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UMLINDI The Watchman

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NATURAL RESOURCES AND ENGINEERING
Soil, Climate and Water

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agriculture
Department: Agriculture
REPUBLIC OF SOUTH AFRICA

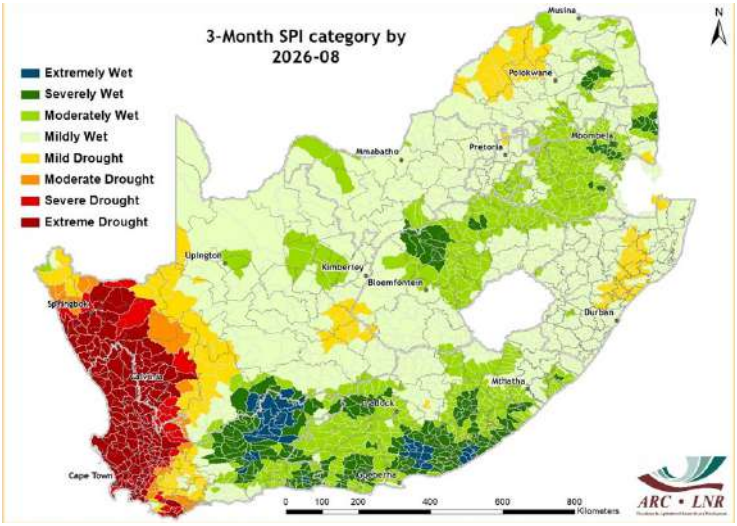
South African Weather Service

267th Edition

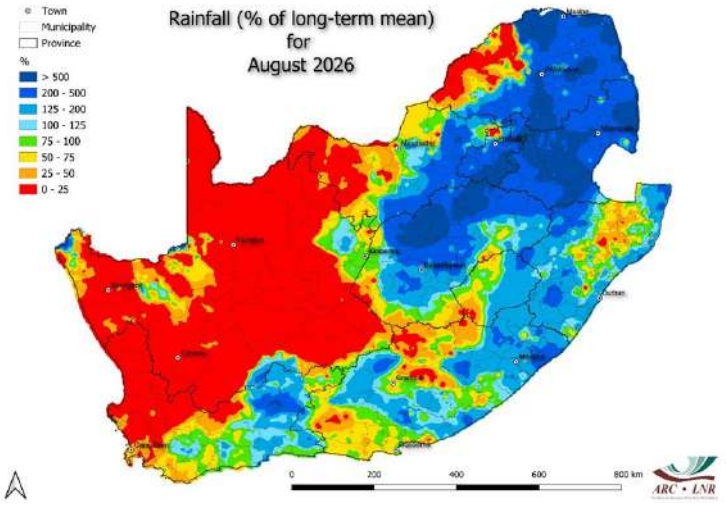
Images of the Month

From drier-than-normal winter conditions to an El Niño summer

Rainfall remained limited across much of the winter rainfall region during August 2026, extending the drier conditions observed during the latter part of the winter season and increasing drought concerns. Considering the three winter months, the Standardized Precipitation Index (SPI) map ending in August 2026 depicts developing severe to extreme conditions across parts of the region. These conditions may place further pressure on soil moisture and winter crops as the season progresses towards harvest.



As September marks the transition towards the summer rainfall season, the 2026/27 summer rainfall season is therefore not starting from a completely dry baseline, with some areas benefiting from rainfall during the preceding months (see August rainfall map) and residual soil moisture from the wet 2025/26 season. Nevertheless, dry conditions can still be expected in some areas as the season develops.



Attention is also turning to the forecast El Niño conditions and the potential for warmer-than-normal temperatures during the coming summer. A strong El Niño signal does not automatically translate into severe agricultural drought, as each event evolves differently, and its impacts depend on other climate drivers. However, given the increased risk of below-normal rainfall and high temperatures, farmers and agricultural stakeholders should prepare early by monitoring seasonal forecasts from the South African Weather Service, as well as drought indicators provided by the Agricultural Research Council products such as the Umlindi newsletter, ADEWS (https://www.drought.agric.za) and Weather Risk site (https://www.weatherrisk.arc.agric.za/) to guide timely decisions.

The Agricultural Research Council - Natural Resources and Engineering (ARC-NRE) Soil, Climate and Water campus collected the data, generated the products and compiled the information contained in this newsletter, as part of the Coarse Resolution Imagery Database (CRID) project that was funded by the Department of Agriculture and Department of Science and Technology at its inception and is currently funded by the Department of Agriculture (DoA).

1. Rainfall

Overview:

August 2026 rainfall reflected a clear west–east contrast across South Africa, with the dry conditions that had persisted over the western interior through June and July continuing, while rainfall became more concentrated over the eastern and south-eastern parts of the country. In the winter rainfall region, the expected seasonal rainfall remained limited, particularly over the south-western Cape, where most areas received less than 25 mm, with some locations below 10 mm. The southern Cape received somewhat more rainfall, although totals remained variable. The summer rainfall region also remained relatively dry across the Northern Cape, North West and western Limpopo, where monthly totals were mostly below 10 mm. Further east, however, rainfall increased noticeably, with 25–75 mm recorded across much of the Free State, Gauteng, Mpumalanga, KwaZulu-Natal and the Eastern Cape, and locally 75–150 mm along parts of the eastern escarpment and coastal areas. Much of this rainfall was associated with the 9–12 August cold-front and cut-off-low event, which brought widespread rain, snowfall and very cold conditions to parts of the southern and eastern interior. Compared with the earlier winter months, the main change was therefore not a broad increase in rainfall, but a greater concentration of rainfall over the eastern summer rainfall region, while the western interior and winter rainfall region remained comparatively dry. Relative to the long-term mean, several areas of the central and eastern interior received 125–200% of their August rainfall, whereas much of the west received less than 50%.

