IS LIFE - SANITATION IS DIGNITY

water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

2030 NDP

Overview

South Africa is currently in a strong El Niño state predicted to persist through the 2024 summer season. The event is associated with drier and warmer conditions during the summer seasons. As a result, in March, below-normal rainfall was received in most parts of the Country, while only isolated parts of the Western Cape, KwaZulu Natal, Mpumalanga, and Limpopo Provinces received above-normal rainfalls.

The most recent 24-month Standardised Precipitation Index revealed that the Northern Cape Province (Namakwa District) remains affected mainly by moderate to severe drought, including the Sarah Baartman District in the Eastern Cape, also experiencing moderate to severe drought. Some districts in the Western Cape, Limpopo, Free State, Gauteng, and North-West experienced only moderate drought conditions in the last 24 months.

At the end of March 2024, the national dam levels were at 85.8% of full supply capacity (FSC). This is lower than last year during the same reporting period by 7.4% of FSC. Approximately 22% of the dams nationally were above 100% of FSC (either full or spilling), 69% were between 50 and 100% of FSC, 9% were between 10 and 50% of FSC, and at least 1% were at <10% of FSC (critically low).

The analysis of national fluoride concentrations has revealed that the Country's surface water fluoride concentrations are typically low (≤ 0.4 mg/ℓ). However, a few instances of high fluoride levels were detected in the Limpopo Province (Ga-Selati River) and Eastern Cape Province (Elands River). The high fluoride concentrations in the Ga-Selati River were linked to return flows from the mining complex surrounding Phalaborwa into the river, while they were associated with natural geology and land cover in the Elands River.

Rainfall

The distribution of total monthly rainfall across the Country for October to March 2024 is presented in Figure 1. The Country is currently in a strong El Niño state. This El Niño event was predicted to persist through the 2024 summer season, and thereafter, it is predicted to weaken with ENSO neutral conditions by the 2024 winter season. Rainfalls (100-200 mm) were observed over isolated parts of the Limpopo, KwaZulu Natal and Mpumalanga Provinces.

The monthly rainfall anomalies expressed as a percentage of normal rainfall are presented in Figure 2. Below-normal rainfall was received in most parts of the Country, while only isolated parts of the Western Cape, KwaZulu Natal, Mpumalanga, and Limpopo Provinces received above-normal rainfalls.

The South African Weather Service (SAWS) multi-model rainfall forecast has indicated mostly below-normal rainfall over most of the Country during Jan-Feb-Mar (JFM), Feb-Mar-Apr (FMA), and Mar-Apr-May (MAM) except 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.

