

September 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 April. The rains in September were primarily concentrated in the winter rainfall region along the Western and some isolated parts of Limpopo and Mpumalanga. Some parts of the Western Cape received more than 120 mm of total rainfall in September 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 forecasts above-normal minimum and maximum temperatures during this period.

As of 30 September 2023, 28% of the national 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, remained 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 30 September 2023, storage in the system had progressively improved to 49.2% of FSC, up from 19% in the previous year. The comparison of dam storage levels for September 2022 and September 2023 demonstrates that all provinces have storage levels equal to or greater than the previous year's at the same time of reporting.

Resource Quality Information Services (RQIS) is a directorate under the Water Resource Management branch within the Chief Directorate: National Water Resource Information Management. RQIS is situated in the northeast of Pretoria against the tranquil backdrop of Roodeplaat Dam and the surrounding hills. The responsibility for reporting on surface water quality in South Africa rests with RQIS.

## Rainfall

The distribution of total monthly rainfall across the country from April to September 2023 is presented in [Figure 1](#). Above-average rainfall was observed across the country, with wetter-than-normal conditions across parts of the Western and Eastern sides of the country. The Western Cape recorded rainfall amounts of >120 mm. Below-average precipitation was observed in most parts of the Northern Cape, North West and Limpopo.

The monthly rainfall anomalies expressed as a percentage of normal rainfall are presented in [Figure 2](#). Above-normal rainfall for September was experienced in the Western side of the country and some isolated parts of Limpopo and Mpumalanga 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.

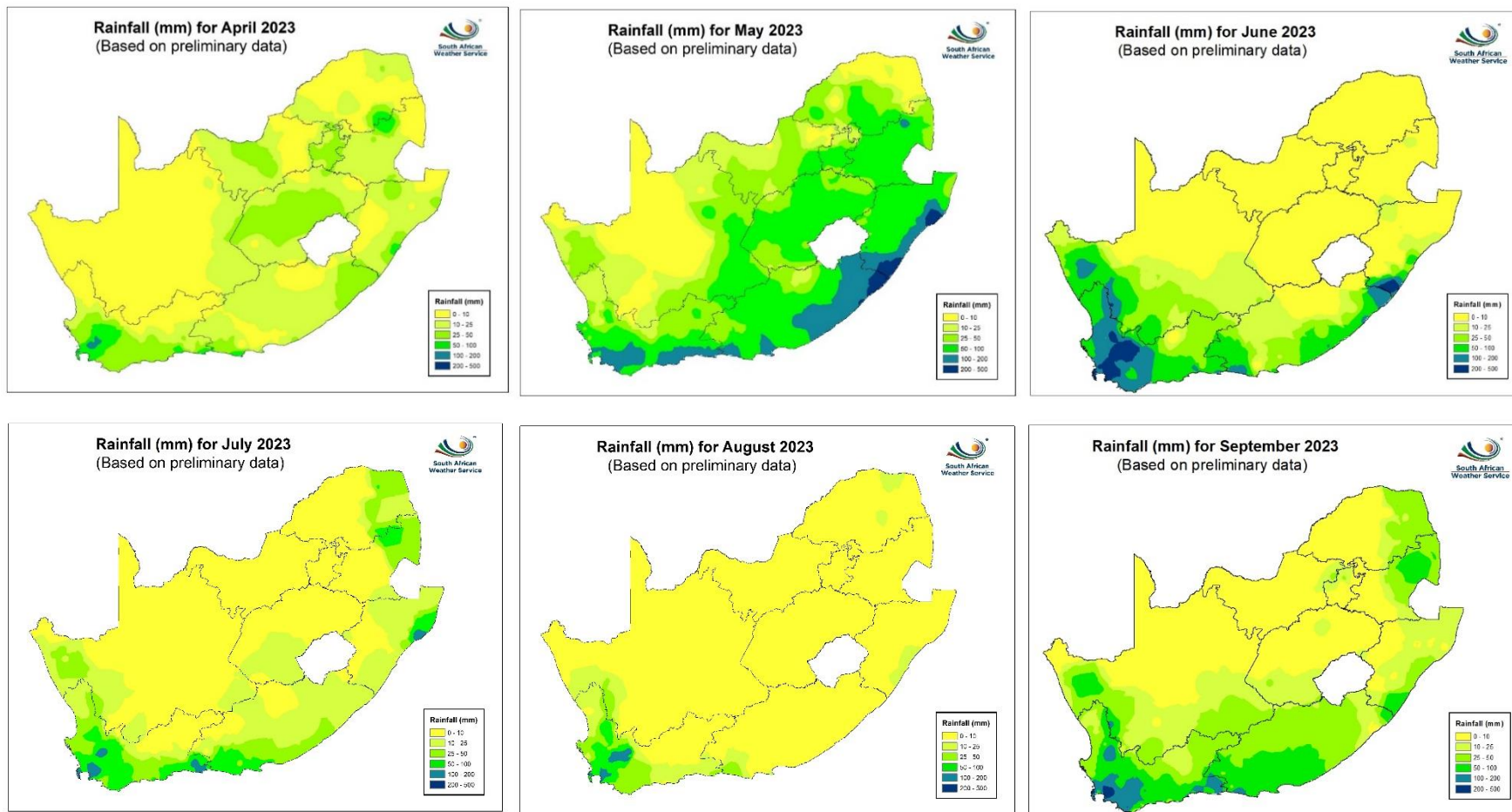


Figure 1: Winter season monthly rainfall distribution from April to September 2023 (Source: SAWS <https://www.weathersa.co.za/home/historicalrain>)