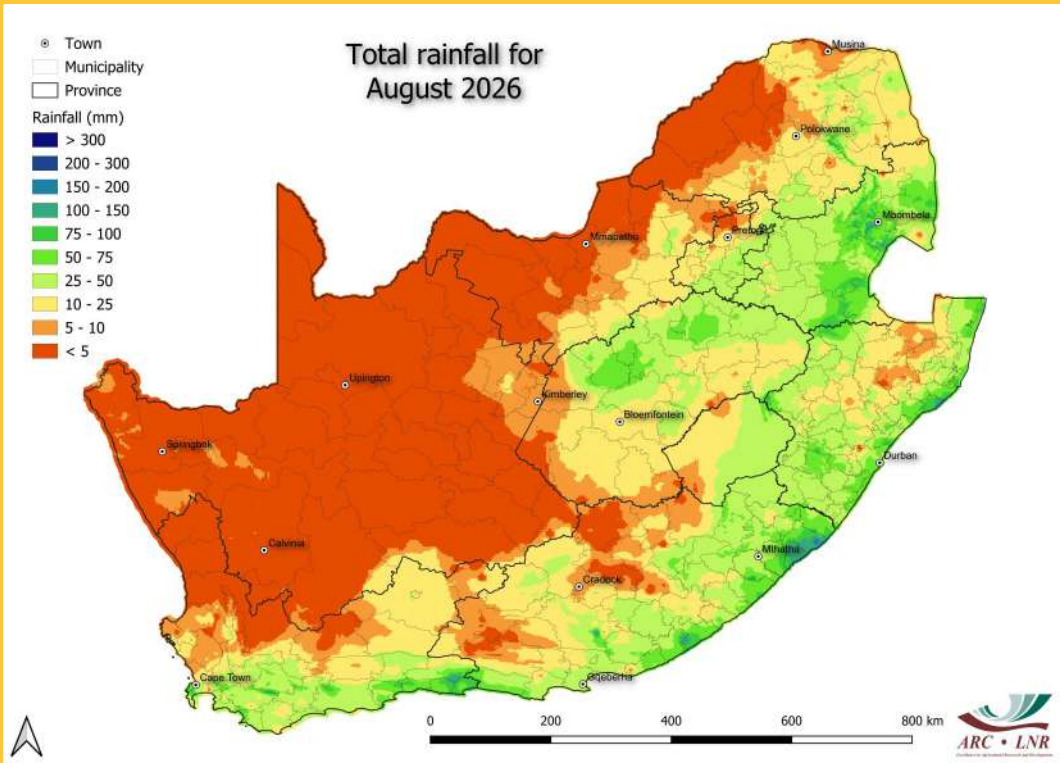


Figure 1

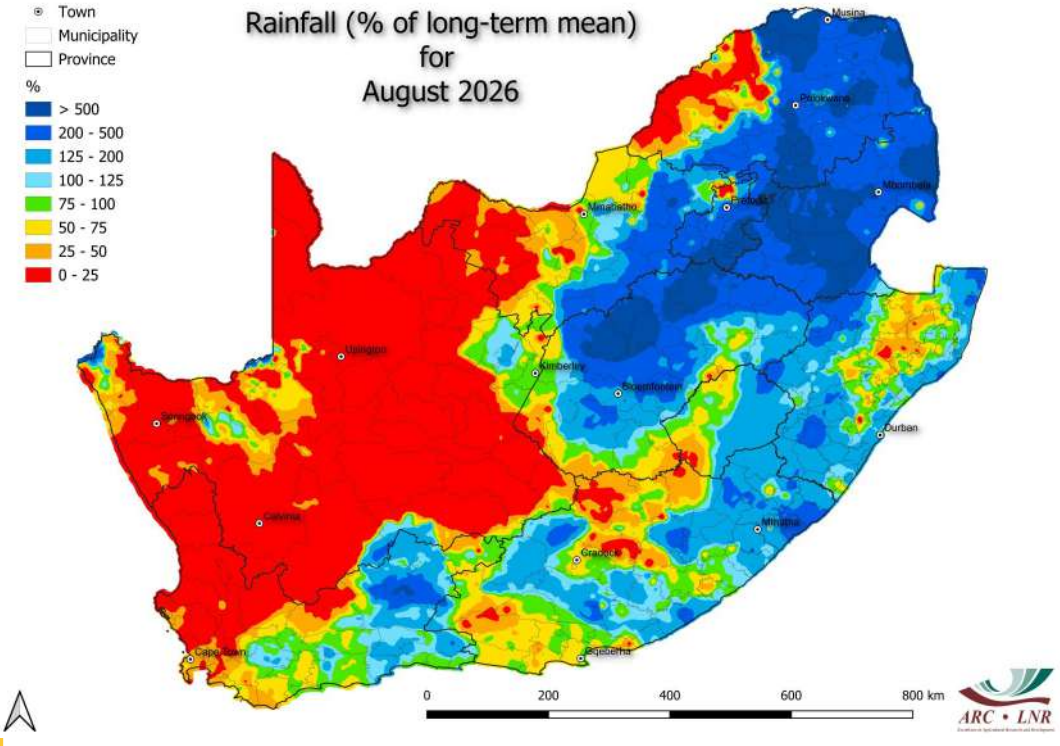


Figure 2

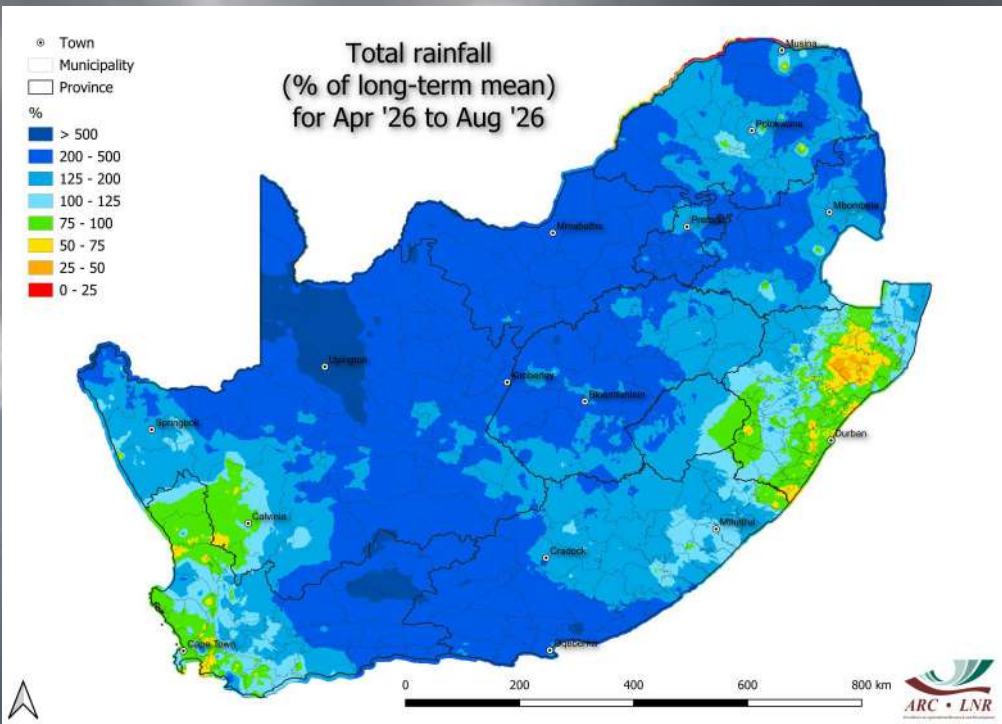


Figure 3

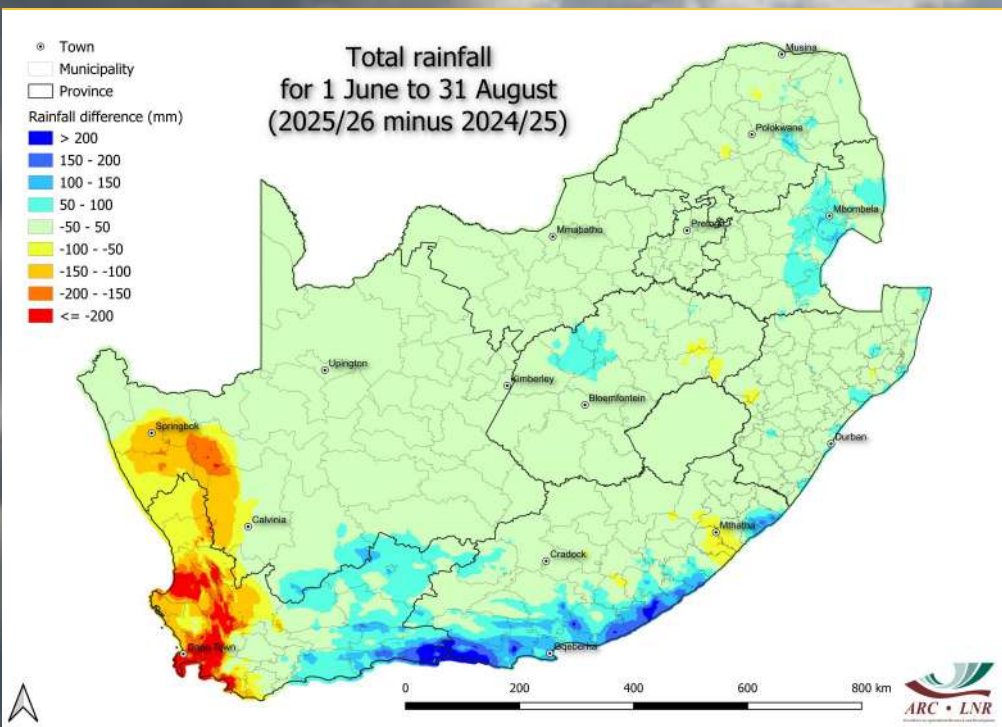


Figure 4

Figure 1:
August rainfall was concentrated mainly over the eastern and southern parts of the country, while most of the western and northern interior received less than 10 mm.

