June 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 experiences winter rainfall in the southwestern parts of the country and summer rainfall in the eastern part of the country. In the Western Cape, the Winter rainfall season has commenced, as expected in June. The southwestern tip of the country has a Mediterranean climate with hot summers and cool, wet winters. The country is currently in a weak El Niño-Southern Oscillation (ENSO), predicted to rapidly decline into a neutral state by mid-to-end of winter.

At the end of June 2024, the national dam levels were at **85.8%** of Full Supply Capacity (FSC). This level is lower than last year, at the same time as reporting when national storage was **95%** of FSC. Approximately **26%** of the national dams were **above 100% of FSC** (either full or spilling)**, 64%** were between 50 and 100% of FSC, **9%** were between 10 and 50% of FSC, while at least **1%** were below 10% of FSC (critically low).

The most recent 24-month Standardised Precipitation Index revealed that the Namakwa District in the Northern Cape Province, the Thabo Mafutsanyane District in the Free State, the Sarah Baartman District in the Eastern Cape, the Capricorn and the Mopani Districts in Limpopo were among the districts that had some areas experiencing severe drought. Other Districts such as the Zululand District in KwaZulu-Natal, Gert Sibande District in Mpumalanga, Bojanala and Ngaka Modiri Districts in North West, Sekhukhune Districts in Limpopo, Ekurhuleni and Sedibeng Districts in Gauteng and the City of Cape Town in Western Cape only experienced moderate drought.

After a relatively dry and warmer-than-normal month of May, some parts of the country experienced rainfall and snow over high-altitude areas in June. The precipitation resulted from a cut-off low-pressure system that developed over the western and southern parts of the country from 2 to 3 June 2024. The subsequent weather conditions caused storms and floods, particularly in KwaZulu Natal, the Eastern Cape, and the Western Cape, causing destruction and fatalities.

Rainfall

The country is currently in a weak El Niño-Southern Oscillation (ENSO), predicted to rapidly decline into a neutral state by mid-to-end of winter. The monthly rainfall distribution during the current hydrological year for the summer and winter seasons is presented in Figure 1 and Figure 2, respectively. Winter rainfall regions received good rainfall during the month of June 2024. Meanwhile, the summer rainfall regions experienced a decrease in June as expected. However, some areas in KwaZulu Natal received high rainfall. Between 50-100 mm of rainfall was received over isolated parts of the KwaZulu-Natal, Western Cape, and Eastern Cape Provinces.

The monthly rainfall anomalies expressed as a percentage of normal rainfall for the summer season and the beginning of the winter season are presented in Figure 3 and Figure 4, respectively. Above-normal rainfalls were received in isolated parts of the Western Cape, Free State, Northwest, Eastern Cape, and KwaZulu-Natal Provinces.

The South African Weather Service (SAWS) multi-model rainfall forecast has indicated mostly below-normal rainfall over most parts of the country during the June-July-August 2024 (JJA), July-August-September 2024 (JAS), and August-September-October (ASO) forecast periods (Figure 5). In JAS, the southwestern parts of the country, which normally receive significant rainfall during the early winter season, are expected to receive mostly below-normal rainfall during this period, while only the northern parts of Mpumalanga are expected to receive slightly above-normal rainfall. Moreover, minimum and maximum temperatures are expected to be mostly above-normal countrywide.

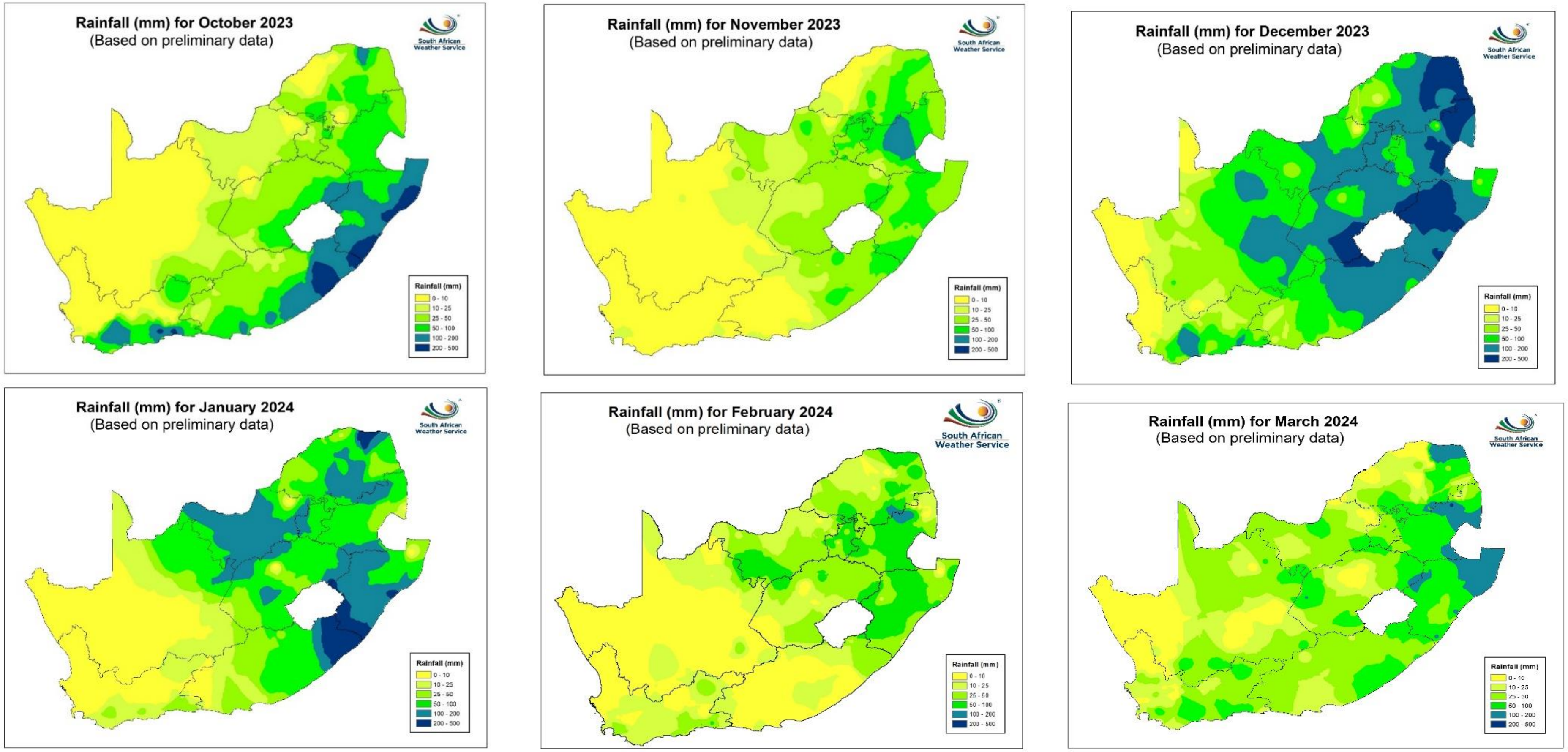


Figure 1: Summer season monthly rainfall distribution for October 2023 to March 2024 (Source: SAWS https://www.weathersa.co.za/home/historicalrain)