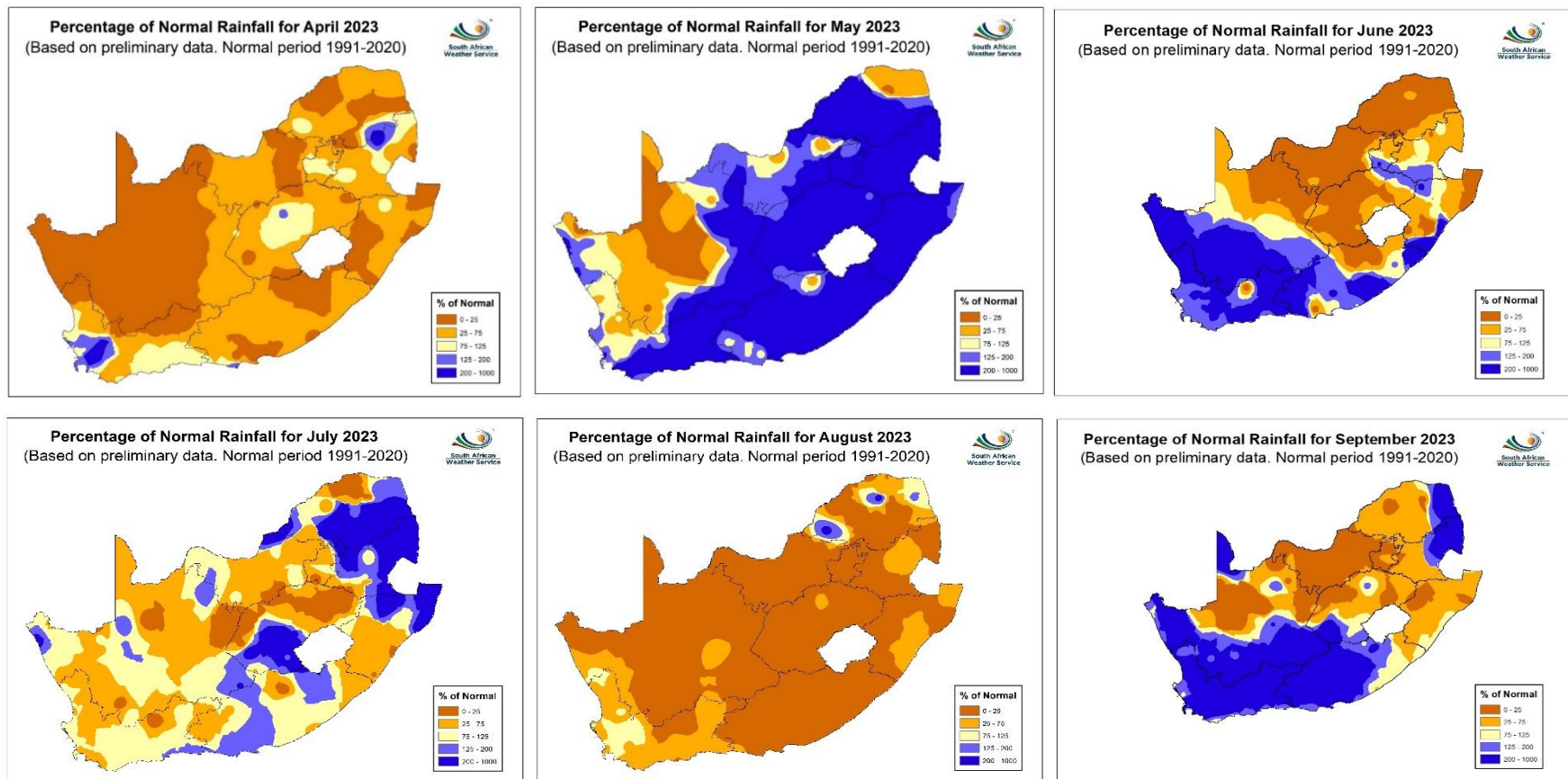


Figure 2: Winter season Percentage of normal rainfall from April to September 2023. Blue shades are indicative of above-normal rain, and the darker yellow shades of below-normal rainfall [Source: SAWS <https://www.weathersa.co.za/home/historicalrain>]

## National Dam Water Storage

The 24-month (long-term) Standardised Precipitation Index (SPI) for September 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, **28%** 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 83.4% FSC (Pongolapoort Dam) and 99.1% FSC (Bloemhof Dam) for the last week of September 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 (September 2023)*