Figure 2:
Rainfall was above normal across much of the eastern half of the country, extending towards the southern regions, particularly the Eastern Cape and parts of the Western Cape, while large parts of the western and northern interior recorded less than 25% of their August rainfall.

Figure 3:
From April to August 2026, the country recorded widespread near- to above-normal rainfall.

Figure 4:
When comparing rainfall during June–August 2025/26 with the corresponding three-month period in 2024/25, rainfall was generally comparable across much of the country. The main difference was observed in the winter rainfall region, which received up to 200 mm less rainfall. In contrast, adjacent areas of the Western Cape and the all-year rainfall region received more rainfall.

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2. Standardized Precipitation Index

Standardized Precipitation Index

The Standardized Precipitation Index (SPI - McKee *et al*., 1993) was developed to monitor the occurrence of droughts from rainfall data. The index quantifies precipitation deficits on different time scales and therefore also drought severity. It provides an indication of rainfall conditions per quaternary catchment (in this case) based on the historical distribution of rainfall.

REFERENCE:
McKee TB, Doesken NJ and Kliest J (1993) The relationship of drought frequency and duration to time scales. In: Proceedings of the 8th Conference on Applied Climatology, 17-22 January, Anaheim, CA. American Meteorological Society: Boston, MA; 179-184.

Standardized Precipitation Index (SPI) maps revealing drought conditions for short-term (6-month SPI), medium-term (12-month SPI) and long-term (24-month and 36-month SPI) ending in August 2026 are shown in Figures 5-8. The short-term SPI map indicates that conditions have not changed substantially since the beginning of winter, with widespread wet conditions persisting across much of South Africa, ranging from moderately wet to extremely wet across the interior, extending into the southern interior. However, following recent drier-than-normal conditions over the winter rainfall region, most parts of the region depict developing drought conditions. The medium-term SPI map reflects a similar pattern, with the dry conditions over the eastern regions and the western parts of the country still evident. The long-term SPI map shows predominantly near-normal to wetter-than-normal conditions across most parts of South Africa, with isolated parts of the Cape provinces, extending towards KwaZulu-Natal and Mpumalanga, depicting mild–moderate drought conditions.

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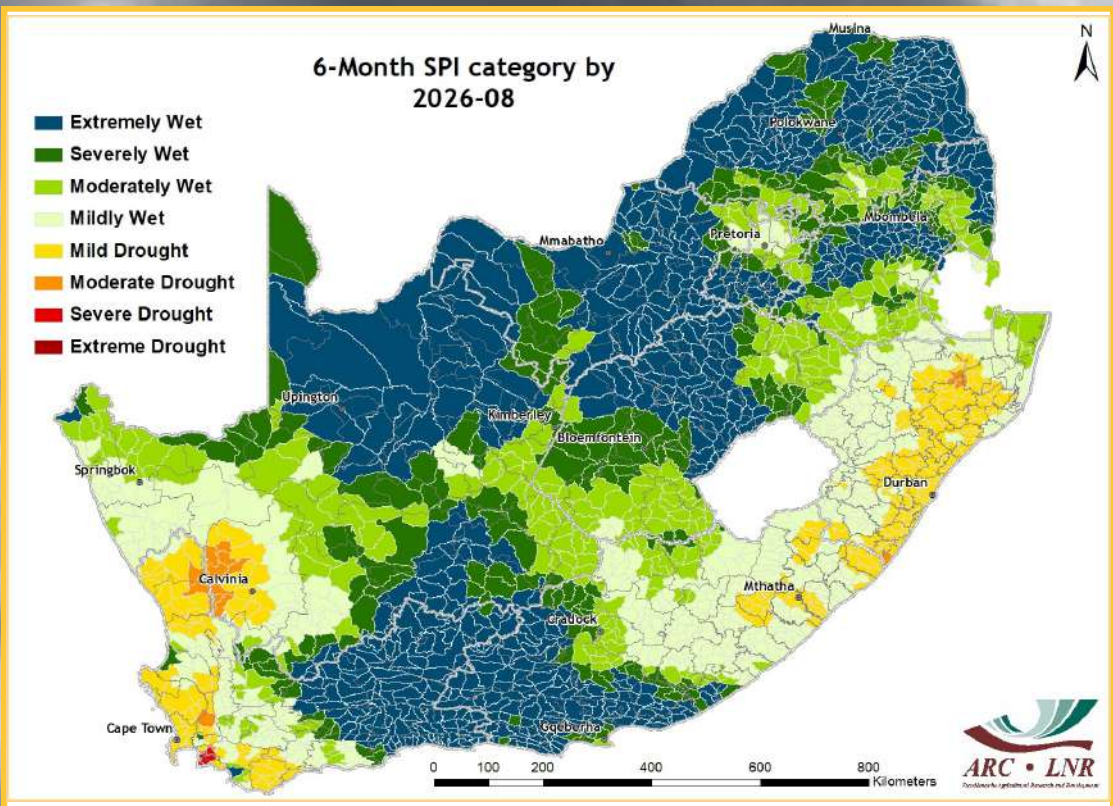