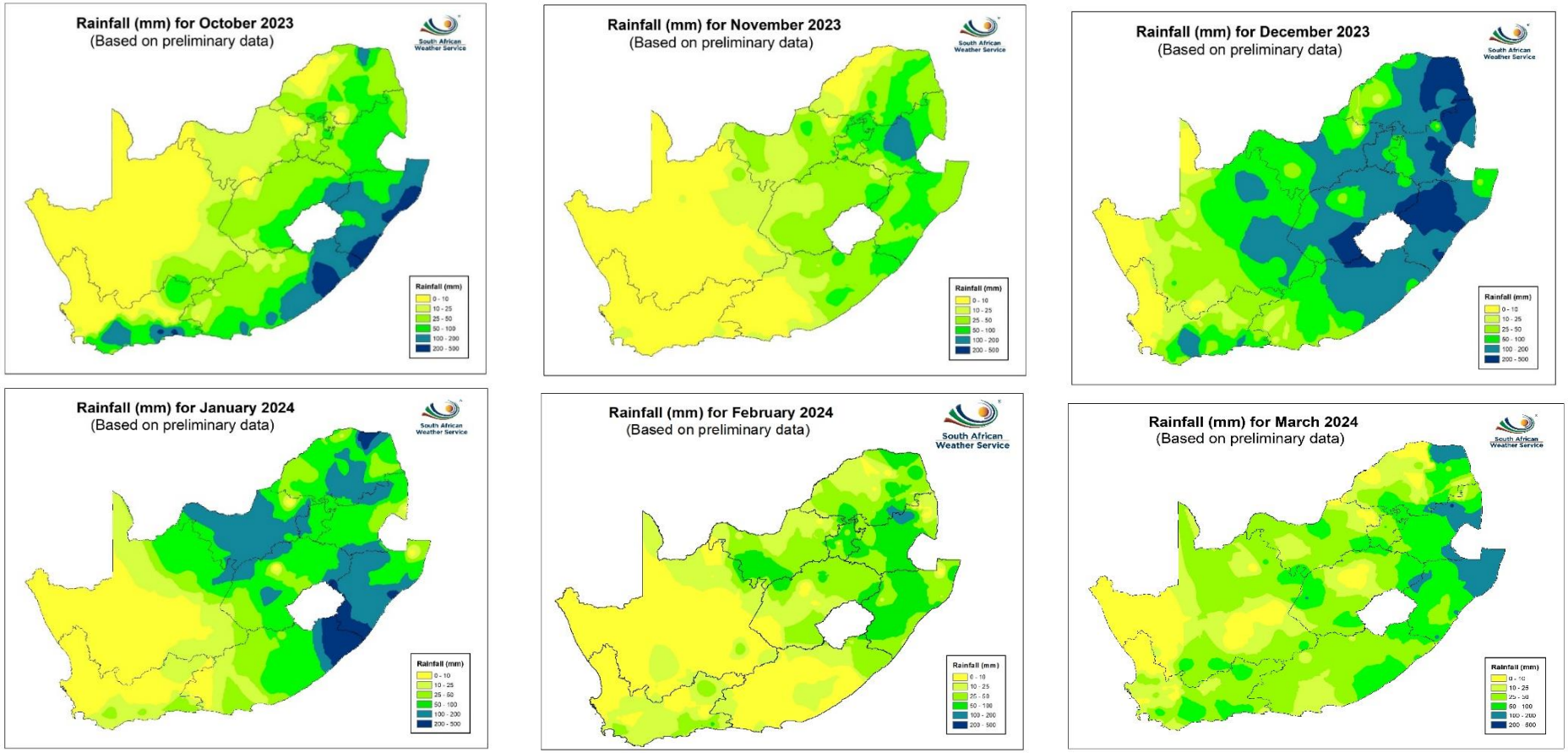


Figure 1: Summer season monthly rainfall distribution for October 2023 to March 2024 (Source: SAWS https://www.weathersa.co.za/home/historicalrain)

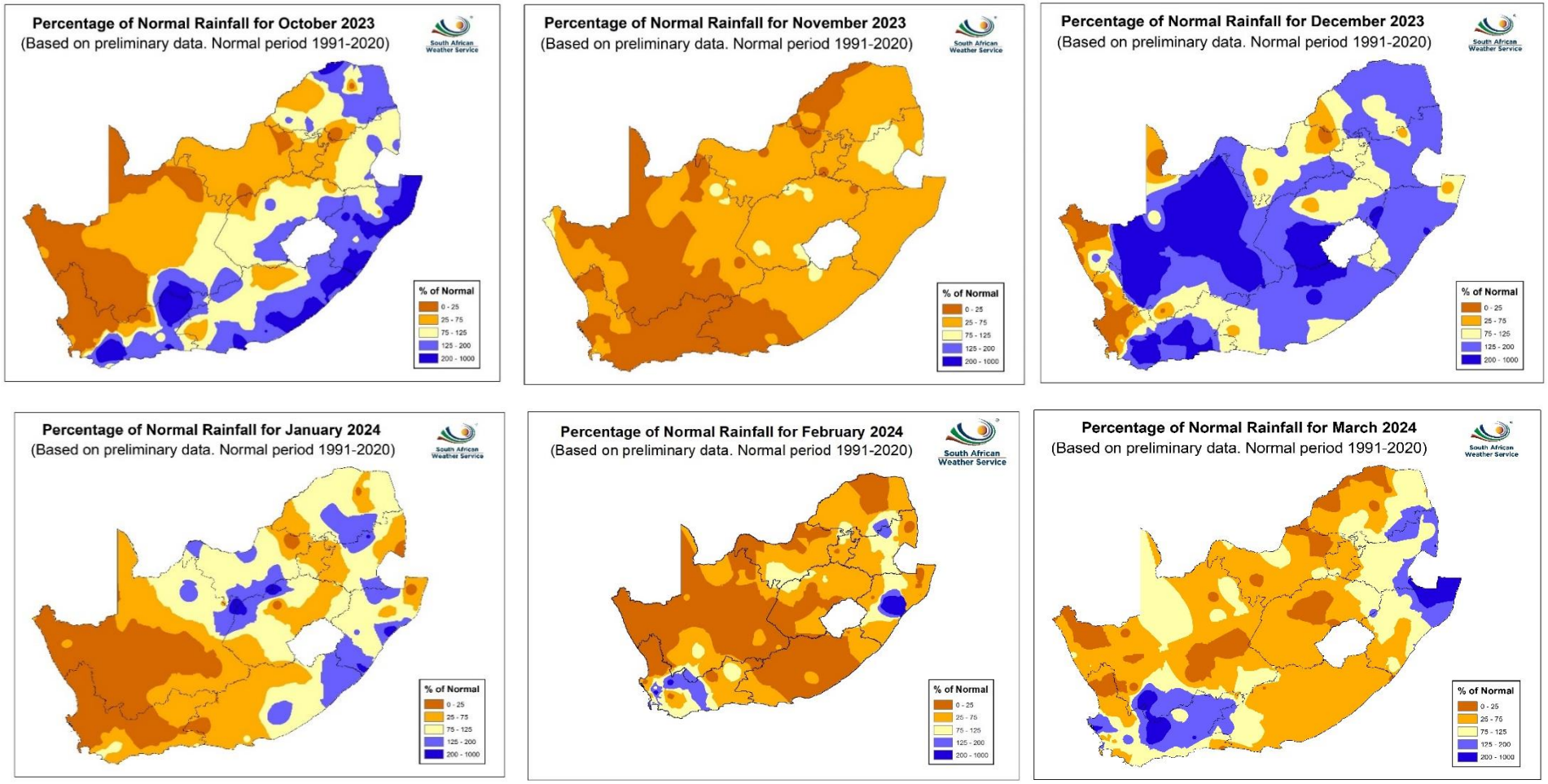


Figure 2: Summer season Percentage of normal rainfall for October 2023 to March 2024. Blue shades are indicative of above-normal rain, and the darker yellow shades of below-normal rainfall (Source: SAWS https://www.weathersa.co.za/home/historicalrain)