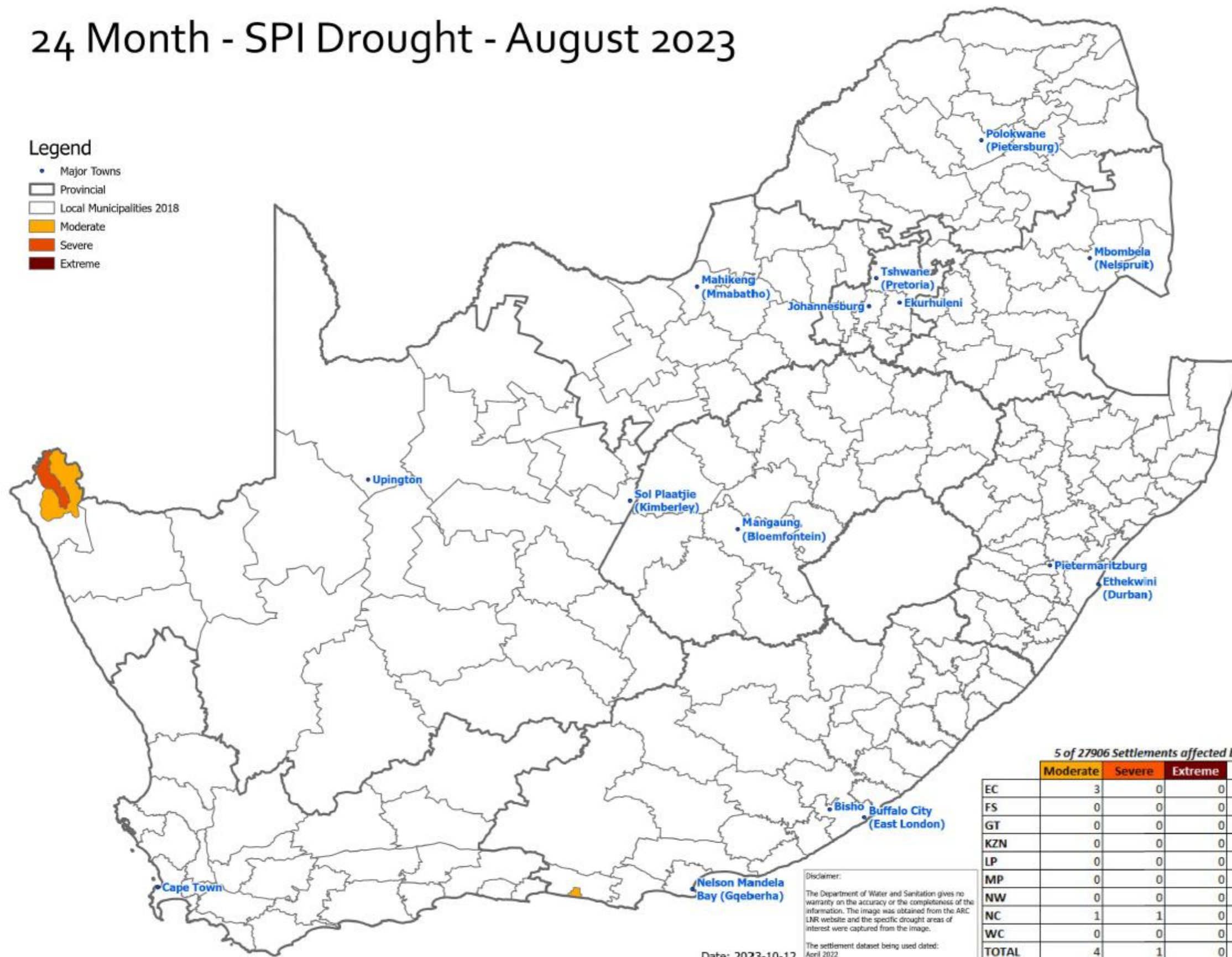
Reservoir	River	Province	25 September 2023 (% FSC)
Middle-Letaba Dam	Middle-Letaba River	Limpopo	3.9
Nuwejaars Dam	Nuwejaarspruit River	Eastern Cape	4.6

The Sarah Baartman (48.5%) is the only District Municipality with below 50% FSC for 30 September 2023. [Figure 4](#) illustrates the dam storage's spatial distribution and status for 26 September 2023.

# 24 Month - SPI Drought - August 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
<b>TOTAL</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>5</b>	<b>27906</b>

**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 LMR website and the specific drought areas of interest were captured from the image.  
 The settlement dataset being used dated: April 2022