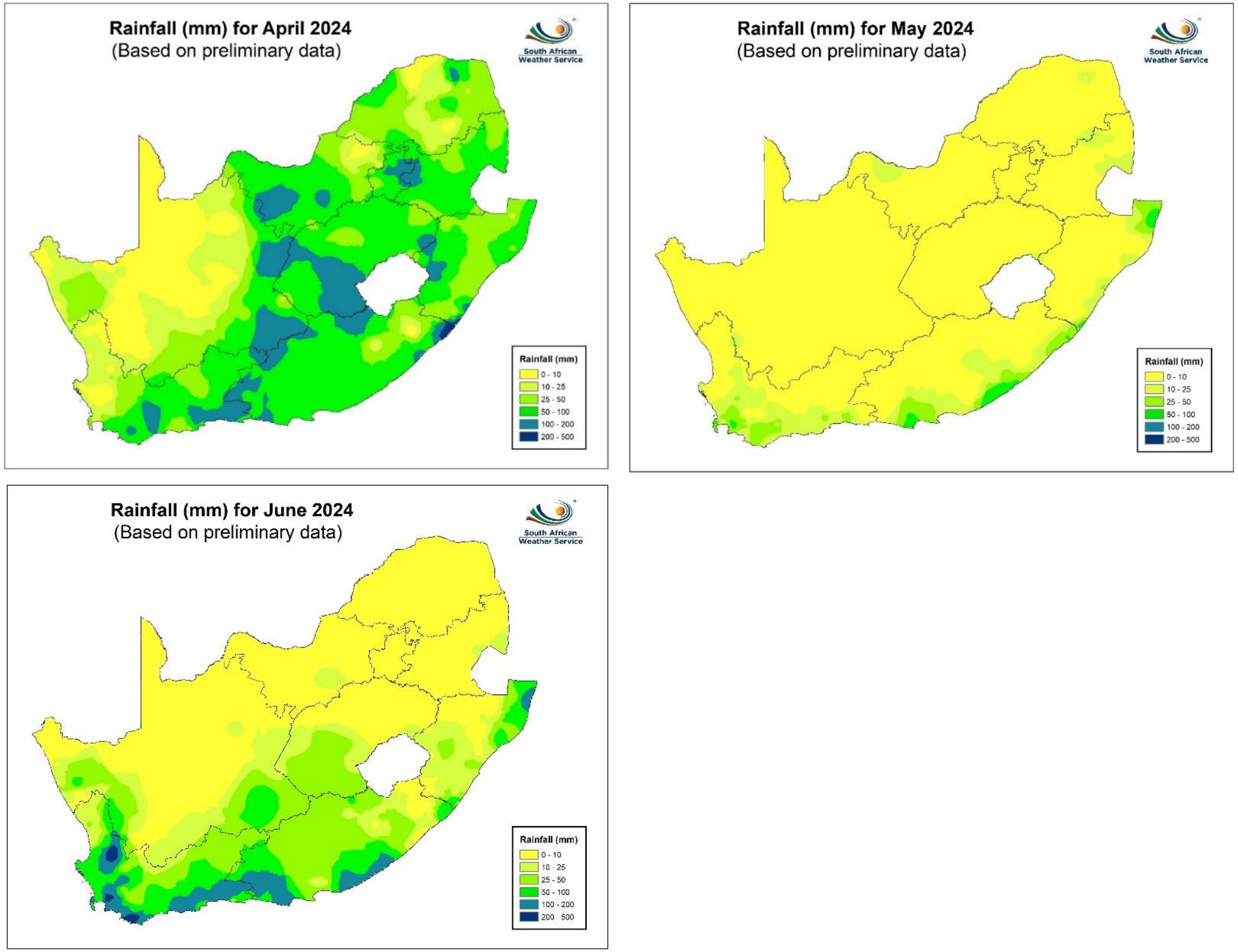


Figure 2: Winter season monthly rainfall distribution for April to June 2024 (Source: SAWS https://www.weathersa.co.za/home/historicalrain)

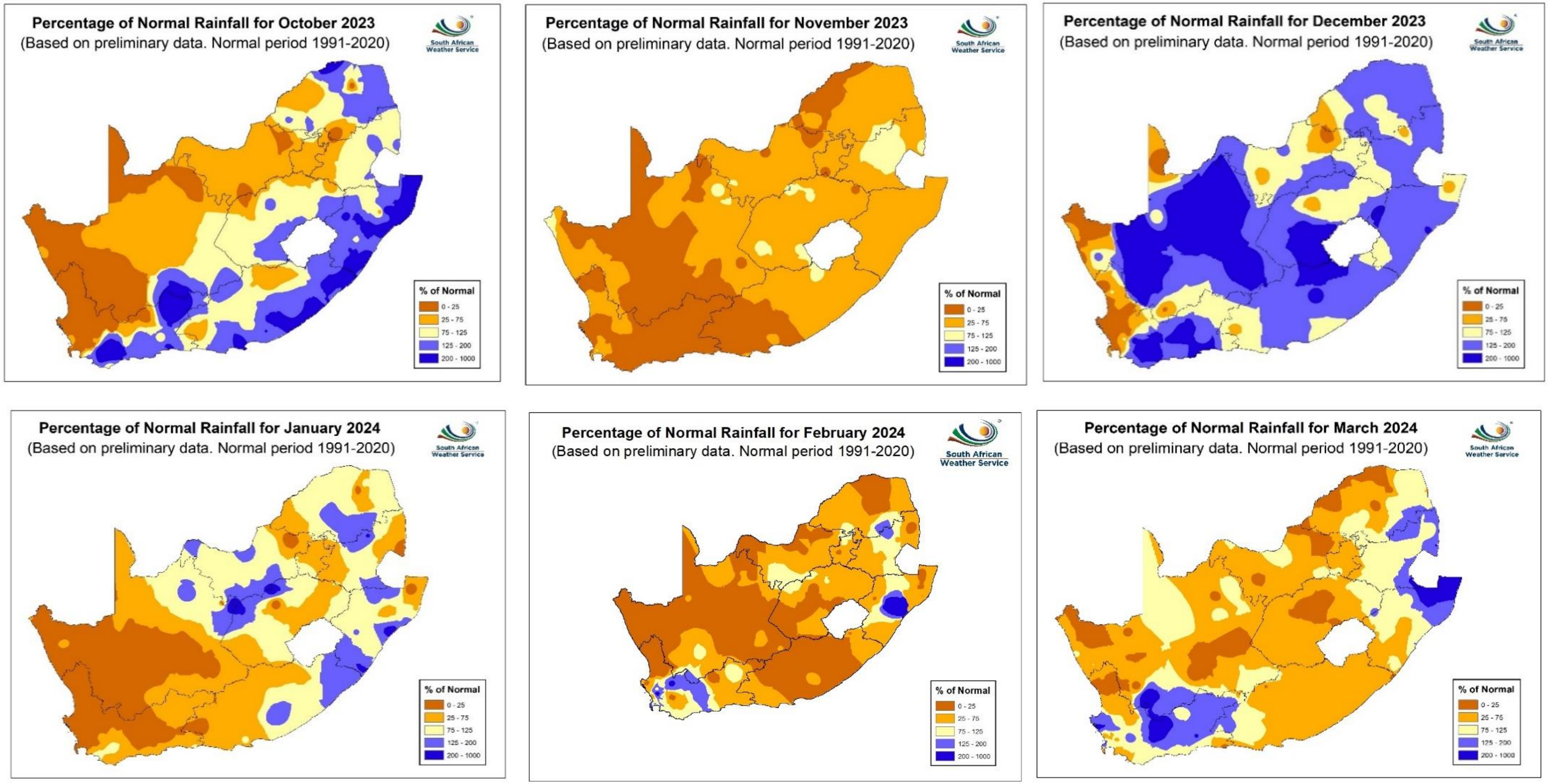


Figure 3: Summer season Percentage of normal rainfall for October 2023 to March 2024. Blue shades are indicative of above-normal rain, and the darker yellow shades of below-normal rainfall (Source: SAWS https://www.weathersa.co.za/home/historicalrain)