National Dam Storage

The national dam water storage for the previous four years, and the trend from October for hydrological year 2023/24 is presented in Figure 3 below. At the end of March 2024, the national dam levels were at **85.8%** of full supply capacity (FSC). This is lower than last year's same period of reporting when national storage was at **93.2%** of FSC. Approximately **25%** of the dams nationally were **above 100% of FSC** (either full or spilling)**, 69%** were between 50 and 100% of FSC, **9%** were between 10 and 50% of FSC, and at least **1%** were at <10% of FSC (critically low).

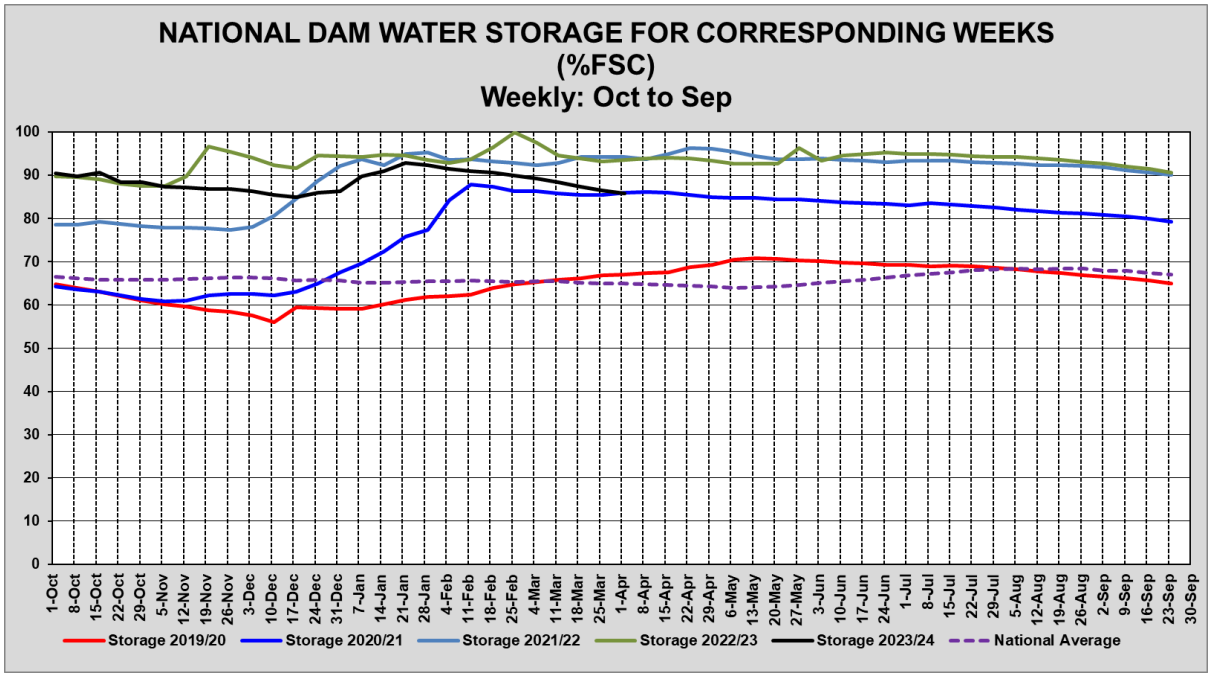


Figure 3 National Dam Storage on 25 March 2024

The comparison of the Country's five largest dam storage %FSC for March 2023 and March 2024 is presented in Table 1. Because of the drier and warmer conditions experienced this summer, there were no significantly higher storage levels for the highlighted large dam during March than the previous year.

Table 1: Storage Levels comparison for the Five Largest storage Dams (by volume) to last year

Reservoir	River	Province/Country	25 March 2023 (%FSC)	25 March 2024 (%FSC)	% Change (-/+)
Gariep Dam	Orange River	Free State	97.5	85.7	-1.6
Vanderkloof Dam	Orange River	Free State	98.5	95.8	-0.7
Sterkfontein Dam	Nuwejaarspruit River	Free State	101.6	99.5	-0.1
Vaal Dam	Vaal River	Free State	102.1	63.9	-1
Pongolapoort Dam	Phongolo River	Kwazulu-Natal	83.5	82	0.6

The spatial distribution of the dams and a classified range of their storage levels on 25 March 2024 is presented in Figure 4 . An observation can be made that most of the dams across the Country are at storage levels of between 50 – 100% of FSC. The Middle-Letaba Dam in Limpopo Province remains at critical dam levels, as given in Table 2 below.