Date: 2023-10-12

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

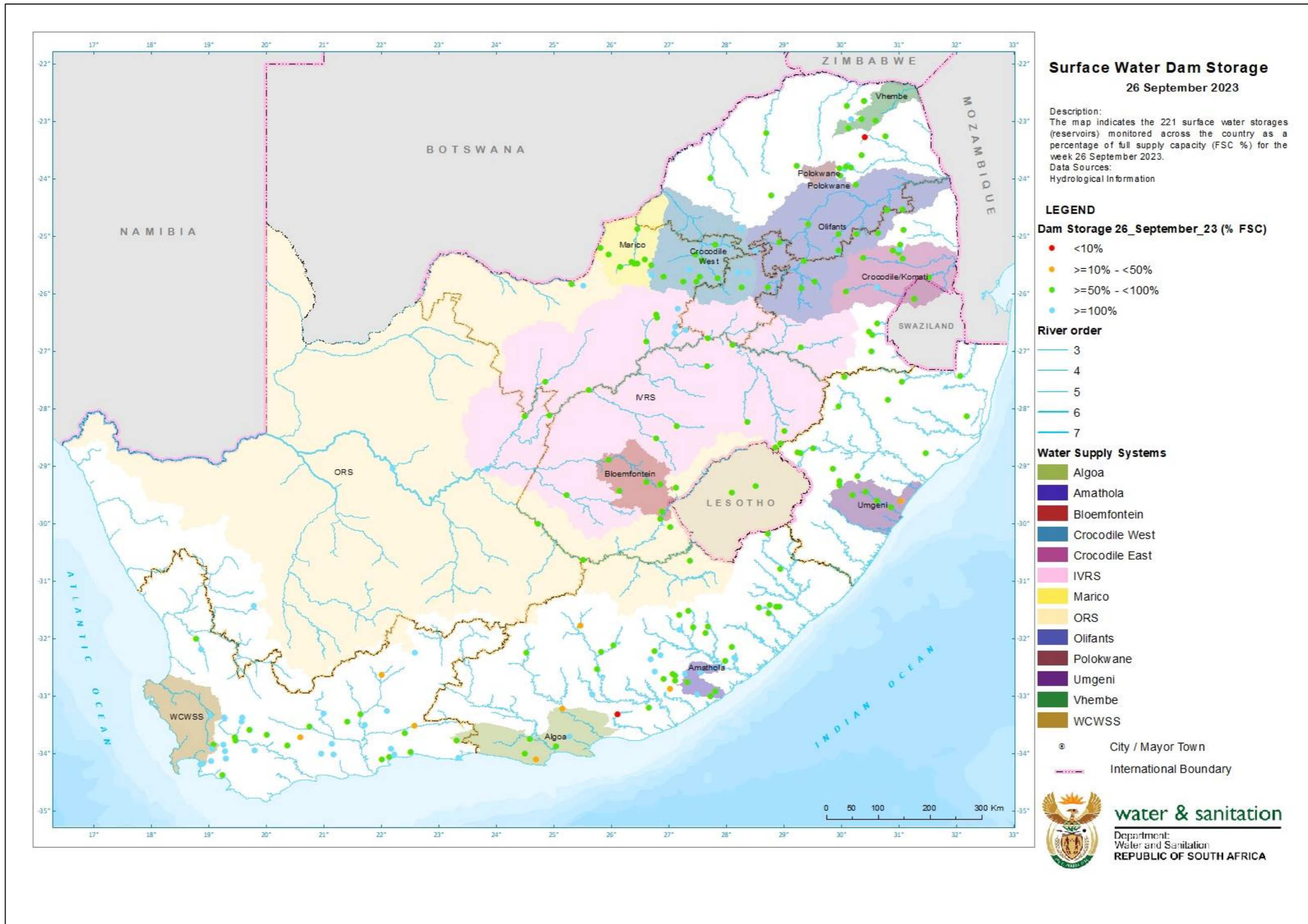
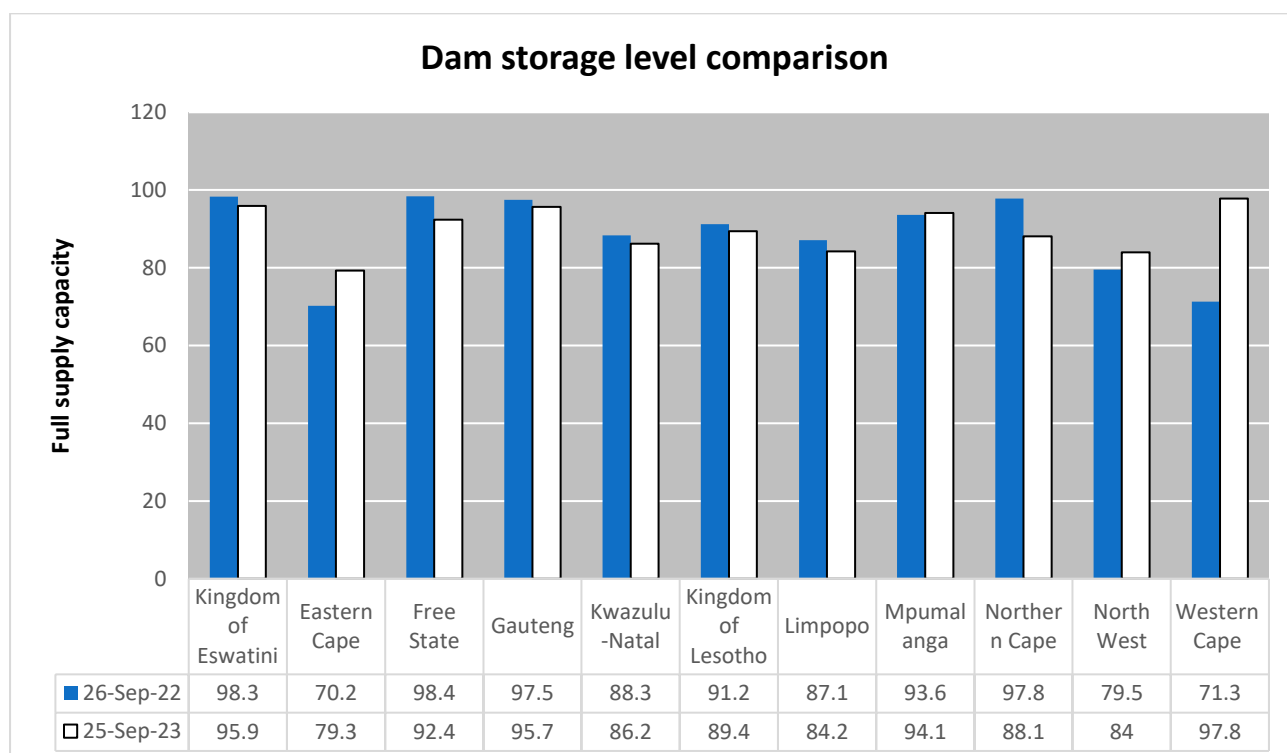


Figure 4: Water Supply System and dam storage – end of September 2023

The comparison of dam storage levels for September 2022 and September 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.