Figure 5

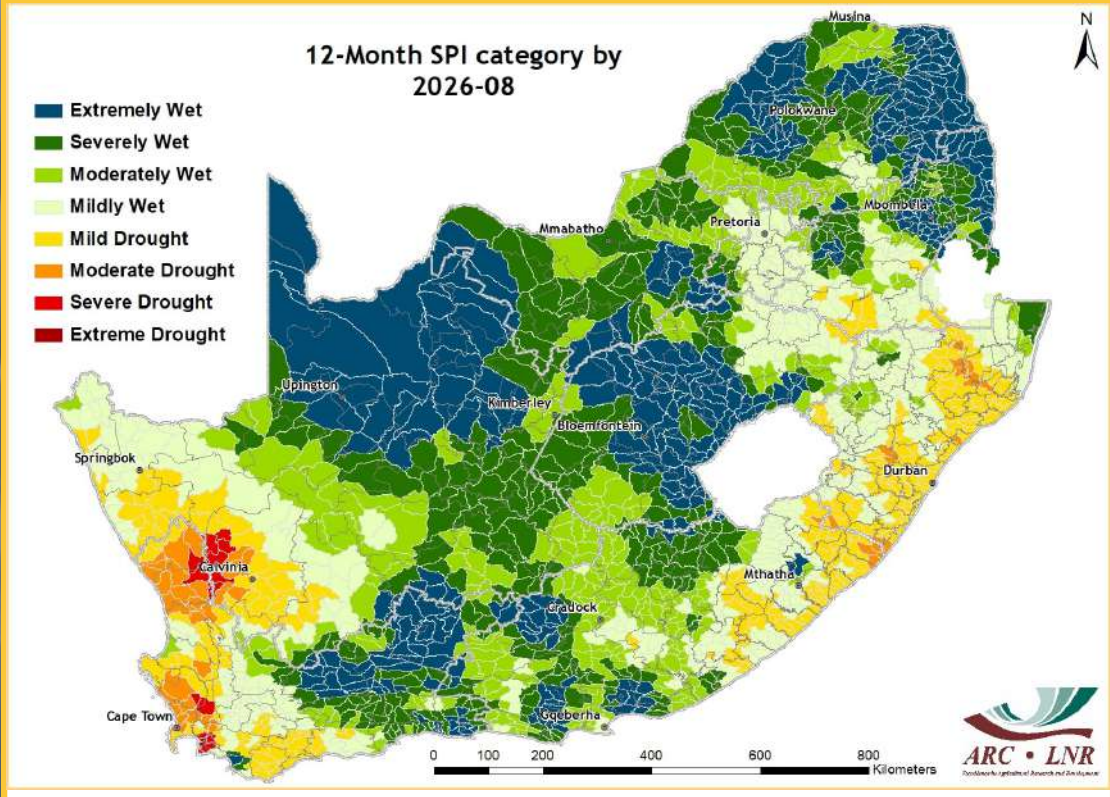

Figure 6

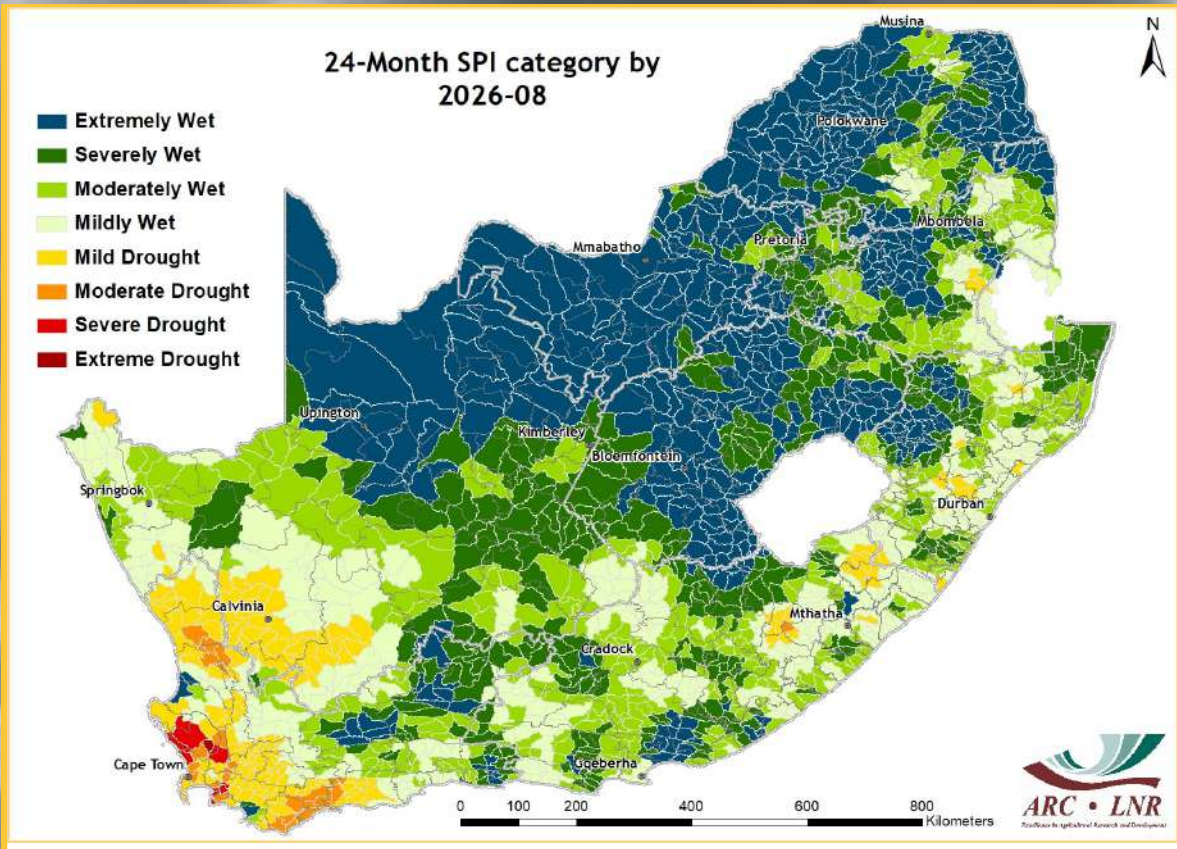

Figure 7

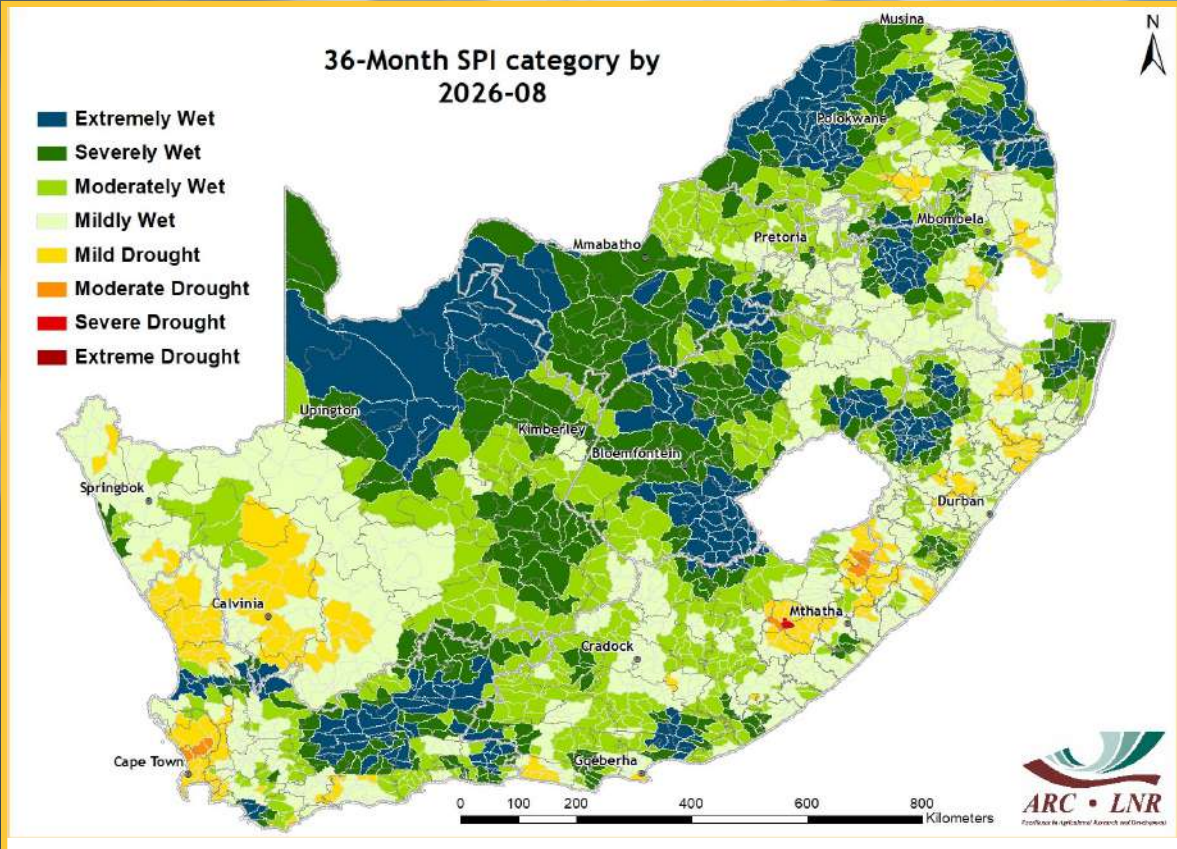

Figure 8

3. Rainfall Deciles

Deciles are used to express the ranking of rainfall for a specific period in terms of the historical time series. In the map, a value of 5 represents the median value for the time series. A value of 1 refers to the rainfall being as low or lower than experienced in the driest 10% of a particular month historically (even possibly the lowest on record for some areas), while a value of 10 represents rainfall as high as the value recorded only in the wettest 10% of the same period in the past (or even the highest on record). It therefore adds a measure of significance to the rainfall deviation.