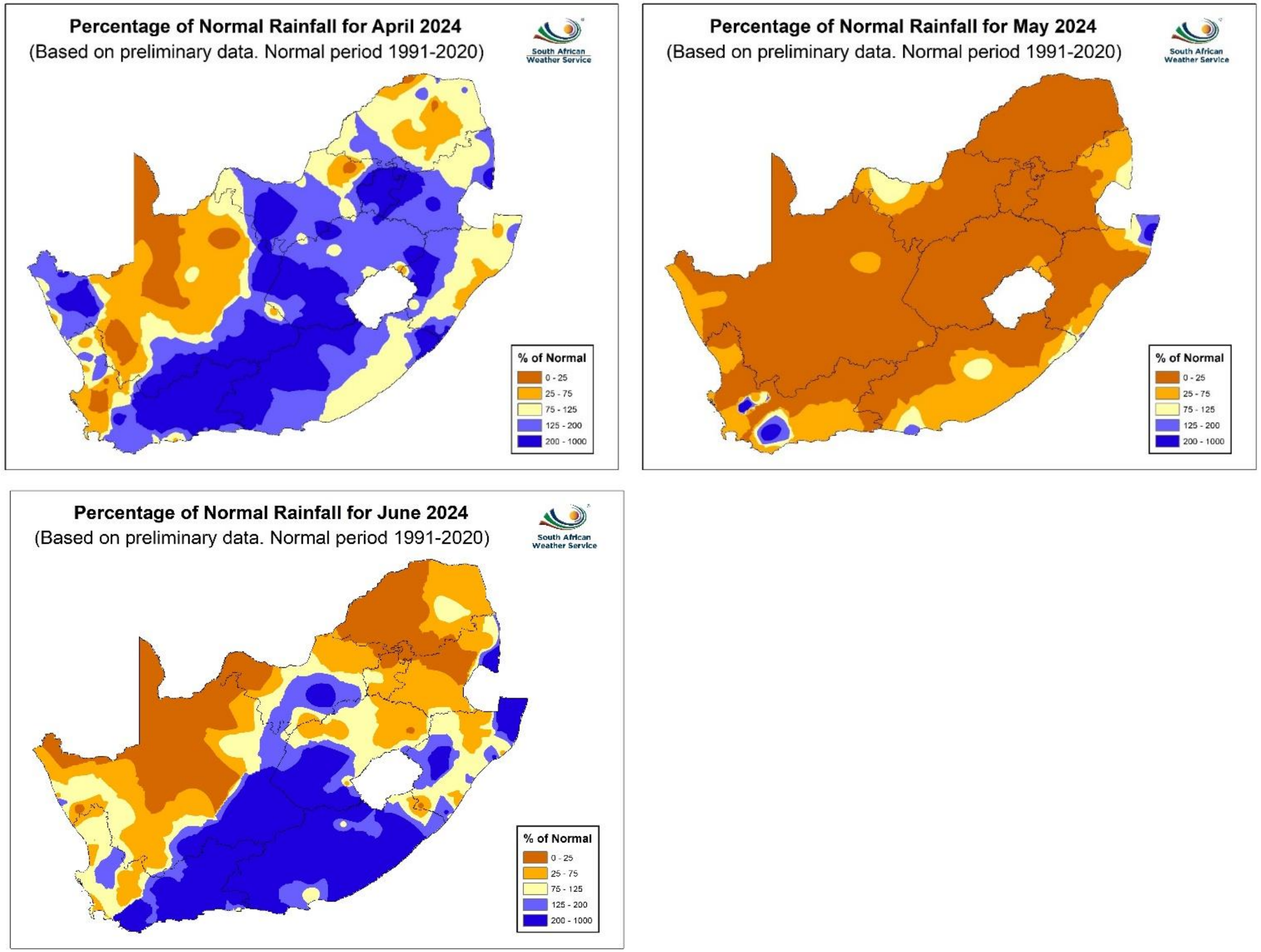


Figure 4: Summer season percentage of normal rainfall for April to June 2024. Blue shades are indicative of above-normal rain, and the darker yellow shades of below-normal rainfall (Source: SAWS https://www.weathersa.co.za/home/historicalrain)

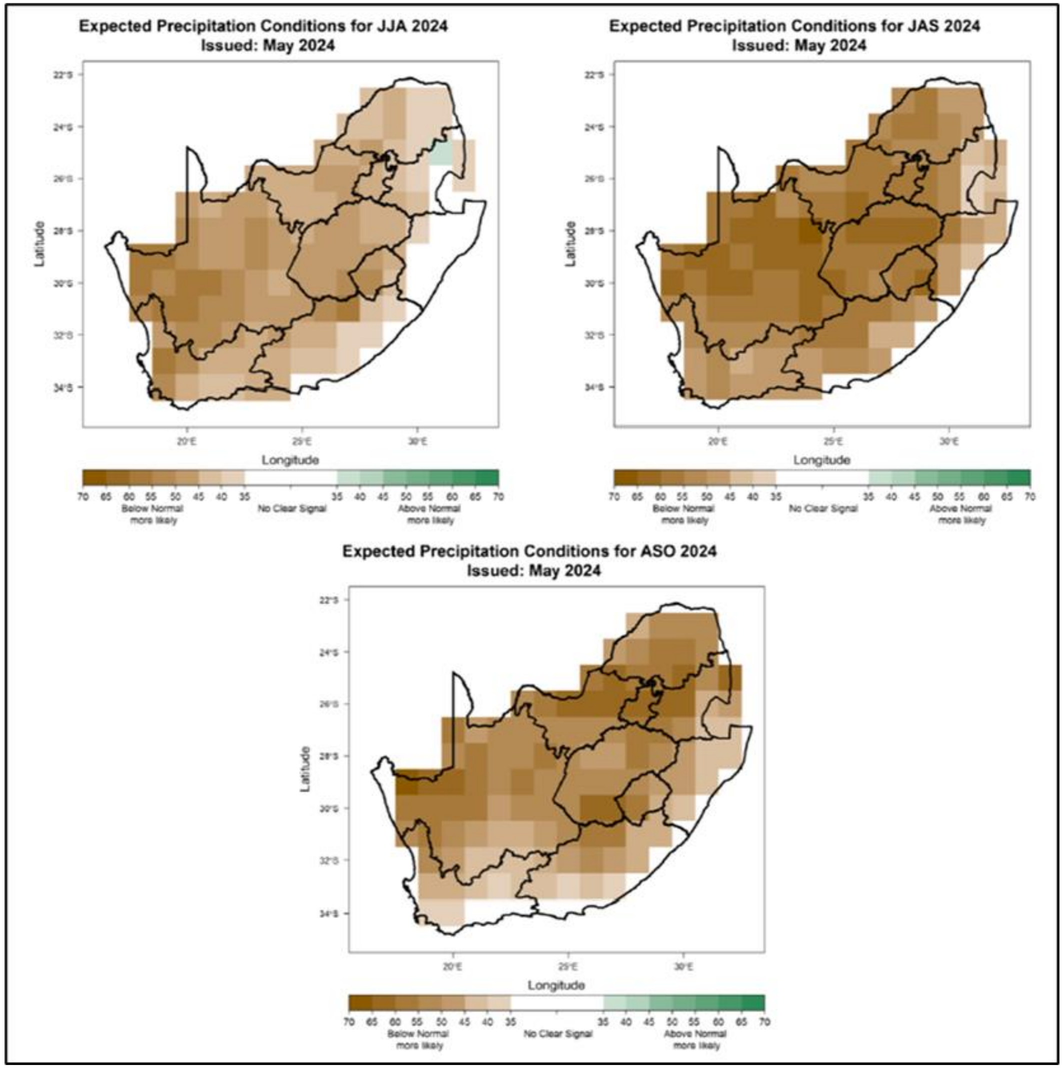


Figure 5: June-July-August 2024 (JJA; top left), July-August-September 2024 (JAS; top right), August-September-October 2024 (ASO; bottom) seasonal precipitation prediction. Maps indicate the highest probability of the above-normal and below-normal categories (Source: SAWS)

National Dam Storage

The national dam's water storage trends for the previous four hydrological years and the trend for the current hydrological year (2023/24) are presented in Figure 6 below. At the end of June 2024, the national dam levels were at **85.8%** of Full Supply Capacity (FSC). This level is lower than last year, at the same time of reporting when national storage was **95%** of FSC. Approximately **26%** of the national dams were **above 100% of FSC** (either full or spilling)**, 64%** were between 50 and 100% of FSC, **9%** were between 10 and 50% of FSC, and at least **1%** were below 10% of FSC (critically low).