Table 2: Dams below 10% of Full Supply Capacity compared to last year

Reservoir	River	Province/Country	25 March 2023 (%FSC)	25 March 2024 (%FSC)	% Change (-/+)
Middel-Letaba Dam	Middel-Letaba River	Limpopo	2.5	2.4	-0.1

Figure 5 presents the 24-month Standardised Precipitation Index (SPI) for February 2024, indicating that several District Municipalities experienced droughts over the last 24 months. Gauteng (Ekurhuleni and Sedibeng district) remains the Province most affected by moderate to severe drought, followed by the city of Cape Town and Eden district in the Western Cape, which is experiencing moderate to severe drought. Other districts that have experienced moderate drought in the last 24 months include the Namakwa in Northern Cape, the Thabo Mafutsanyane District in Free State, the Sedibeng District in Gauteng, the Mopani District in Limpopo, the Sarah Bartman District in Northern Cape, and the Ngaka Modiri Molema District in the North-West. Drought conditions in these areas result from continuous below normal rainfalls.

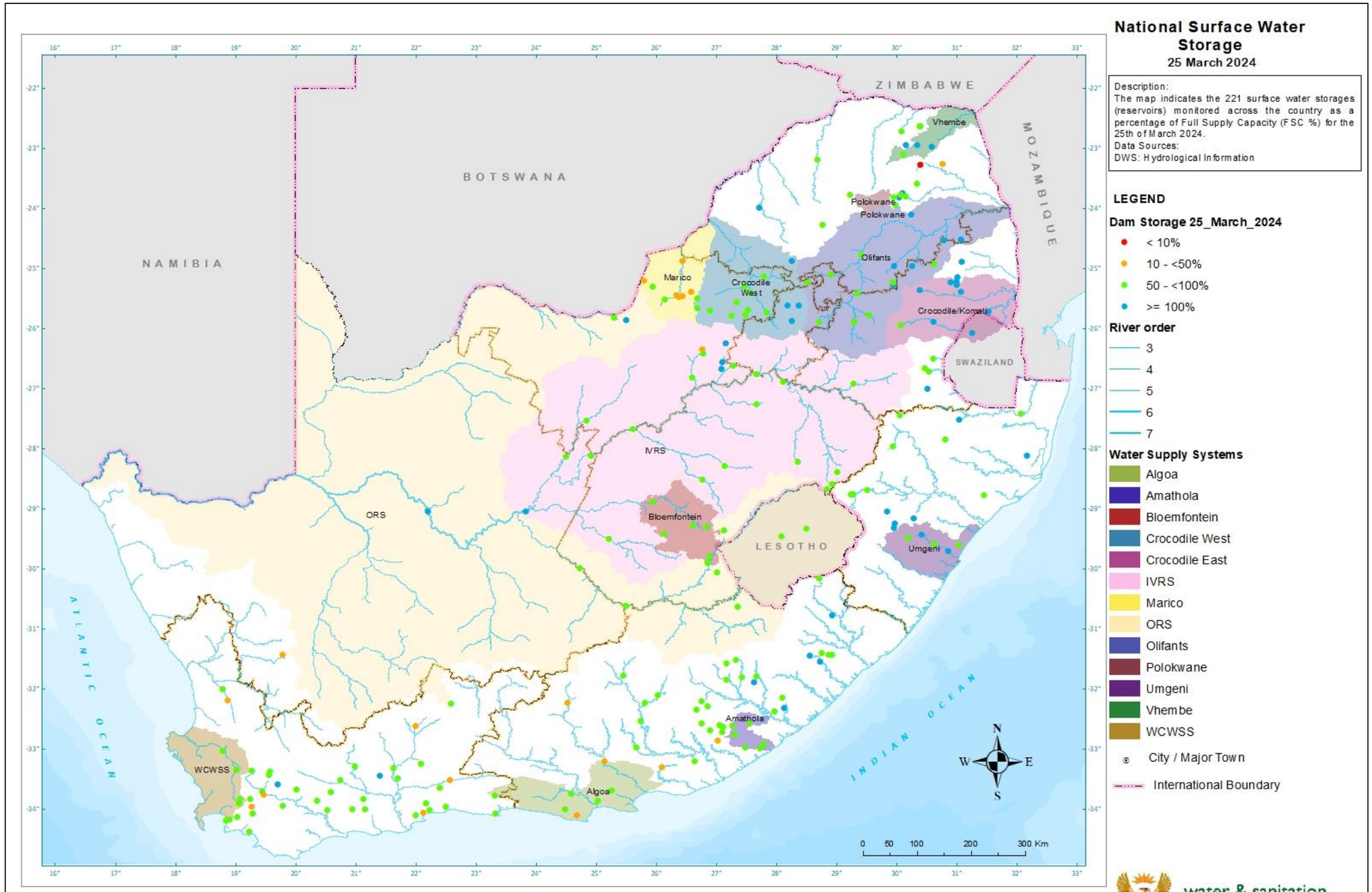


Figure 4: Surface Water Storage Levels - March 2024.