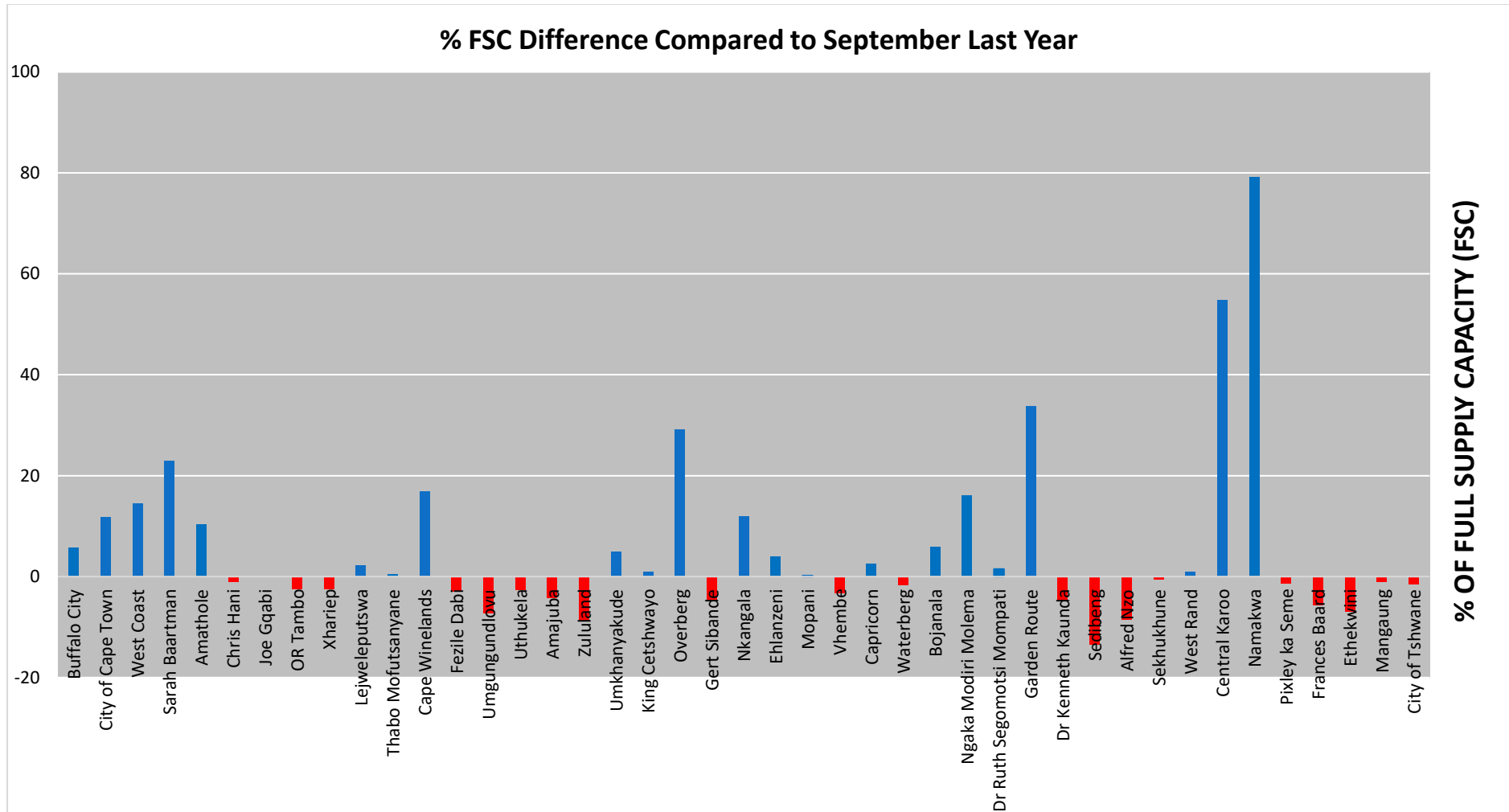


*Figure 5: Water Storage Levels per Province/Country September 2022 vs. September 2023.*

The water storage levels comparison per District Municipalities (DM) is presented in Figure 6. Namakwa DM, Sarah Baartman DM, Central Karoo DM, Garden Route DM, and Overberg DM have experienced a significant increase compared to last year. In contrast, the Umgundlovu DM, Zululand DM, Sedibeng DM, Alfred Nzo 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 September 2022 vs September 2023*

*Table 2: Water Supply Systems storage levels and applicable restrictions*

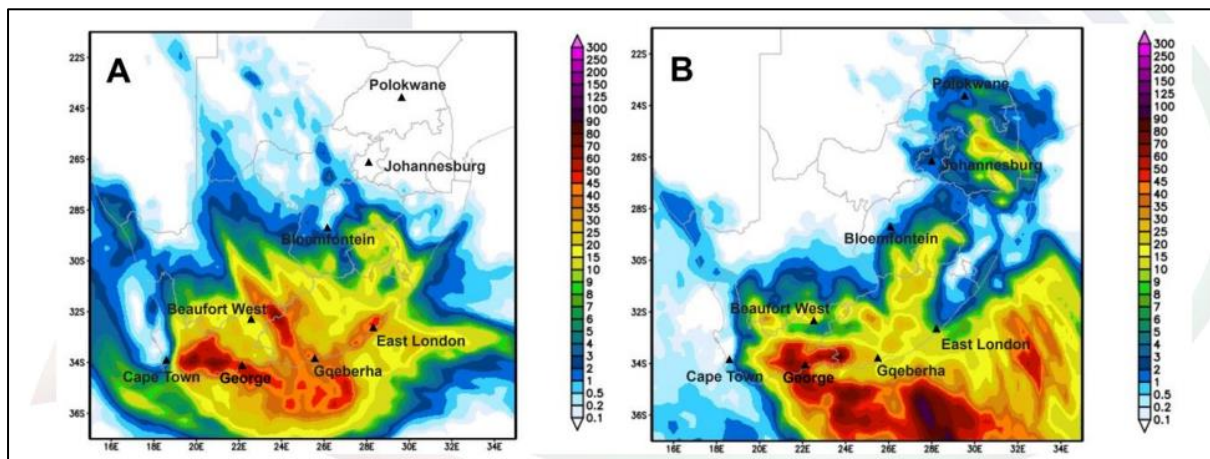
Water Supply Systems/clusters	Cap in 10 m <sup>6 3</sup> (% FSC)	25 September 2022 (% FSC)	18 September 2023 (% FSC)	25 September 2023 (% FSC)	Comments (systems below 50% in red)
Algoa System	282	19	48.9	49.8	System of 5 dams for Nelson Mandela Bay Metro, Sarah Baartman (SB) DM, Kouga LM and Gamtoos Irrigation: <b>Water restrictions imposed as from 1 June 2023, Urban (Domestic and Industrial) = 30%, Irrigation = 65%, these are yet to be gazetted.</b>
Amatole System	241	84.2	97.4	99.7	System of 6 dams for Bisho & Buffalo City, East London: <b>No restrictions for 2023/2024.</b>
Klipplaat System	57	100.6	100.1	100.7	System of 3 dams for Queenstown (Chris Hani DM, Enoch Ngijima LM): <b>10% for domestic and 50% for irrigation use. Restrictions were gazetted on 17 December 2021</b>
Butterworth System	14	100.2	95.9	100.2	Xilinx Dam and Gcuwa weirs for Butterworth: <b>Domestic restrictions of 20% still in place (Covid and community frustration occurring, further interventions like augmenting river flows from upstream Dams)</b>
Integrated Vaal River System	10 546	94.6	92.3	91.6	System of 14 dams serving Gauteng, Sasol, and ESKOM: <b>No restrictions, the system recovered reasonably well since the February/March flooding event</b>