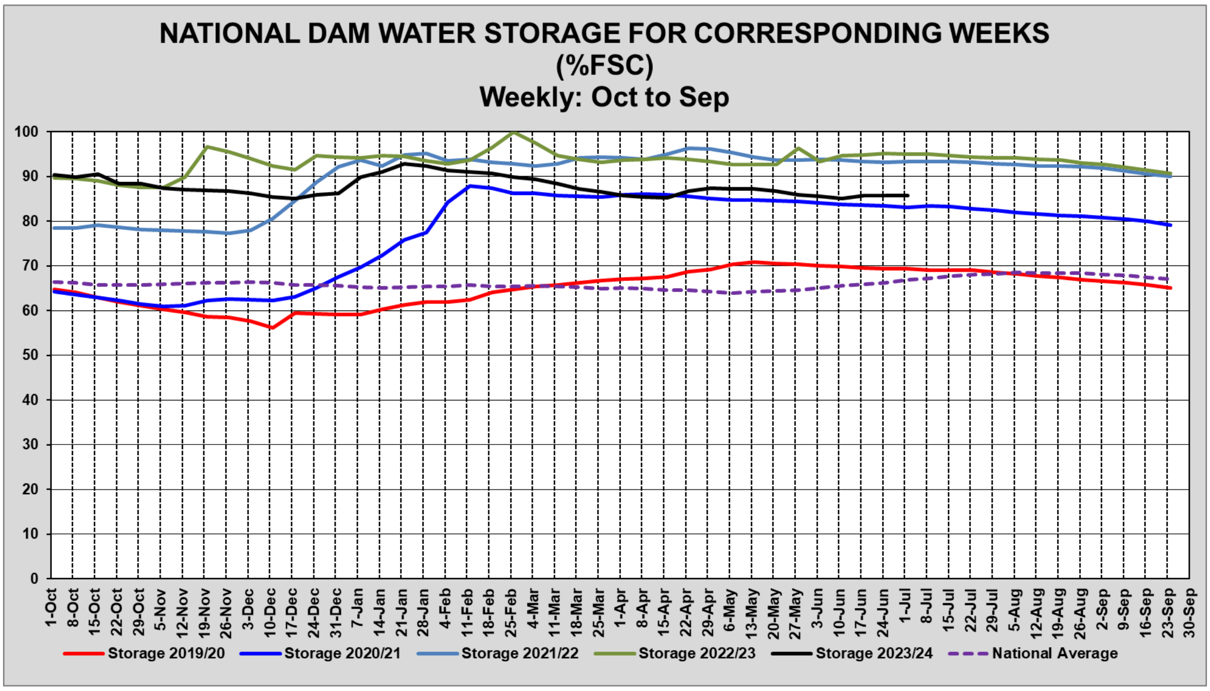


Figure 6: National Dam Storage on 24 June 2024

The comparison between June 2023 and June 2024 of the country's five largest dam storage %FSC is presented in Table 1. Due to the drier and warmer conditions experienced this summer compared to 2023, Gariep Dam and Sterkfontein Dam storage levels have declined by -40.3%, -16.9%, and -1.7 %, respectively.

The Middle-Letaba Dam in Limpopo Province remains the only dam at critical levels, as given in Table 2.

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

Reservoir	River	Province/Country	24 June 2023 (%FSC)	24 June 2024 (%FSC)	% Change (-/+)
Gariep Dam	Orange River	Free State	99.7	84	-16.9
Vanderkloof Dam	Orange River	Free State	99.3	99.8	0.5
Sterkfontein Dam	Nuwejaarspruit River	Free State	100.8	99.1	-1.7
Vaal Dam	Vaal River	Free State	94	53.7	-40.3
Pongolapoort Dam	Phongolo River	KwaZulu-Natal	85.4	85.5	0.1

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

Reservoir	River	Province/Country	24 June 2023 (%FSC)	24 June 2024 (%FSC)	% Change (-/+)
Middle-Letaba Dam	Middel-Letaba River	Limpopo	5	1.4	-4.4

The spatial distribution of the dams with a classified range of their storage levels on 24 June 2024 is presented in Figure 7. An observation can be made that most of the dams across the country are at storage levels of between 50-100% of FSC.

Figure 8 presents the 24-month Standardised Precipitation Index (SPI) for May 2024, indicating that several District Municipalities have experienced droughts in the previous 24 months. The Namakwa District in the Northern Cape Province, the Thabo Mafutsanyane District in the Free State, the Sarah Baartman District in the Eastern Cape, the Capricorn and the Mopani Districts in Limpopo were among the districts that had some areas experiencing severe drought. Moreover, districts such as the Zululand District in KwaZulu-Natal, Gert Sibande District in Mpumalanga, Bojanala and Ngaka Modiri Districts in North West, Sekhukhune Districts in Limpopo, Ekurhuleni and Sedibeng Districts in Gauteng and the City of Cape Town in Western Cape only experienced moderate drought. The persistent below-normal rainfall in these districts is the cause of the drought conditions.