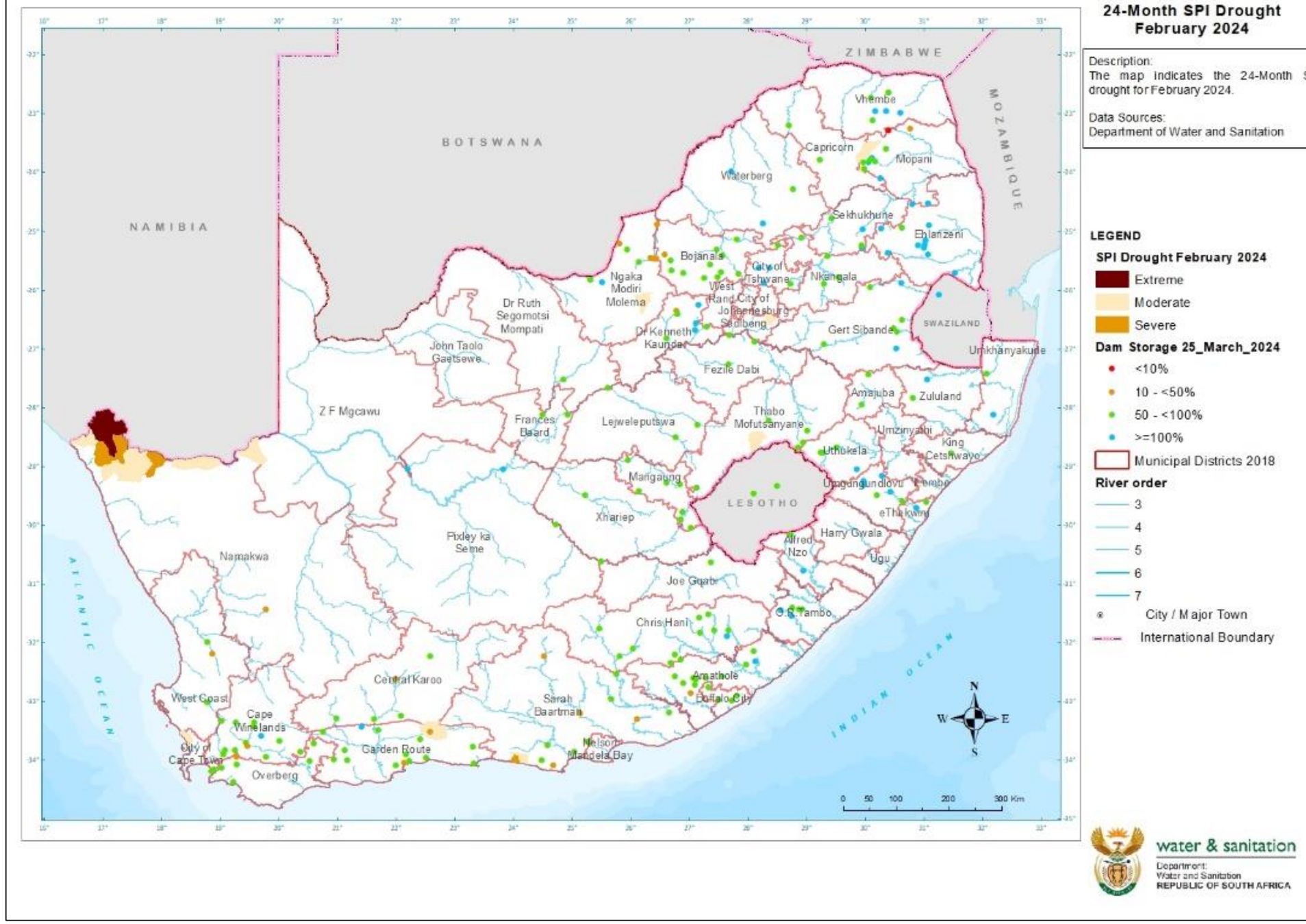
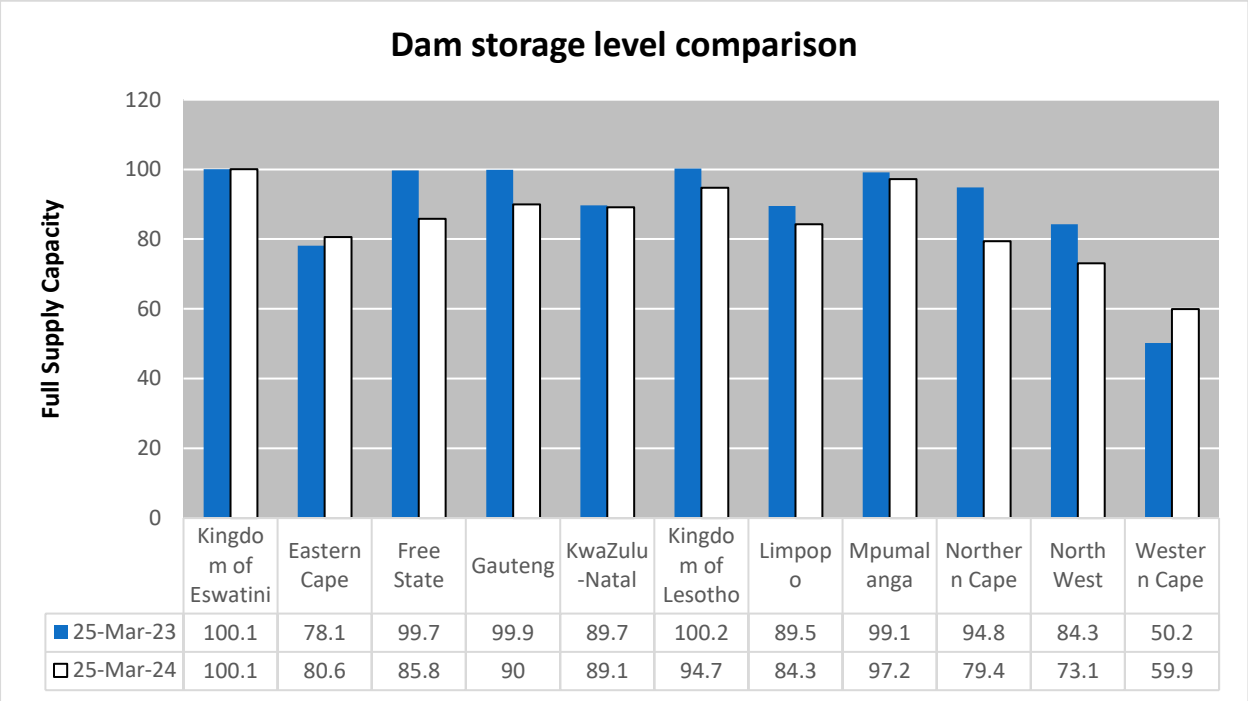