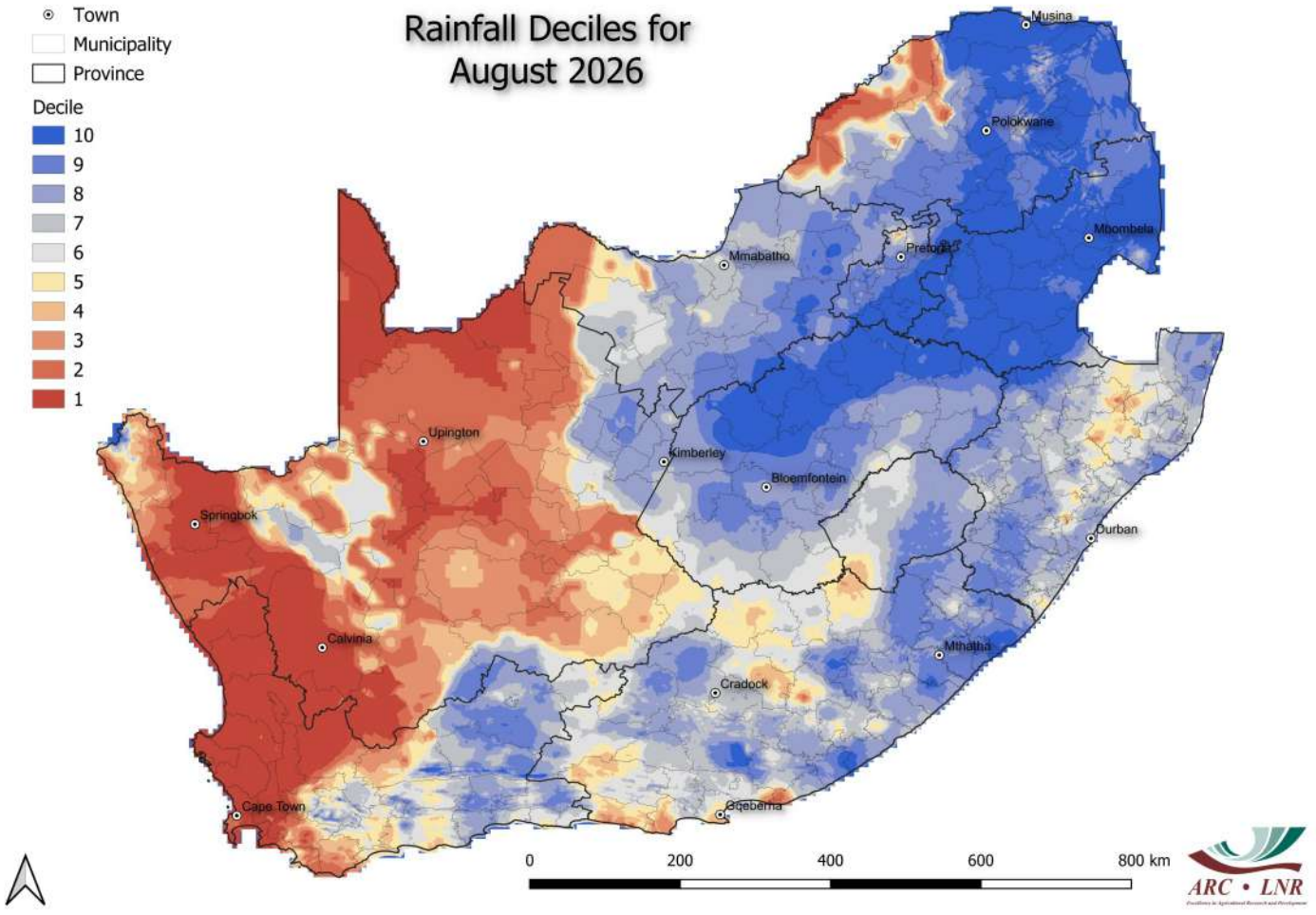

Figure 9

Figure 9:
A clear west–east rainfall contrast is evident across South Africa, with much of the eastern and southern regions receiving above-normal rainfall relative to the historical August totals. In contrast, the western regions were generally drier.

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4. Vegetation Conditions

Vegetation Mapping

The Normalized Difference Vegetation Index (NDVI) is computed from the equation:

NDVI=(IR-R)/(IR+R)

where:
IR = Infrared reflectance &
R = Red band

NDVI images describe the vegetation activity. A decadal NDVI image shows the highest possible "greenness" values that have been measured during a 10-day period.

Vegetated areas will generally yield high values because of their relatively high near infrared reflectance and low visible reflectance. For better interpretation and understanding of the NDVI images, a temporal image difference approach for change detection is used.

The Standardized Difference Vegetation Index (SDVI) is the standardized anomaly (according to the specific time of the year) of the NDVI.

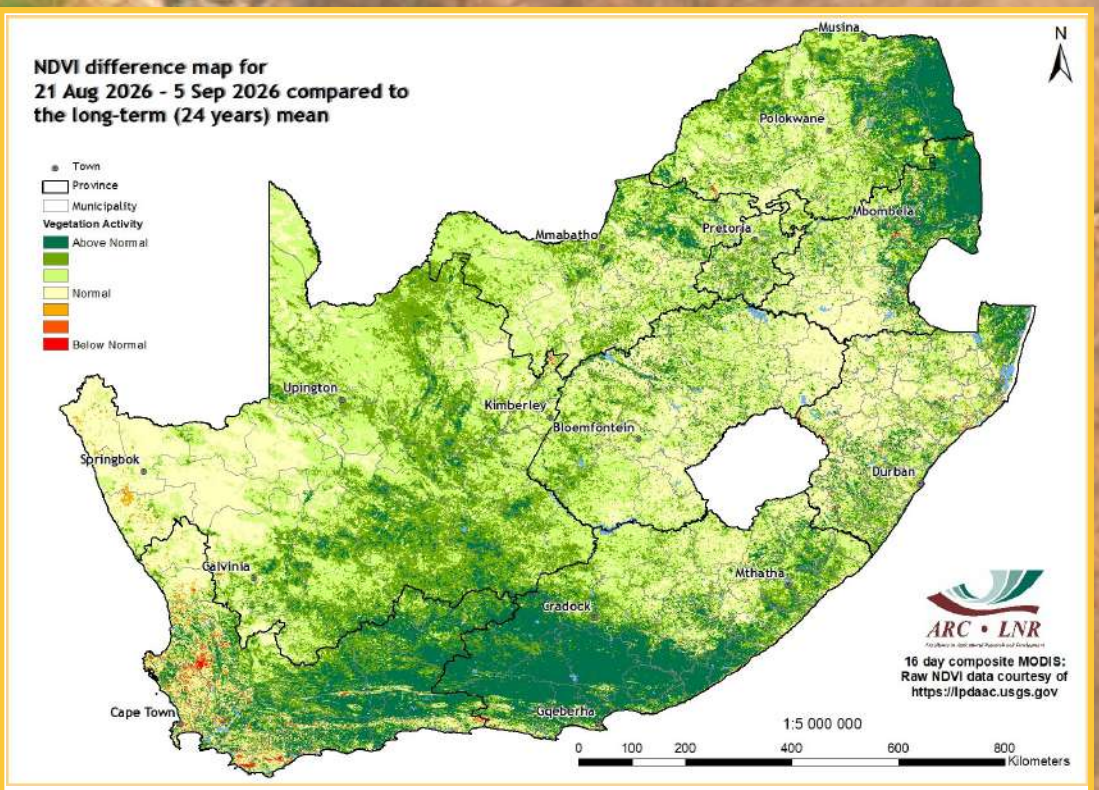

Figure 10

Figure 10:
Compared to the historical averaged vegetation conditions, the 16-day NDVI map for August 2026 shows that many parts of the country experienced above-normal conditions, with the exception of some areas in the Western and Northern Cape, Mpumalanga and Kwa-Zulu Natal provinces, which experienced below-normal activity.