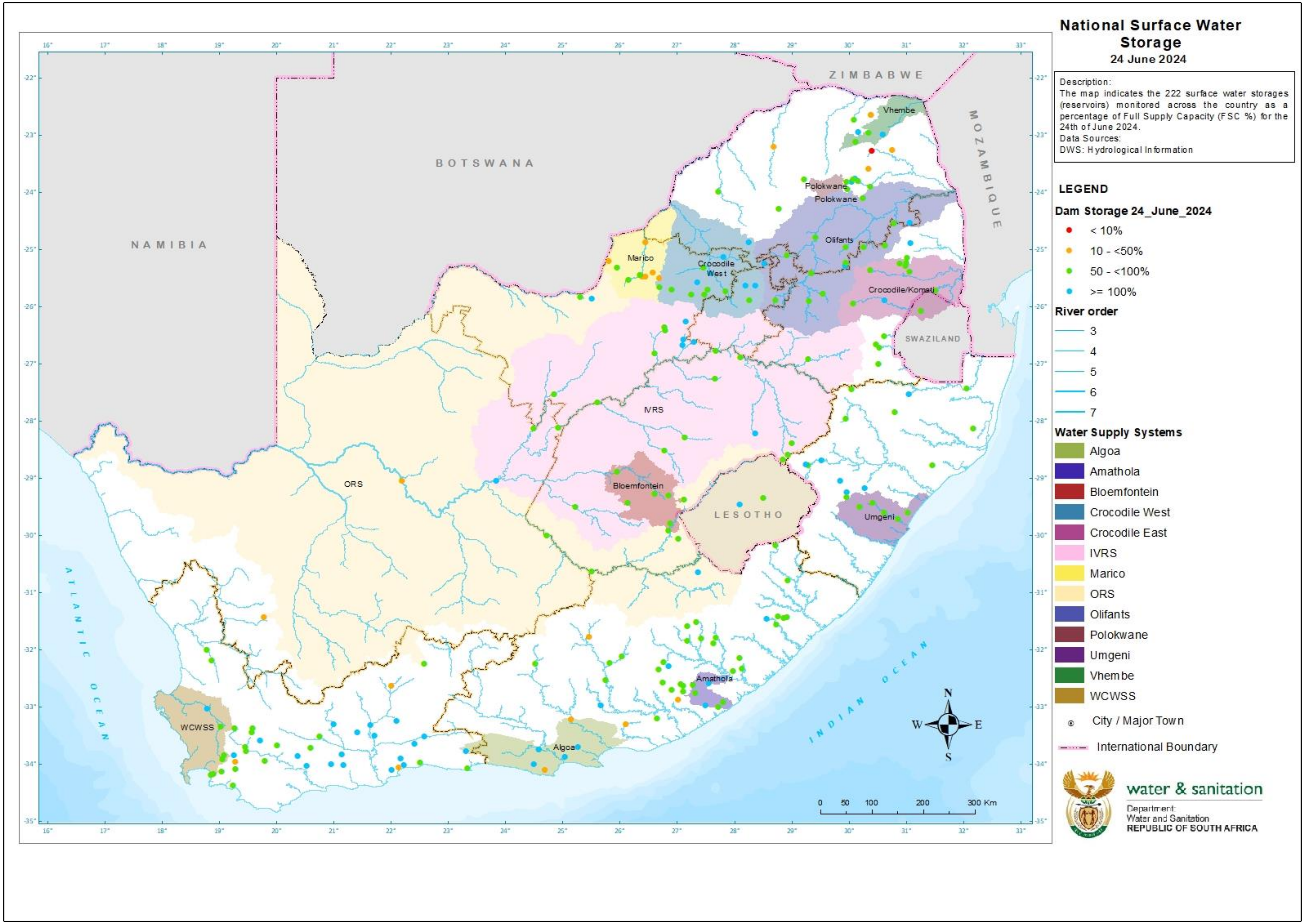
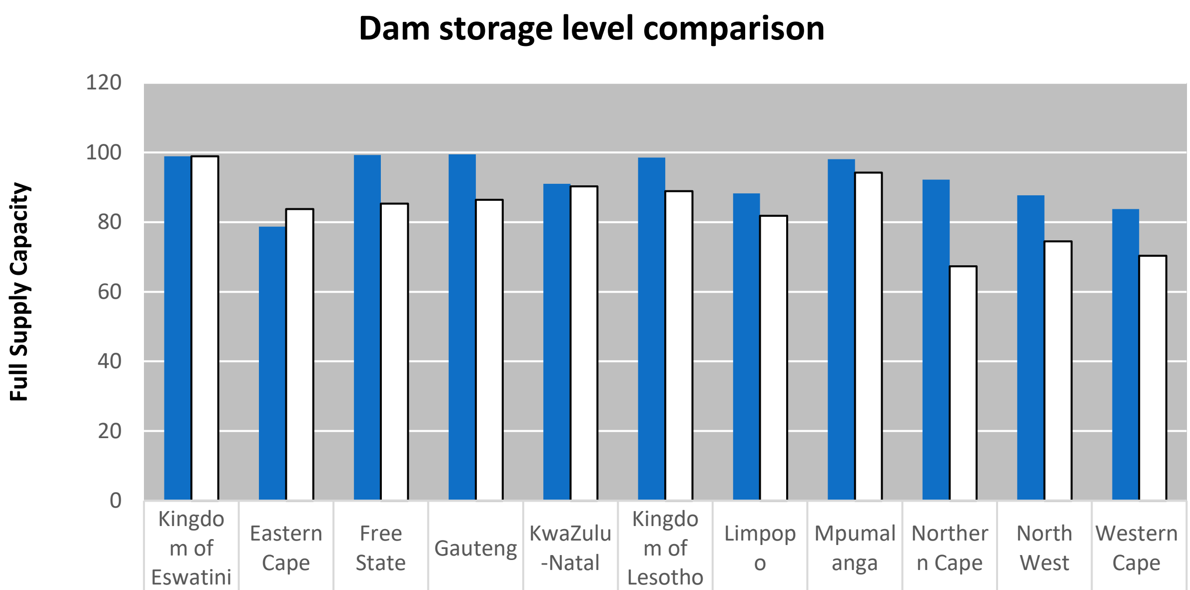


Figure 7: Surface Water Storage Levels - June 2024

Figure 8: 24-month Standardised Precipitation Index (SPI) and dam levels

The comparison of the storage levels per Province and international areas for June 2024 to the same time last year is presented in Figure 9. Seven of the nine provinces are showing a decline in dam storage levels compared to the previous year. The province with increased dam storage levels was the Eastern Cape (+5% of FSC), while the highest decline was in the Free State Cape (-24.9% of FSC).



	Kingdom of Eswatini	Eastern Cape	Free State	Gauteng	KwaZulu-Natal	Kingdom of Lesotho	Limpopo	Mpumalanga	Northern Cape	North West	Western Cape
24-Jun-23	98.9	78.7	99.3	99.4	91	98.5	88.2	98.1	92.2	87.7	83.7
24-Jun-24	98.9	83.7	85.3	86.4	90.3	88.9	81.8	94.2	67.3	74.5	70.3

Figure 9: Water Storage Levels June 2023 vs. June 2024

District Municipalities

The year-on-year comparison of water storage levels per District Municipality (DM) is presented in Figure 10. Sarah Baartman DM, Garden Route DM, and Central Karoo DM experienced a significant increase (>15%) in dam storage levels compared to last year. In contrast, Overberg DM, Capricorn DM, Ngaka Modiri DM, Pixley ka Seme DM, Fezile Dabi DM, Namakwa 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 in effect 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.

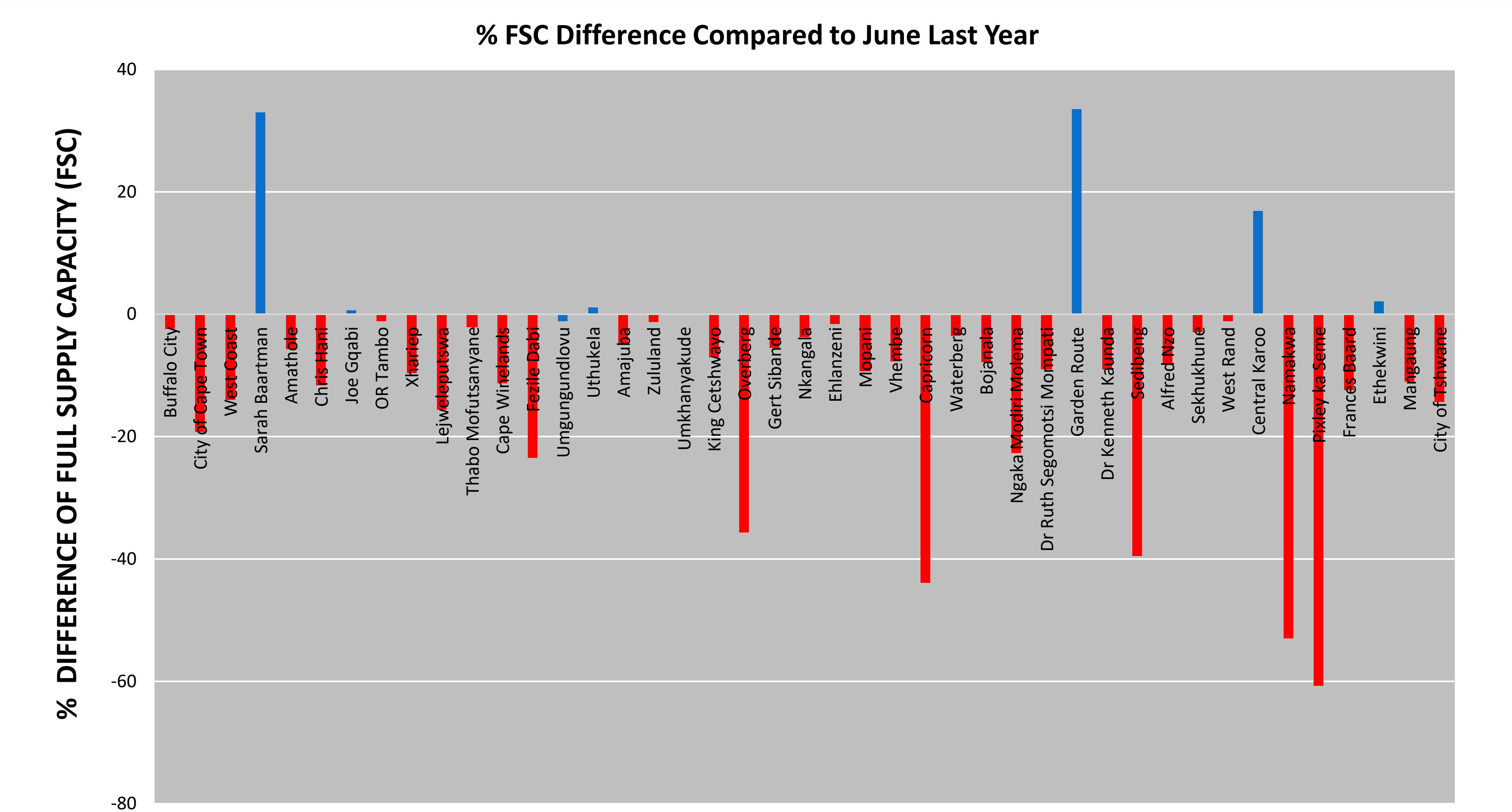


Figure 10: Comparison of water storage levels per District Municipality June 2023 vs June 2024