Figure 5: 24-month Spatial Precipitation Index and dam levels

Figure 6 compares the storage levels per Province and International areas for March 2024 to the same time last year. Seven of the nine Provinces presented a decline in dam storage levels compared to the previous year. The two Provinces with increased dam storage levels were the Eastern Cape (+2.5% of FSC) and Western Cape (+9.7% of FSC), while the highest decline was in the Northern Cape (-15.4%) of FSC.



	Kingdom of Eswatini	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Kingdom of Lesotho	Limpopo	Mpumalanga	Northern Cape	North West	Western Cape
25-Mar-23	100.1	78.1	99.7	99.9	89.7	100.2	89.5	99.1	94.8	84.3	50.2
25-Mar-24	100.1	80.6	85.8	90	89.1	94.7	84.3	97.2	79.4	73.1	59.9

Figure 6: Water Storage Levels March 2023 vs. March 2024.

District Municipalities

The year-on-year comparison of water storage levels per District Municipality (DM) is presented in Figure 7. Sarah Baartman DM and Namakwa DM experienced a significant increase (>20%) in dam storage levels compared to last year. In contrast, Lejweleputswa DM, Ngaka Modiri DM, and Sedibeng 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 presented in Table 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 which were effected from 1 November 2023 to 31 October 2024. However, these restrictions are yet to be gazetted.