Water Supply Systems/clusters	Cap in 10 <sup>6</sup> m <sup>3</sup> (% FSC)	25 September 2022 (% FSC)	18 September 2023 (% FSC)	25 September 2023 (% FSC)	Comments (systems below 50% in red)
Polokwane	254	97.5	97.9	96.8	<u>System of 7 dams serving Polokwane and surroundings:</u> 20% restrictions on Domestic and Industries
Crocodile West	444	91.4	95.7	94.5	<u>6 dams for Tshwane up to Rustenburg:</u> No restrictions
Luvuvhu	225	100.6	98.2	97.7	<u>System of 3 dams for Thohoyandou etc:</u> No restrictions
Umgeni System	923	95.3	88.3	87.5	<u>System of 5 dams serving Ethekeini, iLembe &amp; Msunduzi:</u> No restrictions
Cape Town System	889	85.3	102	109.4	<u>System of 6 dams for the City of Cape Town:</u> No restrictions
Bloemfontein	219	95.1	95.3	94.9	<u>System of 3 dams serving Bloemfontein, Botshabelo and Thaba Nchu:</u> 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	93.8	94.8	92.6	<u>Kwena Dam supplies Nelspruit, Kanyamazane, Matsulu, Malelane and Komatipoort areas &amp; Surroundings:</u> No Restrictions
Orange	7 996	94.8	93.4	92.3	<u>Two dams serving parts of the Freestate, Northern and Eastern Cape Provinces:</u> No restrictions
uMhlathuze	301	97.8	98.9	98.7	<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

## Western Cape Floods and Dams Storage Synopsis

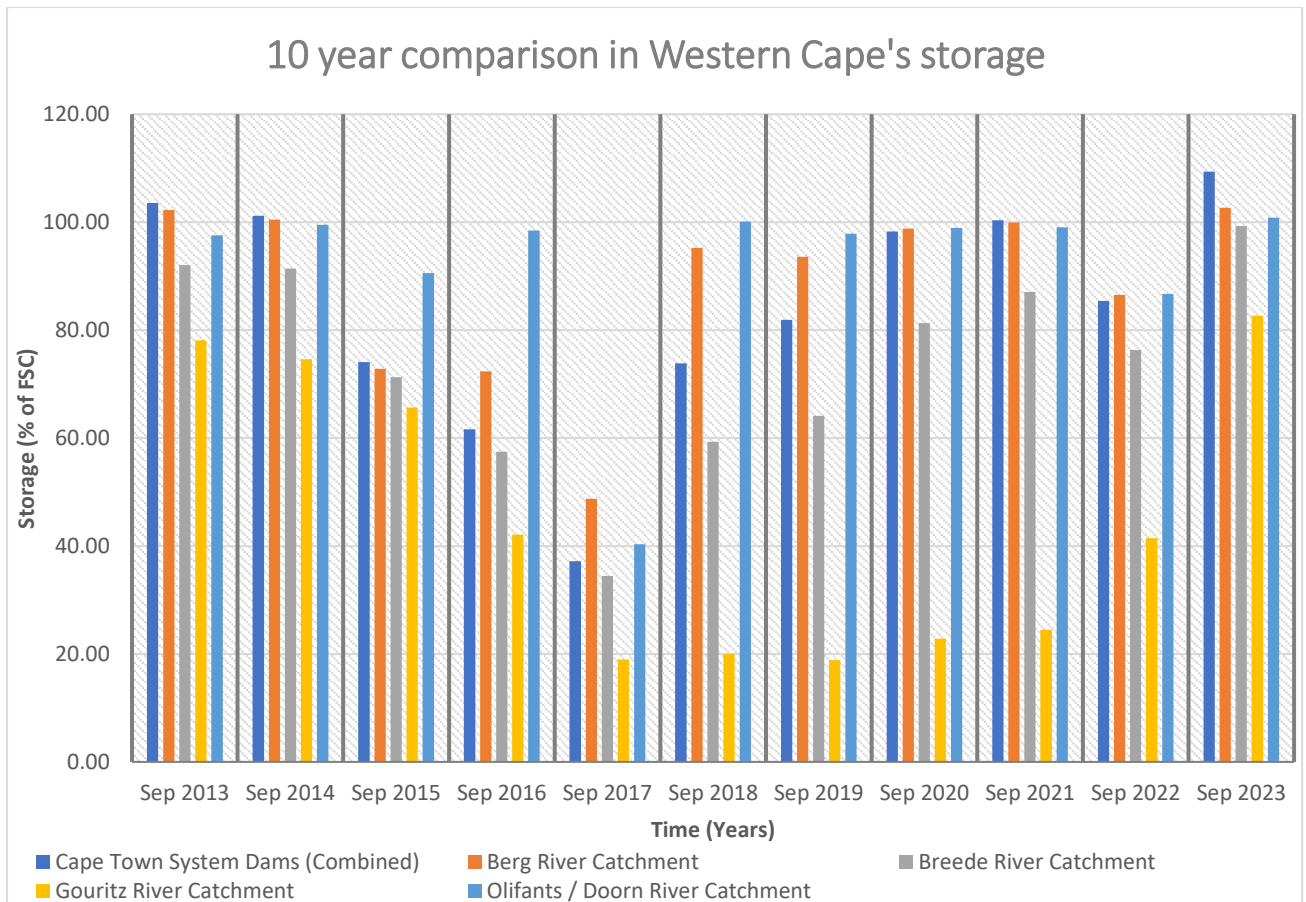
Heavy rainfall is common in the Western Cape this time of the year. The province is located in a winter rainfall region with wet winters and dry summers and is well known for its heavy winter rainfalls. Heavy rains wreaked havoc again in the province on 23-26 September 2023, following flood events on 14-15 June 2023, causing flooding, mudslides, river overflow, and some severe weather-related incidents that resulted in casualties and damage in several areas. The recent floods were caused by a cut-off low-pressure system (the equatorial displacement of a low-pressure system at high altitudes) that formed along South Africa's west coast on Saturday (23 September) (SAWS, 2023). *Cut-off lows are notorious for causing widespread severe weather, including flooding and heavy rainfall.*