Table 3: Water Supply Systems storage levels

Water Supply Systems/clusters	Capacity in $10^6 m^3$	24 June 2023 (% FSC)	17 June 2024 (%FSC)	24 June 2024 (% FSC)	System Description
Algoa System	282	25	78.7	78.7	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	101.1	99.6	99.5	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	98.7	98.6	The following 3 dams serve Queenstown (Chris Hani DM, Enoch Ngijima LM): Boesmanskrantz Dam, Waterdown Dam, Oxkraal Dam
Luvuvhu	225	100.9	98.7	99.8	The following 3 dams serve Thohoyandou etc: Albasini Dam, Vondo Dam, Nandoni Dam
Bloemfontein	219	99.2	88.2	87.9	The following 4 dams serve Bloemfontein, Botshabelo and Thaba Nchu: Rustfontein Dam, Groothoek Dam, Welbedacht Dam, Knellpoort Dam
Butterworth System	14	99.6	90.9	90.4	Xilinxa Dam and Gcuwa weirs serve Butterworth
Integrated Vaal River System	10 546	98.6	84	83.7	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	100.7	96.7	96	The following 2 dams serve Polokwane: Flag Boshielo Dam, Ebenezer Dam
Crocodile West	444	100.2	95.6	95.5	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	97.2	97	96	The following 5 dams serve Ethekwini, iLembe & Msunduzi: Midmar Dam, Nagle Dam, Albert Falls Dam, Inanda Dam, Spring Grove Dam
Cape Town System	889	94.2	66.1	68.3	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
Crocodile East	159	100.2	99.9	99.9	Kwena Dam supplies Nelspruit, KaNyamazane, Matsulu, Malelane and Komatipoort areas and surroundings

Water Supply Systems/clusters	Capacity in $10^6 m^3$	24 June 2023 (% FSC)	17 June 2024 (%FSC)	24 June 2024 (% FSC)	System Description
Orange	7 996	99.6	90.1	90.1	The following two dams service parts of the Free State, Northern and Eastern Cape provinces: Gariep Dam, Vanderkloof Dam
uMhlathuze	301	101.1	94.3	94.1	Goedertrouw Dam supplies Richards Bay, Empangeni 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 was conducted, and water restrictions were 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 is yet to be gazetted
Polokwane	20% restrictions on Domestic and Industrial

Extreme Weather Events – June 2024

After a relatively dry and warmer-than-normal month of May, some parts of the country experienced rainfall and snow over elevated areas in June. The precipitation resulted from a cut-off low-pressure system that developed over the western and southern parts of the country from 2 to 3 June 2024. According to SAWS, the cut-off low-pressure systems are commonly associated with widespread rainfall, snowfall, strong to gale-force winds, and rough sea conditions in winter seasons. The weather service had predicted a heavy 24-hour rainfall, with accumulations of 50 to 100 mm in areas along the coastal belt. Figure 11 shows the movement of the cut-off low-pressure system from 2-3 June, as well as the predicted rainfall accumulation in the affected areas (SAWS,2024a). The subsequent weather conditions caused storms and floods, particularly in KwaZulu Natal, Eastern Cape, and Western Cape, causing destruction and fatalities.

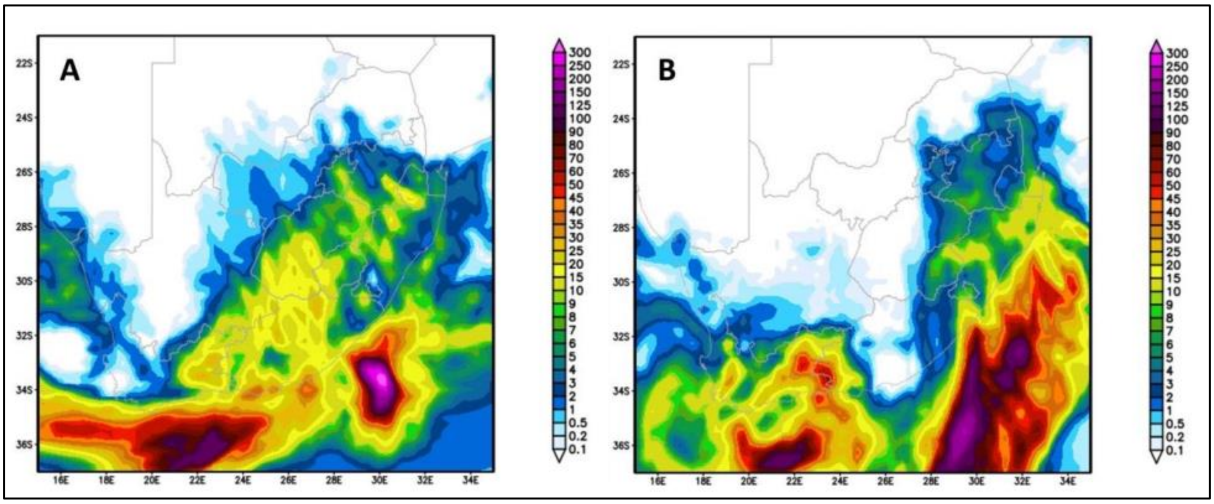


Figure 11: The predicted rainfall accumulation (in mm) for Sunday (2 June) (A) and Monday (3 June) (B) over South Africa. (Source: SAWS Global Forecasting System)

Heavy Rain and Tsunami in KwaZulu Natal

The cut-off low weather system moved over the central interior of the country on Monday, 3 June 2024, and resulted in cold air that invaded the central and western interior. KwaZulu-Natal experienced warm and moist conditions, which later caused atmospheric instability, resulting in a thunderstorm development over the western parts of the province. Severe thunderstorms developed, causing strong damaging winds, small to large hail in some areas, heavy rainfall, and the development of at least two tornadoes (Figure 12) (SAWS, 2024b).