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

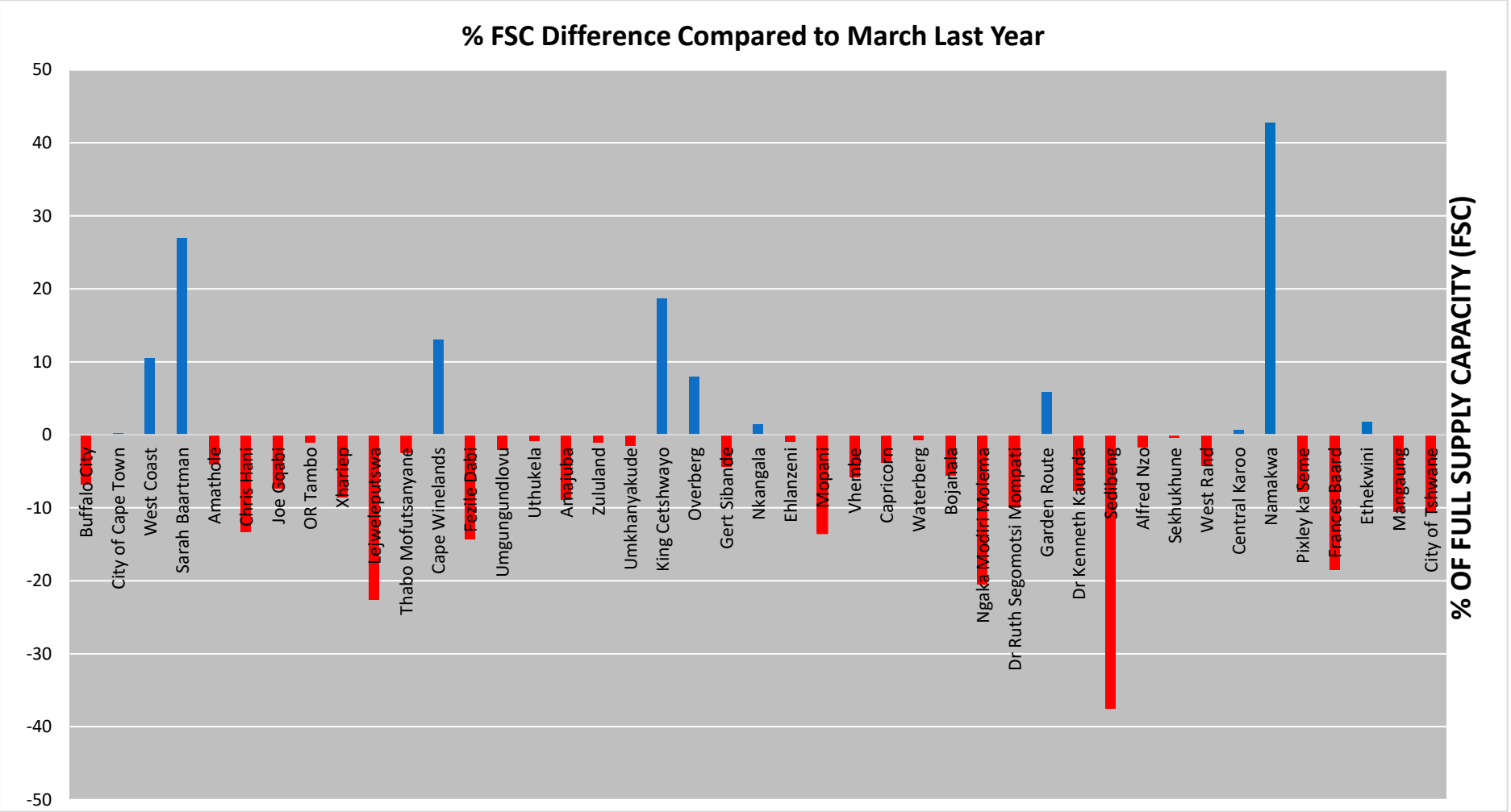


Figure 7: Difference in Water Storage Levels per District Municipality March 2023 vs March 2024

Table 3: Water Supply Systems storage levels

Water Supply Systems/clusters	Capacity in 10^6m^3	25 March 2023 (% FSC)	18 March 2024 (%FSC)	25 March 2024 (% FSC)	System Description
Algoa System	282	13.1	70.8	70	The following 5 dams serve the Nelson Mandela Bay Metro, Sarah Baartman (SB) DM, Kouga LM and Gamtoos Irrigation: Kromrivier Dam, Impofu Dam, Kouga Dam, Loerie Dam, Groendal Dam
Amathole System	241	101.5	96.7	96.8	The following 6 dams serve Bisho & Buffalo City, East London: Laing Dam, Rooikrans Dam, Bridle Drift Dam, Nahoon Dam, Gubu Dam, Wriggleswade Dam
Klipplaat System	57	100.3	90.7	90.6	The following 3 dams serve Queenstown (Chris Hani DM, Enoch Ngijima LM): Boesmanskrantz Dam, Waterdown Dam, Oxkraal Dam
Luvuvhu	225	101.7	99.8	100.5	The following 3 dams serve Thohoyandou etc: Albasini Dam, Vondo Dam, Nandoni Dam
Bloemfontein	219	98.7	92.7	91.8	The following 4 dams serve Bloemfontein, Botshabelo and Thaba Nchu: Rustfontein Dam, Groothoek Dam, Welbedacht Dam, Knellpoort Dam
Butterworth System	14	100.3	95	95.4	Xilinxa Dam and Gcuwa weirs serve Butterworth
Integrated Vaal River System	10 546	101	87.4	86.6	The following 14 dams serve Gauteng, Sasol, and ESKOM: Vaal Dam, Grootdraai Dam, Sterkfontein Dam, Bloemhof Dam, Katse Dam, Mohale Dam, Woodstock Dam, Zaaihoek Dam, Jericho Dam, Westoe Dam, Morgenstond Dam, Heyshope Dam, Nooitgedacht Dam, Vygeboom Dam
Polokwane	254.27	100.5	98.6	98.4	The following 2 dams serve Polokwane: Flag Boshielo Dam, Ebenezer Dam
Crocodile West	444	92.9	90.3	90.4	The Following 7 dams serve Tshwane up to Rustenburg: Hartbeespoort Dam, Rietvlei Dam, Bospoort Dam, Roodeplaat Dam, Klipvoor Dam, Vaalkop Dam, Roodekopjes Dam
uMgeni System	923	101	99.7	99.3	The following 5 dams serve Ethekwini, iLembe & Msunduzi: Midmar Dam, Nagle Dam, Albert Falls Dam, Inanda Dam, Spring Grove Dam
Cape Town System	889	57	68.4	66.8	The following 6 dams serve the City of Cape Town: Voelvlei Dam, Wemmershoek Dam, Berg River Dam, Steenbras-Lower Dam, Steenbras-Upper Dam, Theewaterskloof Dam

Water Supply Systems/clusters	Capacity in 10^6m^3	25 March 2023 (% FSC)	18 March 2024 (%FSC)	25 March 2024 (% FSC)	System Description
Crocodile East	159	100.5	100.3	100.5	Kwena Dam supplies Nelspruit, KaNyamazane, Matsulu, Malelane and Komatipoort areas and Surroundings
Orange	7 996	97.9	90.8	89.6	The Following two dams service parts of the Free State, Northern and Eastern Cape Provinces: Gariep Dam, Vanderkloof Dam
uMhlathuze	301	80	98.4	98.7	Goedertrouw Dam supplies Richards Bay, Empangeni Towns, small towns, surrounding rural areas, industries and irrigators, supported by lakes and transfer from Thukela River

Table 4: Water Supply Systems with Restrictions

Water Supply Systems/clusters	Restrictions
Algoa	The 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.
Bloemfontein	A 15% restriction has been recommended on Domestic and Industrial water supply when the system drops below 95%, notice yet to be gazetted.
Polokwane	20% restrictions on Domestic and Industries