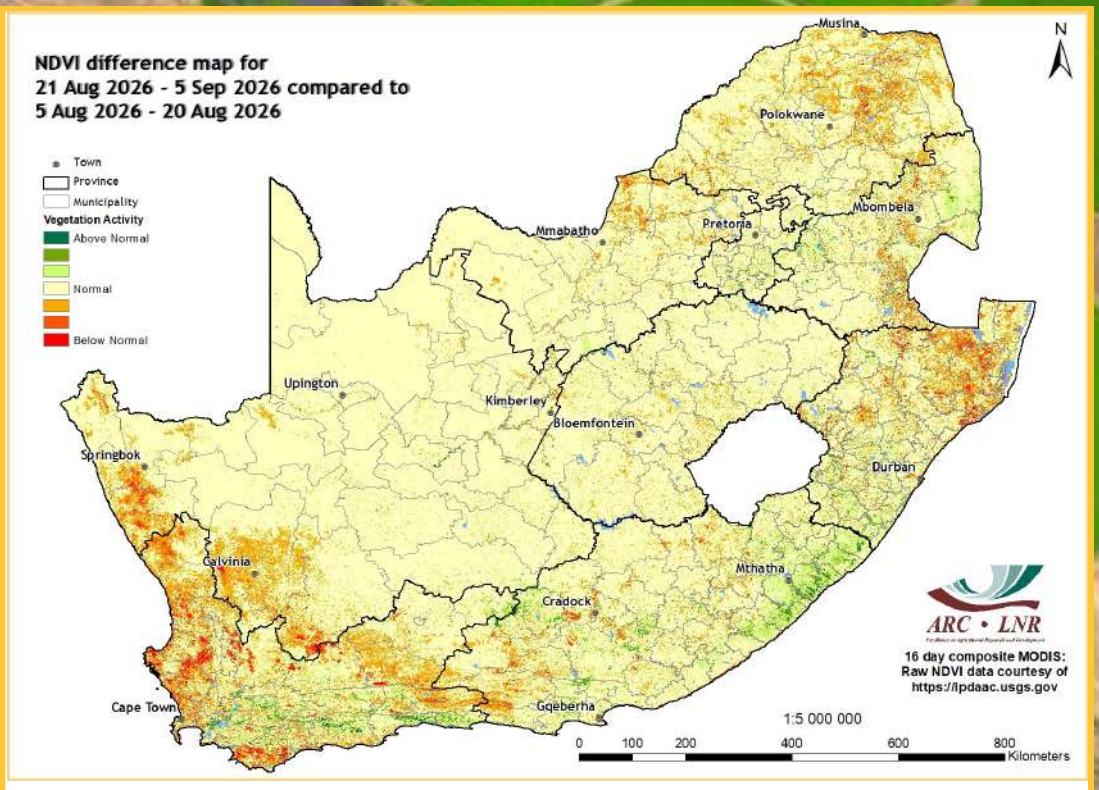

Figure 11

Figure 11:
The 16-day NDVI difference map for August 2026 compared to the preceding 16-day period shows that central parts of the country experienced mainly normal vegetation conditions, while selected parts of the western and north east parts of the country experienced below-normal activity. Patches of above-normal activity remain evident in isolated areas, particularly in the Cape provinces.