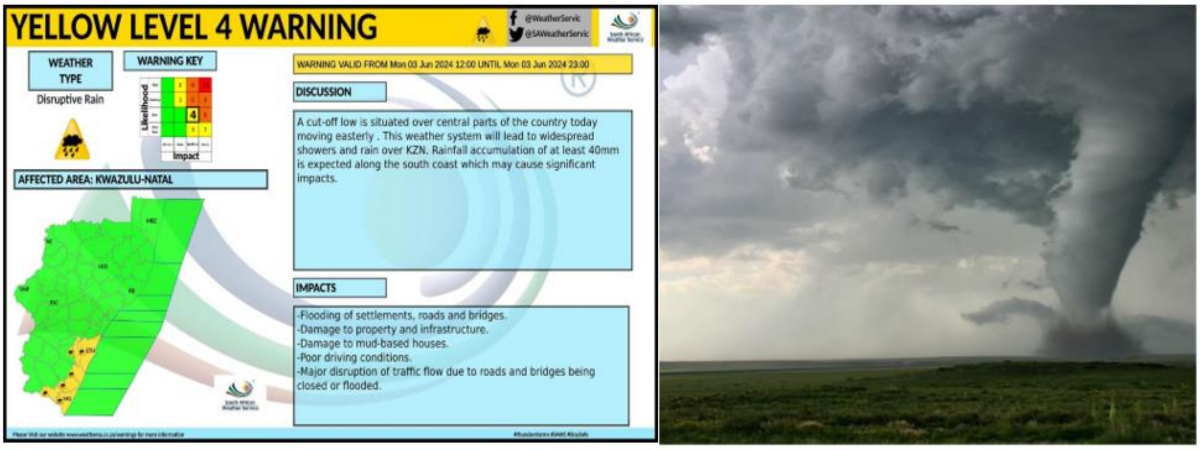


Figure 12: (a) Extreme weather warning for disruptive rain for the KwaZulu Natal Province, and (b) an image was taken in the oThongathi area showing a tornado.

The first tornado occurred between Newcastle and Utrecht over the western interior of KwaZulu-Natal early in the afternoon, and initial investigations by SAWS indicated that it started as a rope tornado and developed into a cone tornado. The second and larger tornado developed later in the afternoon around oThongathi and moved east to the coast near Westbrook and Ballito, where it caused significant damage. The thunderstorm that passed over oThongathi (Tongaat) produced a tornado that was confirmed to be a supercell with a hook echo (SAWS, 2024c).

Several damage indicators were considered and utilized to assess the tornado impact around oThongathi and further down towards the coastline. Considering these key indicators, *SAWS concluded that the oThongathi Tornado could be rated as an EF3 on the Enhanced Fujita scale,* with estimated wind speeds of 225 to 265 km/h, which occurred within the tornado's path.

"One of the tools used to assess the intensity of tornadoes is the Enhanced Fujita (EF) scale, which assigns a rating to a tornado based on estimated wind speeds inferred from observed damage by utilizing various damage indicators. This EF rating system enables the classification of tornadic events. Most tornadoes in South Africa are WEAK, with a low EF rating of 0 to 2. The stronger and more destructive tornadoes (EF3 and EF4) occur every decade or so" (SAWS, 2024c)

The eThekwini Metropolitan Municipality (eMM) reported that the most significant damages from the tornado were in the uThongathi area, parts of the Durban Central Business District, uMgababa, and surrounding areas (eMM, 2024). In the western part of the city, the damage was mainly caused by fallen trees, which blocked roads in Fields Hill, Gillits, and Assagay (Figure 13).

Figure 13: Destruction after the tornado that occurred in oThongathi area.

Floods in Eastern Cape

Between 1 and 3 June 2024, SAWS issued an Orange Level 6 warning for disruptive rainfall and snow, and a Yellow Level 2 warning for destructive winds in the Eastern Cape (Figure 14). On the evening of 1 June 2024, heavy rains in the Nelson Mandela Bay Municipality and Buffalo City Municipality areas threatened settlements. On 2 June 2024, there were reports of damage, flooded areas, missing people, and disruption to basic services, and the affected municipalities began evacuating people from flooded or threatened areas. According to SAWS, a rainfall accumulation of 230 mm was recorded in the NMBM. The municipalities affected by floods in the Eastern Cape include Nelson Mandela Bay Municipality, Buffalo City Municipality, Sarah Baartman District Municipality, and Amathole District Municipality.

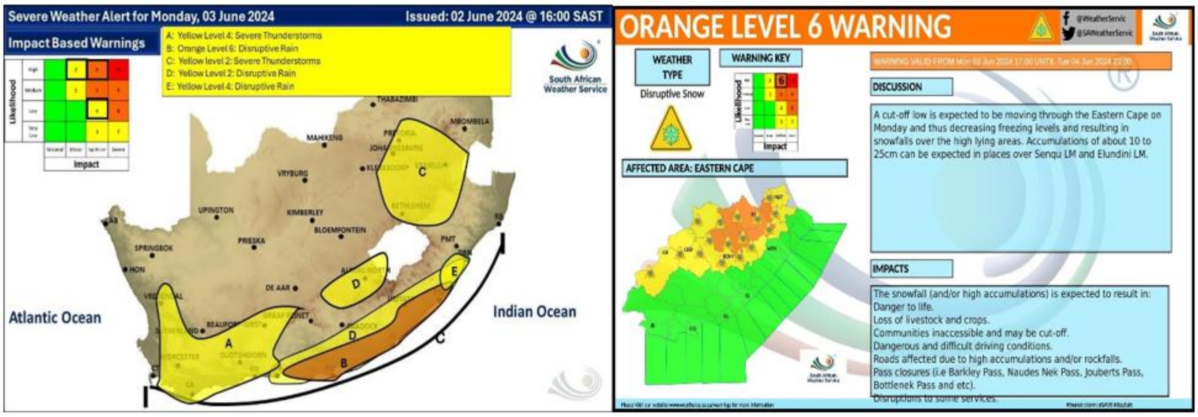


Figure 14: Severe weather warnings for disruptive rainfall and snow in the Eastern Cape.

On 4 June, the surface water storage exceeded 100% in the following dams of the Eastern Cape:

- Loerie Dam - 102,44%
- Wriggleswade Dam - 100.33%
- Nahoon Dam - 101.47 %

The Eastern Cape Provincial Disaster Operations Committee that sat on 4 June 2024 reported a risk of waterborne diseases at Oyster Bay (Kouga Local Municipality) due to a saturated water table resulting from contaminated water as the water from recent flooding is getting into the septic tanks. Moreover, the DWS National Office (Dam Safety Office) dispatched a team of Engineers to conduct inspections after reports of Tiryville Dam being in danger of collapse. The floods resulted in the displacement of over 1200 people, in the Buffalo City Municipality and Nelson Mandela Bay Municipality, while at least seven people reportedly lost their lives. Figure 15 shows some destruction caused by floods in parts of the Eastern Cape.

Figure 15: (a) Shows flooded roads in Buffalo city, and (b) a collapsed bridge at Kwanobuhle area, Nelson Mandela Bay Municipality.

WATER QUALITY EXPLAINED - a continuation from the May 2024 bulletin

Water quality refers to the condition and characteristics of water that determine its fitness for various uses and the health of aquatic ecosystems. It encompasses the chemical, physical, and biological properties of water and the presence of contaminants and pollutants. Water quality in natural water bodies such as lakes, rivers, and oceans can be affected by several factors. These factors include natural processes like weathering, erosion, and biological interactions, as well as human activities such as industrial discharges, agricultural runoff, and improper waste disposal. Contaminants commonly found in water include organic and inorganic substances, pathogens, **heavy metals**, pesticides, and nutrients like nitrogen and phosphorus. Assessing water quality is essential for understanding the health of aquatic ecosystems, identifying sources of pollution, and developing effective management strategies.

PART C: CHEMICAL WATER QUALITY PARAMETERS - HEAVY METALS

Chemical parameters commonly investigated to establish water quality include a category of metals classified as heavy metals. The term "heavy metal" refers to any metal or metalloid element with a relatively high density ranging from 3.5 to 7 g/cm³, and it is toxic at low concentrations. (Gautam *et al*., 2014). Their position in the periodic table is shown in Figure 16.