SAWS issued a yellow/orange level 2 and level 6 disruptive rainfall warning for the Western Cape province, which was valid from 24-25 September 2023. The weather service predicted that rainfall accumulations would reach 120mm. Figure 7 depicts detailed numerical weather prediction data indicating 24-hour accumulated rainfall from 24-25 September.



*Figure 7: Numerical weather prediction data indicating 24-hour accumulated rainfall for A) Sunday (24 September) and B) Monday (25 September). (Source: Global Forecast System, NCEP)*

The recent rainfalls have significantly improved dam storage in the Western Cape; a storage increase of **(+5.4%)** was reported in the last week of September, while the Cape Town System reported a storage of **109.4%** for the week. **TheeWaterskloof, Voelviei, and Bellair Dams in the Western Cape were reported to be overflowing, with the Bellair Dam overflowing for the first time since 2015.** Figure 8 below depicts a 10-year comparison of Western Cape storage, with storage in September 2023 being the highest in the last ten years.



*Figure 8: 10-year comparison in Western Cape's Dams Storage.*

## Spotlight on DWS: Resource Quality Information Services (RQIS)

RQIS is a directorate under the Water Resource Management (WRM) branch within the Chief Directorate: National Water Resource Information Management. RQIS is situated in the northeast of Pretoria against the tranquil backdrop of Roodeplaat Dam and the surrounding hills (Figure 9). The responsibility for reporting on surface water quality in South Africa rests with RQIS.



Figure 9 RQIS, June 2001, looking north-west. Aerial photo by B. Hohls

### Background

RQIS began as the Hydrological Research Institute (HRI) in 1972 with the main function of the provision of hydrological data to the then Department of Water Affairs. Testing laboratories for major inorganic salts began in 1974, and Trace Metal, Organic, and Biological laboratories were added by 1978. In 1994, the HRI changed its name to the Institute for Water Quality Studies (IWQS) due to growing concern for water quality resulting from economic development and water use. The IWQS focused on water quality analysis and investigations and adopted a holistic approach to sustainable management of resource quality. After restructuring and transformation in 2003, IWQS was changed to Resource Quality Services (RQS) with a growing emphasis on the provision of information. In 2014, RQS changed to Resource Quality Information Services (RQIS)

The core business of RQIS is to effectively design and implement the national water resource quality monitoring programmes and provide this information to stakeholders. The services and products of RQIS include:

- Development and management of water quality and laboratory information system;

- The development, implementation and operation of strategic national water resource quality monitoring programmes, including coordination of stakeholder sampling and national water resource quality reporting;
- Analysis of water quality samples, development of sample analysis techniques and accreditation of laboratories;
- Provision of quality assurance to RQIS analytical services, national water resource quality monitoring programmes and information systems, including monitoring and technical support functions; and
- Provision of administrative support to management and scientific functions.

RQIS comprises the following three sub-directorates along with an administration unit:

- Resource Quality Monitoring;
- Analytical Services; and
- Resource Quality Information.

### **Resource Quality Monitoring (RQM)**

The main responsibility of the RQM sub-directorate is to set up National Monitoring Systems. These systems are designed, reviewed, and implemented to monitor the quality of surface water and aquatic ecosystems at the national level. RQM is also responsible for developing frameworks, strategies, standards, and information management systems, such as the National Wetlands Management Framework, National Water Resource Strategy, Rehabilitation Management Guidelines, and Sampling Techniques. Additionally, RQM conducts ad hoc studies and investigations on water resource quality, such as **fish kill incidents and outbreaks of water-borne diseases**.