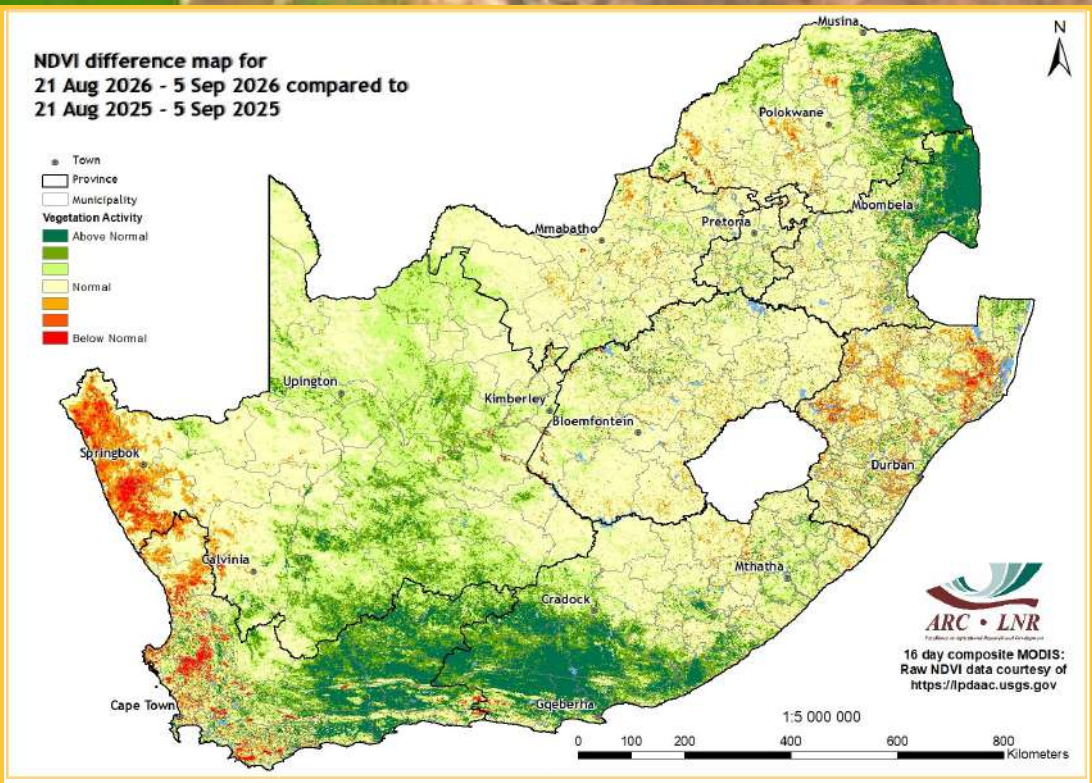

Figure 12

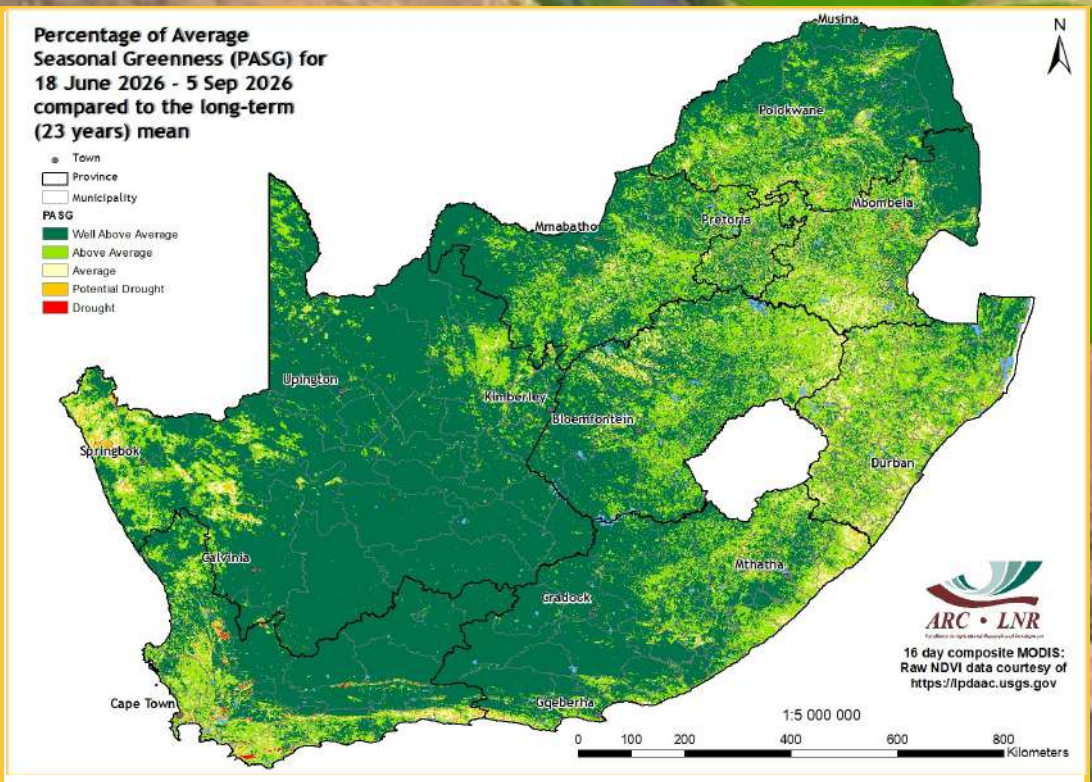

Figure 13

Vegetation Mapping *(continued from p. 7)*

Interpretation of map legend

NDVI-based values range between 0 and 1. These values are incorporated in the legend of the difference maps, ranging from -1 (lower vegetation activity) to 1 (higher vegetation activity) with 0 indicating normal/the same vegetation activity or no significant difference between the images.

Cumulative NDVI maps:

Two cumulative NDVI datasets have been created for drought monitoring purposes:

Winter: January to December
Summer: July to June

Figure 12:
The 16-day NDVI difference map for August 2026 compared to the same period last year shows that the country continued to experience a mix of vegetation conditions. Some areas in the west and eastern half of the country experienced mainly below-normal activity while patches of above-normal activity occurred in the Cape provinces and in the far north areas of the country.

Figure 13:
The Percentage of Average Seasonal Greenness (PASG) map for the past 3 months shows that many parts of the country experienced well above-average vegetation conditions, while a few isolated areas, particularly along the west coastline, experienced drought and potential drought.

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5. Vegetation Condition Index

Vegetation Condition Index (VCI)

The VCI is an indicator of the vigour of the vegetation cover as a function of the NDVI minimum and maximum encountered for a specific pixel and for a specific period, calculated over many years.

The VCI normalizes the NDVI according to its changeability over many years and results in a consistent index for various land cover types. It is an effort to split the short-term weather-related signal from the long-term climatological signal as reflected by the vegetation. The VCI is a better indicator of water stress than the NDVI.

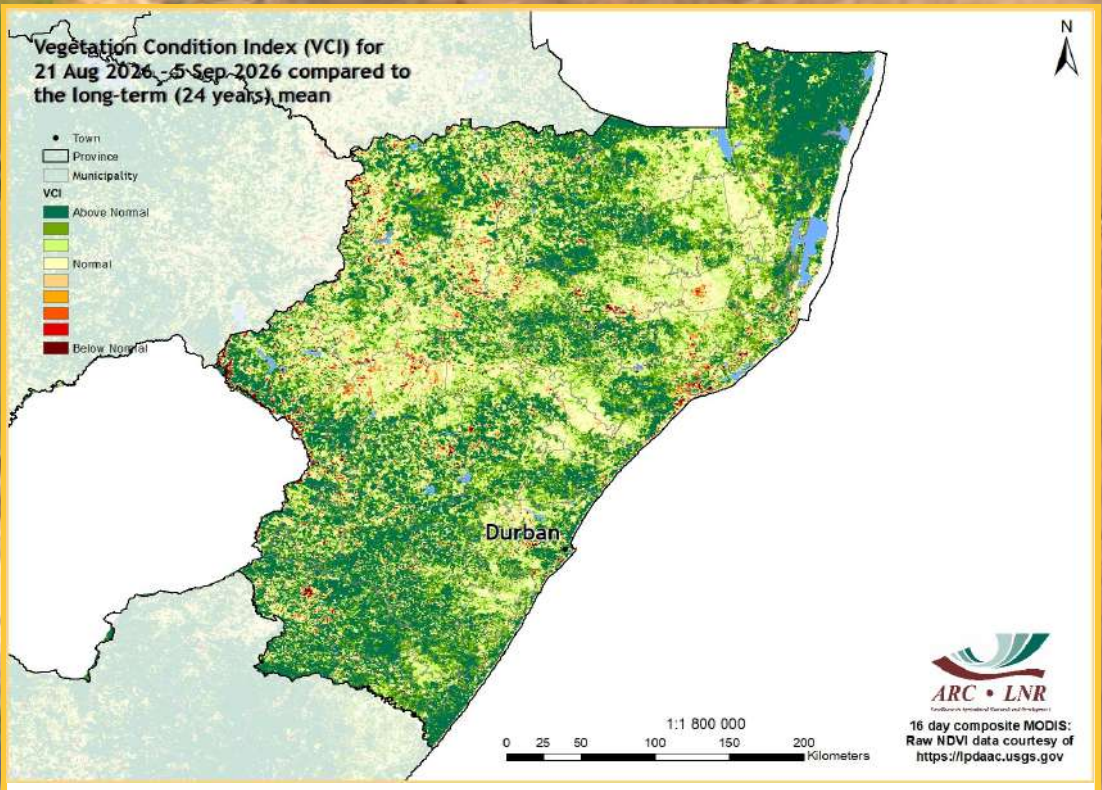


Figure 14

Figure 14:
The 16-day VCI map for August 2026 shows that KwaZulu-Natal experienced mainly a mix of vegetation conditions with below-normal activity in isolated areas.

Figure 15:
The 16-day VCI map for August 2026 shows that many parts of Western Cape experienced a mix of vegetation conditions with above-normal vegetation conditions observed in the western regions and below-normal vegetation activity prevailing in the eastern parts of the province.