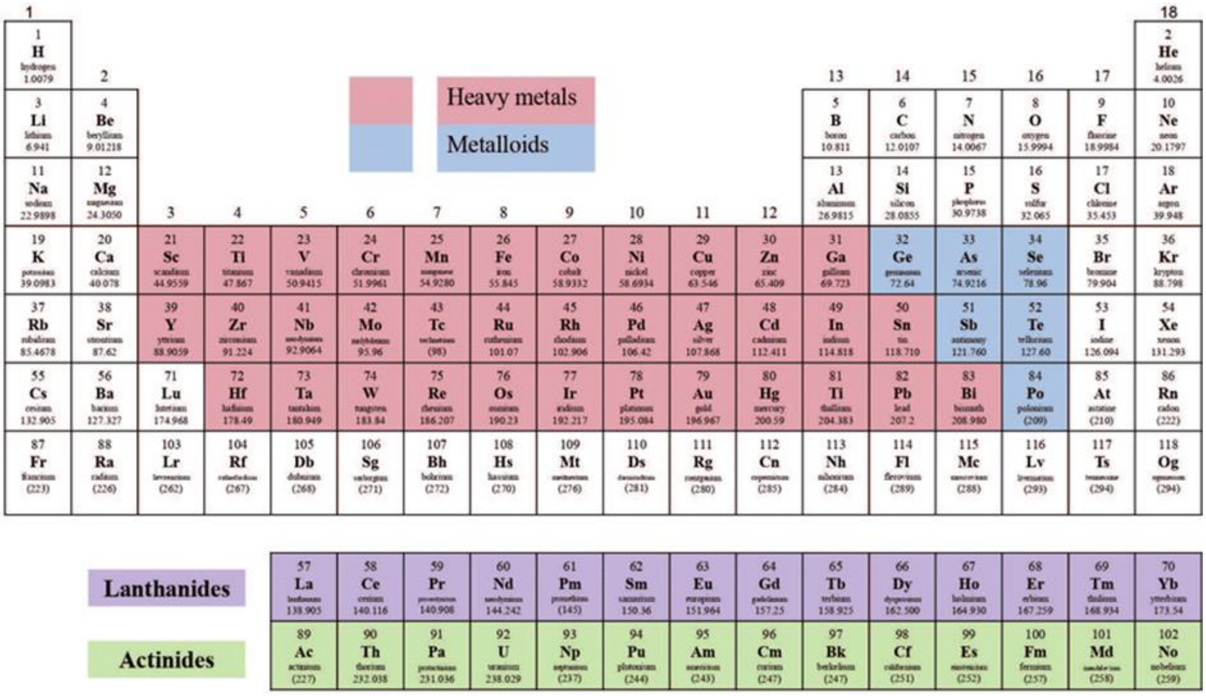


Figure 16: Position of heavy metals in the periodic table (http://dx.doi.org/10.5772/intechopen.96805)

Although metals, such as Iron (Fe), Zinc (Zn), Copper (Cu), Cobalt (Co), Chromium (Cr), Manganese (Mn) and Nickle (Ni) have an essential role in the metabolism of humans and animals in very trace amounts, their higher concentration may cause toxicity and health hazards (Gautam *et al.,* 2014). Others, such as Lead (Pb), Mercury (Hg), Cadmium (Cd) and Arsenic (As), are not utilized in biological functions but are extremely toxic and carcinogenic. The threat of heavy metals in the environment is more serious than those of other pollutants due to their non-biodegradable nature, accumulative properties and long biological half-lives.

Even at very low concentrations, some heavy metals can induce damage to multiple organs, including the lungs, kidneys, liver, prostate, oesophagus, stomach, and skin. They can also cause neurodegenerative disorders and diseases such as Alzheimer's and Parkinson's (Zamora-Ledezma *et al.,* 2021). Heavy metals can also impact aquatic organisms such as phytoplankton, zooplankton, and fish by bio-accumulation, leading to oxidative damage, endocrine disruption, and a weakened immune system, ultimately affecting the survival and growth of these organisms (Zamora-Ledezma *et al.,* 2021). Heavy metal pollution can severely disrupt the natural balance of water ecosystems, leading to a loss of aquatic biodiversity.

Heavy metals exist in two forms: particulate (either elemental or in some insoluble compound) or dissolved in water. Lead (Pb), Nickel (Ni), Chromium (Cr), Cadmium (Cd), Arsenic (As), Mercury (Hg), Selenium (Se), Zinc (Zn) and Copper (Cu) are the most popular heavy metals.

Sources of heavy metals

Toxic heavy metals are released into water bodies daily from diverse natural and anthropogenic sources.

Natural Sources

- Weathering of metal-bearing rocks
- Erosion and volcanic activities
- Forest fires
- Biogenic sources of plants and animals.

Anthropogenic Sources of some important heavy metals

The expansion of urban areas, industrial growth, and the use of chemical fertilizers in agriculture have increased toxic heavy metal pollutants in aquatic ecosystems through industrial wastewater, urban drainage systems, and stormwater management (Zhang et al., 2023). Sources of some common heavy metals in the environment are:

- Arsenic: pesticides, wood preservatives, biosolids, ore mining and smelting
- Cadmium: paints and pigments, plastic stabilisers, electroplating, and phosphate fertilizers
- Chromium: tanneries, steel industries and fly (coal) ash
- Copper: pesticides, fertilizers, biosolids, ore mining and smelting
- Mercury: gold and silver mining, coal combustion, medical waste
- Nickel: industrial effluents, kitchen appliances, surgical instruments, automobile batteries
- Lead: emissions from the combustion of leaded fuel, battery waste, insecticides, and herbicides.

The Trace Metal Laboratory at Resource Quality Information Services analyses potable water, surface water and groundwater for the following metals: Aluminium (Al), Antimony (Sb), Arsenic (As), Barium (Ba), Beryllium (Be), Bismuth (Bi), Boron, Cadmium (Cd), Cerium (Ce), Chromium (Cr), Cobalt (Co), Copper (Cu), Iron (Fe), Lead (Pb), Manganese (Mn), Molybdenum (Mo), Nickel (Ni), Scandium (Sc), Selenium (Se), Strontium (Sr), Thallium (Tl), Thorium (Th), Titanium (Ti), Tungsten (W), Vanadium (V), Zinc (Zn) and Zirconium (Zr). Their instrumental method of analysis is by Inductively Coupled Plasma Optical Emission Spectrometry.

Wastewater treatment to remove heavy metals includes metal hydroxide or metal sulphide precipitation followed by filtering of the insoluble form from solution, ion exchange, membrane filtration, microbe-assisted phytobioremediation, and adsorption over low-cost biosorbents and nanomaterials (Gautam *et al*., 2014).

Table 5: Guidelines for Drinking Water Quality according to SANS 241: 2015: 2 / World Health Organization (WHO) – Guidelines for Drinking Water Quality

Physical Parameter	**Standard Limit**
Aluminium* (µg/L as Al)	≤300
Antimony (µg/L as Sb)	≤20
Arsenic (µg/L as As)	≤10
Barium (µg/L as Ba)	≤700
Boron (µg/L as B)	≤2400
Cadmium (µg/L as Cd)	≤3
Chromium (µg/L as Cr)	≤50
Copper (µg/L as Cu)	≤2000
Iron (µg/L as Fe)	≤2000
Lead (µg/L as Pb)	≤10
Manganese (µg/L as Mn)	≤400
Mercury (µg/L as Hg)	≤6
Nickel (µg/L as Ni)	≤70
Selenium (µg/L as Se)	≤40
Zinc (mg/L as Zn)	≤5

*Aluminum is an element whose specific weight on the periodic table is not greater than 5 g/cm^3 and whose atomic number is not greater than 20 (it does not have sufficient density to be called "heavy"). However, due to aluminium's toxicity, it is included as one of the heavy metals on some lists of toxins.

There are no health-based guideline values for heavy metals such as Bismuth, Cobalt, Molybdenum, Scandium, Thallium, Titanium, Tungsten, Vanadium, and Zirconium in the World Health Organization's Guidelines for Drinking-water Quality as these metals are rarely found in drinking water at concentrations of health concern.

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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
ENSO	El Niño-Southern Oscillation
EF	Enhanced Fujita (scale)
FSC	Full Storage Capacity
HY	Hydrological Year
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
WMA	Water Management Area
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 a needed water treatment system
SAWS	South African Weather Service

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