An Overview of National Flouride Concentrations in South Africa

Water Fluoridation and defluoridation of drinking water have systemic and topical effects on human health. Several research studies suggest that an optimal water fluoride content is between 0.5 and 0.7 mg/l (du Plessis, 1995; DWAF, 1996; SABS, 2001), while the World Health Organization (WHO) suggests an ideal range of 0.5 to 1 mg/l (WHO, 1994). Figure 8 shows that the Country's surface water fluoride levels are typically low (0.4 mg/l or less). A few instances of high fluoride levels were detected in the Limpopo and Eastern Cape provinces, as shown by the red dots in Figure 8. The southernmost stretch of the Ga-Selati River in Limpopo province has an average fluoride concentration of 3.4 mg/l. The high fluoride concentrations in Ga-Selati River have previously been linked to return flows from the mining complex surrounding Phalaborwa into the Ga-Selati River (Van Veelen and Dhemba, 2011).

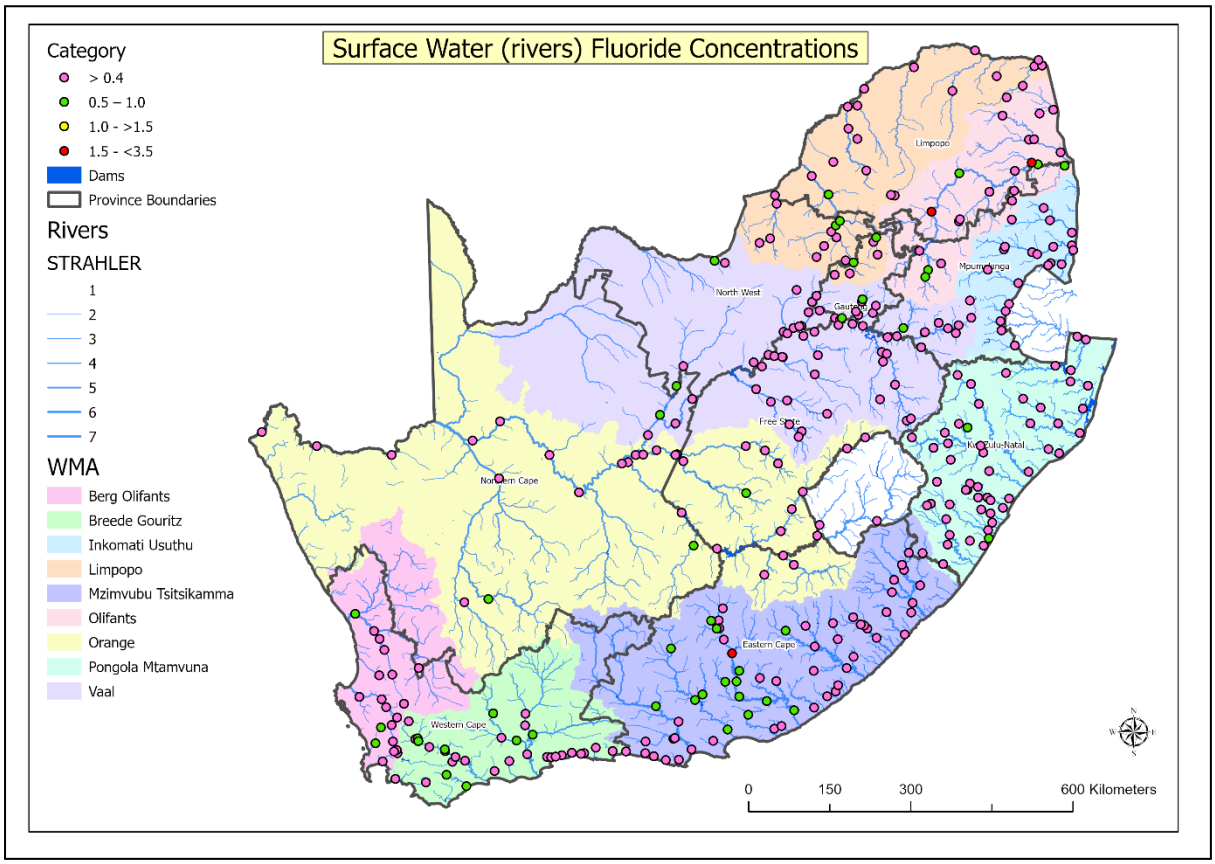


Figure 8: Map depicting median fluoride concentrations in South Africa from 1970 to 2023

In the Eastern Cape Province, a median fluoride concentration of 1.5 mg/l was found at one site on the Elands River. This, however, is due to the natural geology and land cover at that location, where the area comprises forests and cultivated land in Scherp Arabie (Hohls *et al.* 2001). Flouride, at an optimal concentration (0.5 - 1.0 mg/l), protects teeth, particularly in children aged 1 to 10 years (DWAF, 1996). The environment is also tolerant to fluoride at lower concentrations (<2 mg/l). However, drinking water with fluoride concentrations above 3 mg/l may have health effects, including severe tooth damage, particularly in newborns, and can affect food-producing sectors. According to DWAF (1996) the threshold for chronic fluoride exposure is manifested as skeletal damage, which can be determined primarily through radiological examinations.

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Glossary

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

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