RQM provides information required for DWS to perform its custodian role through:

- National State of Water and Sanitation Report;
- State of Rivers Report;
- Water quality status and trends report to different stakeholders;
- Resource Directed Measures Reports and Sources Directed Studies; and
- Water Quality Planning Studies such as the Integrated Water Quality Management Strategy.

Information is provided at Local, Provincial and National government levels through:

- Water Quality Health Risk Reports;
- State of the Environment Report; and
- Ad hoc Water quality Reports such as Pollution incidents.

Information is also provided in terms of international agreements and for International Water Resources Strategic and Development Planning through:

- United Nations Environment Programme South Africa Global Environment Monitoring System (UNEP SA GEMS) Report;
- SDG 6.3 Ambient Water Quality Report; SDG 6.6. Spatial Extent (Wetlands, Lakes & Estuaries), River Condition, Dams and Lakes Trophic and Turbidity Reports & SDG 6.B.1 Report (Citizen Science);
- The United Nations Educational, Scientific and Cultural Organization (UNESCO) Citizen Science & RAMSAR Reports;

- Organisation for Economic Co-operation and Development (OECD) - Working Party on Biodiversity, Water and Ecosystems; and
- Transboundary Technical Water Quality Reports such as The Limpopo Watercourse Commission (LIMCOM) and The Orange-Senqu River Commission (ORASECOM).

## **Analytical Services**

The Analytical Services sub-directorate of RQIS plays a vital role in managing water resources and water supply by analysing water quality. It provides a wide range of data and information on various water quality constituents, including major salts, nutrients, trace metals, biological entities and organic contaminants. Analytical Services comprises three Biology laboratories (Microbiology, Hydrobiology and Toxicity) and three Chemistry laboratories (Organic, Inorganic and Trace Metal). These laboratories are equipped with computer technology and laboratory equipment and have specialist groups that work together to analyse water samples and provide comprehensive support for water resource management.

Analytical Services offers its services to DWS and other government departments while adhering to the ISO/IEC 17025:2017 standard. This standard outlines the requirements for competency, impartiality and consistent operation of the laboratories. The Analytical Services laboratories were previously accredited by the South African National Accreditation System (SANAS); however, accreditation was withdrawn in 2018 due to the suspension of Supply Chain Management requests. Plans to obtain accreditation for the laboratories again are underway and the latest update on laboratory accreditation is that the Hydrobiology and Microbiology have just achieved SANAS accreditation.

## **Scope of Analysis**

The following determinants form part of the scope of test work on potable water, groundwater and surface water samples conducted at RQIS:

### **Hydrobiology Laboratory**

- Chlorophyll-a
- Phaeophytin-a
- Phytoplankton identification and enumeration
- Total suspended solids
- Quantiplate Microcystin

### **Microbiology Laboratory**

- Enumeration of Total coliforms and Escherichia coli
- Standard Plate Count

### **Toxicity Laboratory**

- Selenastrum capricornutum growth inhibition test
- Vibrio fischeri bioluminescent bacteria test



### **Inorganic Chemistry Laboratory**

- Ammonia as N, Chloride, Electrical Conductivity at 25°C, Fluoride, Nitrate, Nitrite, Orthophosphate as P, pH, Potassium, Silicon, Sodium, Potassium, Calcium, Magnesium, Sulphate, Total Alkalinity, Total Kjeldahl Nitrogen, Total Oxidised Nitrogen, Total Phosphate and Turbidity.

### **Organic Laboratory**

- Persistent Organic Pollutants
- Pesticide residues and other selected organic pollutants in water and sediment samples.

### **Trace Metals Laboratory**

- Aluminium, Antimony, Arsenic, Barium, Beryllium, Bismuth, Boron, Cadmium, Cerium, Chromium, Cobalt, Copper, Iron, Lead, Manganese, Mercury, Molybdenum, Nickel, Selenium, Scandium, Strontium, Thallium, Thorium, Tungsten, Uranium, Vanadium, Zinc, Zirconium, Calcium and Magnesium
- Chemical Oxygen Demand

Water quality data are stored locally on a Laboratory Information Management System (LIMS) and then uploaded to the Water Management System database.

### **Resource Quality Information (RQI)**

The RQI sub-directorate has several responsibilities, which include registering samples, developing and maintaining information systems, and managing various complex projects. These projects include developing tools to assess the quality of resources and supporting the implementation of the National Water Act and Sustainable Development Goal 6. The sub-directorate is also responsible for developing information systems and managing the upgrade and maintenance of the RQIS information technology platform. The assessment tools developed by the sub-directorate provide graphical summaries of the ecological importance and availability of data.

### **The Water Management System (WMS)**

Water Management System (WMS) is a suite of computer programmes that provides vital information for monitoring and managing water resources in South Africa. The WMS's vision is to have an integrated computer system where various directorates and regions, with different mandates and functions, can collaborate and share information and workload. In this way, the Department of Water and Sanitation can ensure consistency in all its decisions and actions in water resource management. WMS features include:

- Map-based Water Quality Data Exploration Tools;
- Text-based Monitoring Point Inventory;
- Eutrophication: Phosphorus and Chlorophyll-a summaries;
- Microbial assessments and
- Ecosystem data.

Further information on RQIS can be found at: [https://intranet.dws.gov.za/Dir\\_IWQS](https://intranet.dws.gov.za/Dir_IWQS)

## 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 <sup>3</sup> /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

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National State of Water Report:

[www.dws.gov.za/Projects/National%20State%20of%20Water%20Report/default.aspx](http://www.dws.gov.za/Projects/National%20State%20of%20Water%20Report/default.aspx)

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