

The Weather Pattern – What is in Store?

It is virtually impossible to accurately predict the weather. This year's winter season has been one of the coldest on record but warmer than usual daytime temperatures have also prevailed. It is no wonder that the perpetual decline of dam levels through South Africa is cause for concern.

Criticism has been levied against the Department of Water & Sanitation for its perceived lack of attention to water supply in the Eastern Cape. The province has been facing acute water challenges for several years, but the situation is now so critical in northern Karoo towns that a humanitarian relief organisation has begun drilling boreholes.

Fortunately, water has been tapped and this is providing relief to thousands of residents, especially those relying on the Klipplaat Water Supply System with three dams supplying water to Queenstown.

The six dams in the Amathole Water Supply providing water to Buffalo and the Algoa Water Supply System consisting of five dams and supplying water to Nelson Mandela Bay, are also hovering at extremely low levels.

Integrated Vaal river system

Upcountry, the picture is a little more positive and recreational fishermen have been showing off good catches on social media.

Despite this Gauteng consumers have been asked to use water sparingly. The level of the Vaal Dam appears to be under stress at just 37% last week, almost 20% down compared to measurements in the same week of last year.

While the entire integrated Vaal river system consisting of 14 dams is not quite as critical, water level warnings have also been issued about Grootdraai, Bloemhof, and the Mohale and Katse dams in Lesotho.

Limpopo's Luvhuhu Water Supply System with three dams is healthy, as is the Polokwane Water Supply System with two dams supplying water mainly to Polokwane.

In the Free State, the Bloemfontein Water Supply System with four dams supplying water to Mangaung is at a reasonable level as it is in Mpumalanga.

By contrast the Northern Cape is the only province that has seen a massive increase in water levels. The Orange Water Supply System with two dams is in a positive position, as is the Crocodile Water Supply system with seven dams in North West.

KwaZulu Natal

In KwaZulu Natal the change of season impacts dam levels. The Department's spokesperson Sputnik Ratau says: "Temperatures will begin to soar and given the continued effects of climate change, we can be expecting that things will get worse before they get better."

He added that when compared to a similar period last year, the province's dam storage capacity was also below average at 57,8%.

One of province's largest dams, the Albert Falls Dam is currently at about 34%. Hazelmere, Spring Grove (located on the Mooi River), Pongolapoort, Goedertrouw and Klipfontein dams are also below average. There are exceptions – Inanda, Midmar, Driel Barrage and Wagendrift dams are at good levels well above the 80% mark.

The Western Cape Water Supply System with six dams is certainly a lot better than it was this time last year.

So, what does the weather hold?

According to Hector Chikoore, an associate professor at North West University who specialises in meteorology, climatology and climate change, the 2020 winter season (June to end August) has been one of the colder ones recorded since instrumental records in South Africa began in 1860.

The South African Weather Service has observed sharp drops in temperature at night and warmer days than average for the time of the year. Examples based on 25 years of observations include a lowest minimum temperature of -5,1 °C at Orania, breaking a previous record of -4,5 °C in August 2018.

Chikoore explains that surface anticyclones are the major source of cold maritime air over the subcontinent. The frequency of ridging anticyclones from the South Atlantic and "blocking" systems may also lead to the anomalous advection of cold meridional air from the Southern Ocean.

Cut-off low-pressure systems are also associated with extreme cold conditions, snowfalls and heavy rainfall.

He says further that several studies have found a link between anomalous winter temperatures over southern Africa and a negative phase of the Southern Annular Mode (SAM).

The SAM is a remote phenomenon over the Southern Ocean associated with the location of the west-wind belt over the Southern Ocean.

The SAM is also linked to the strength of a large anticyclone over the Indian Ocean (Mascarene High), and the location of mid-latitude storm tracks in winter.

In addition to anomalous temperatures, the winter rainfall regions of South Africa also received significant amounts of rainfall, which should be positive for dam levels, agricultural activities, and water supply.

Preliminary data from the SAWS shows most stations in the southern parts of the Western Cape experiencing more than 100% of normal rainfall for the month of July 2020. The station at Darling recorded 247 mm of rainfall, which corresponds to 309% of the climatological normal.

What can we expect regarding rainfall in the coming months?

Climate scientists predict the prospects for the upcoming summer rainfall season using numerical climate models that solve physics laws of both the ocean and the atmosphere.

The El Niño Southern Oscillation (ENSO) influences the South African summer rainfall region. This is a phenomenon linked to the state of sea surface temperatures (SSTs) in the equatorial Pacific Ocean.

El Niño events occur when the SSTs in the equatorial Pacific Ocean are above average, while a La Niña event occurs when the SSTs are below average.

This phenomenon accounts for nearly 40% of the variability of summer season rainfall and temperature over the subcontinent.

El Niño and drought

Most droughts in southern Africa occur during El Niño conditions while higher than average rainfall is linked to La Niña. Some studies have also found a higher likelihood of tropical cyclone landfall over the Mozambican coast during La Niña, even though there is a very small chance of landfall (~5%).

El Niño conditions are mostly associated with offshore west-wind anomalies. These tend to drive away moisture and tropical revolving systems.

The latest ENSO forecasts from most global centres predict the development of La Niña conditions peaking in the summer. There is also a higher probability of average to above-average seasonal rainfall over much of the subcontinent.

Abnormal weather patterns and global warming

The southern African region has experienced rapidly rising temperatures especially in the last 10 years. The SAWS Annual State of the Climate of South Africa 2019 report indicated a statistically significant rising trend in surface air temperatures of 0.16 °C per decade.

According to SAWS records, the years 2015 and 2019 are recorded as two of the warmest years, while the warmest year globally was 2016.

The increase in surface temperatures has also been accompanied by an increased frequency of extreme events such as heat waves and drought.

Most studies on climate trends have found and projected a delay in the onset of the summer rainy season over southern Africa. This is due to drying in the spring, which implies a longer dry season, with consequences for fire management.

In addition, heavy precipitation events have become, and are projected to become, even more intense.