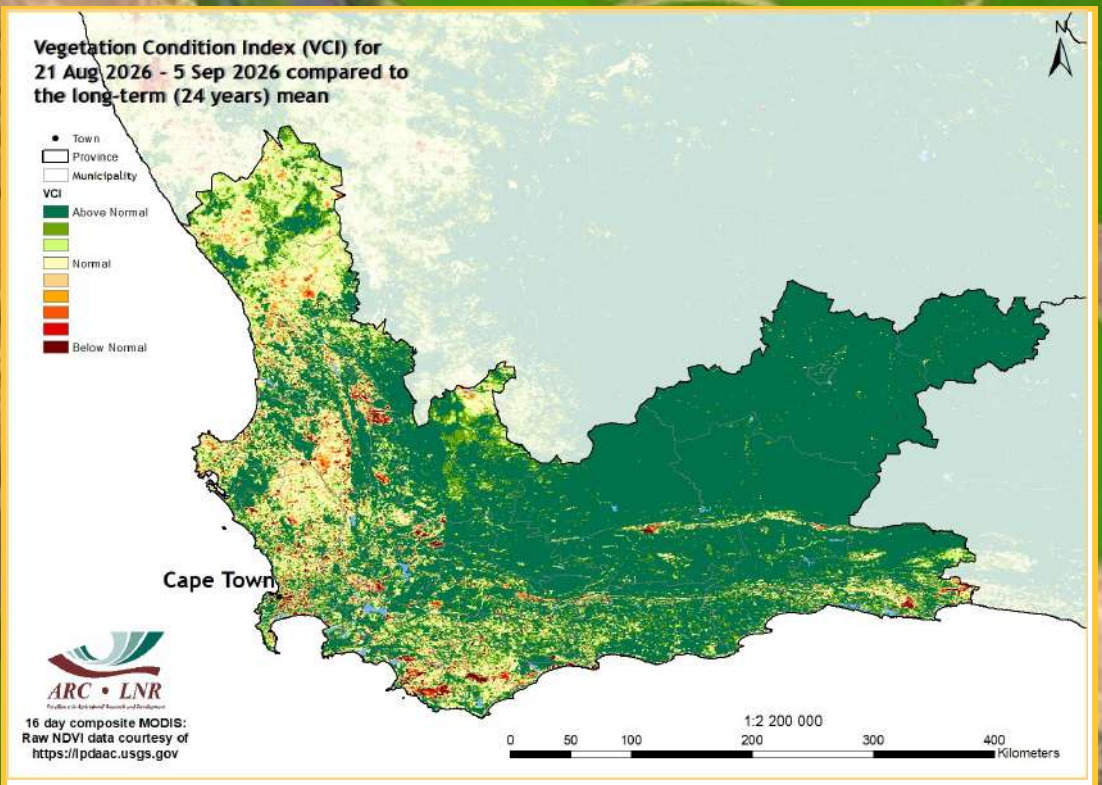
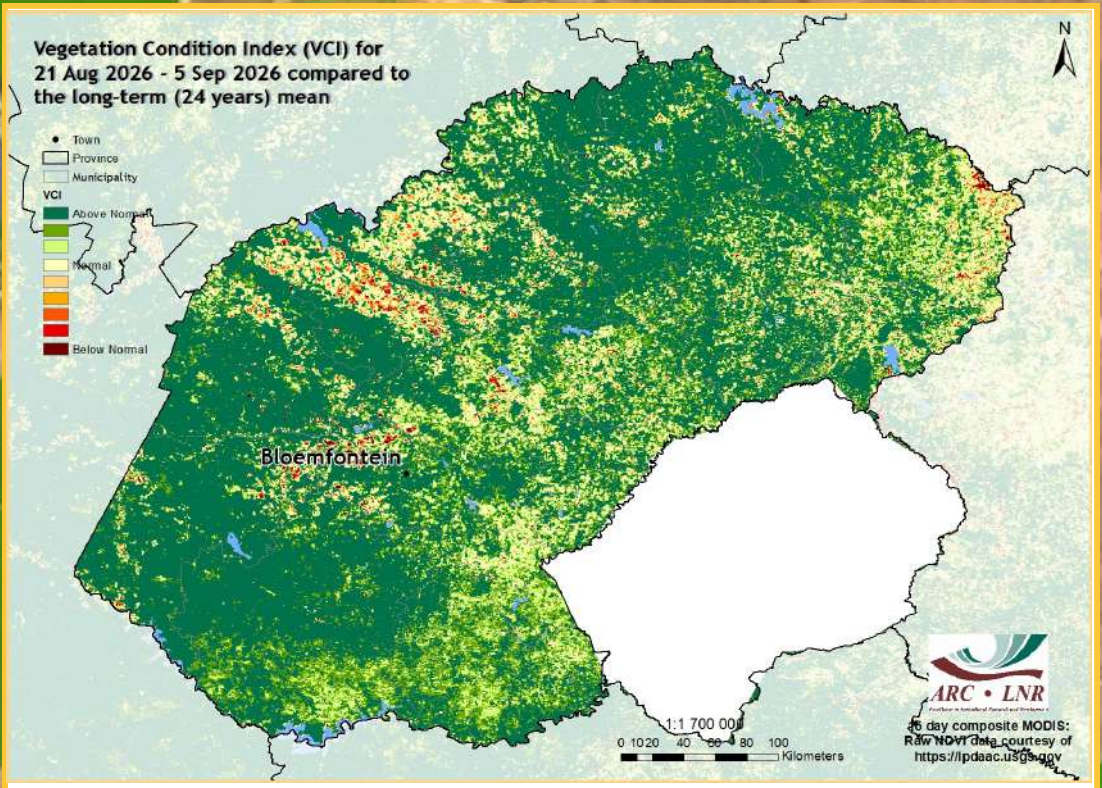


Figure 15



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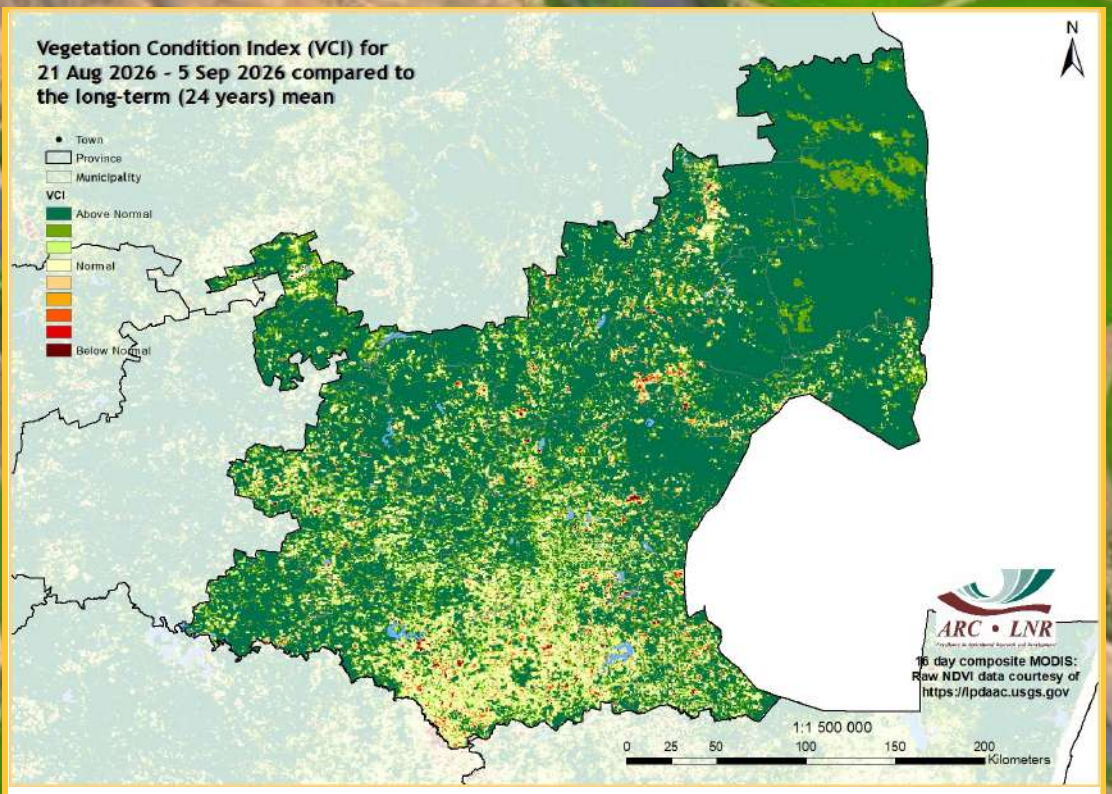

Figure 17

Figure 16:
The 16-day VCI map for August 2026 shows that most parts of Free State experienced mainly above-normal vegetation conditions with below-normal activity in isolated areas.

Figure 17:
The 16-day VCI map for August 2026 shows that many parts of Mpumalanga experienced mainly above-normal vegetation conditions with patches of below-normal activity in isolated areas.

Questions/Comments:
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6. Vegetation Conditions & Rainfall

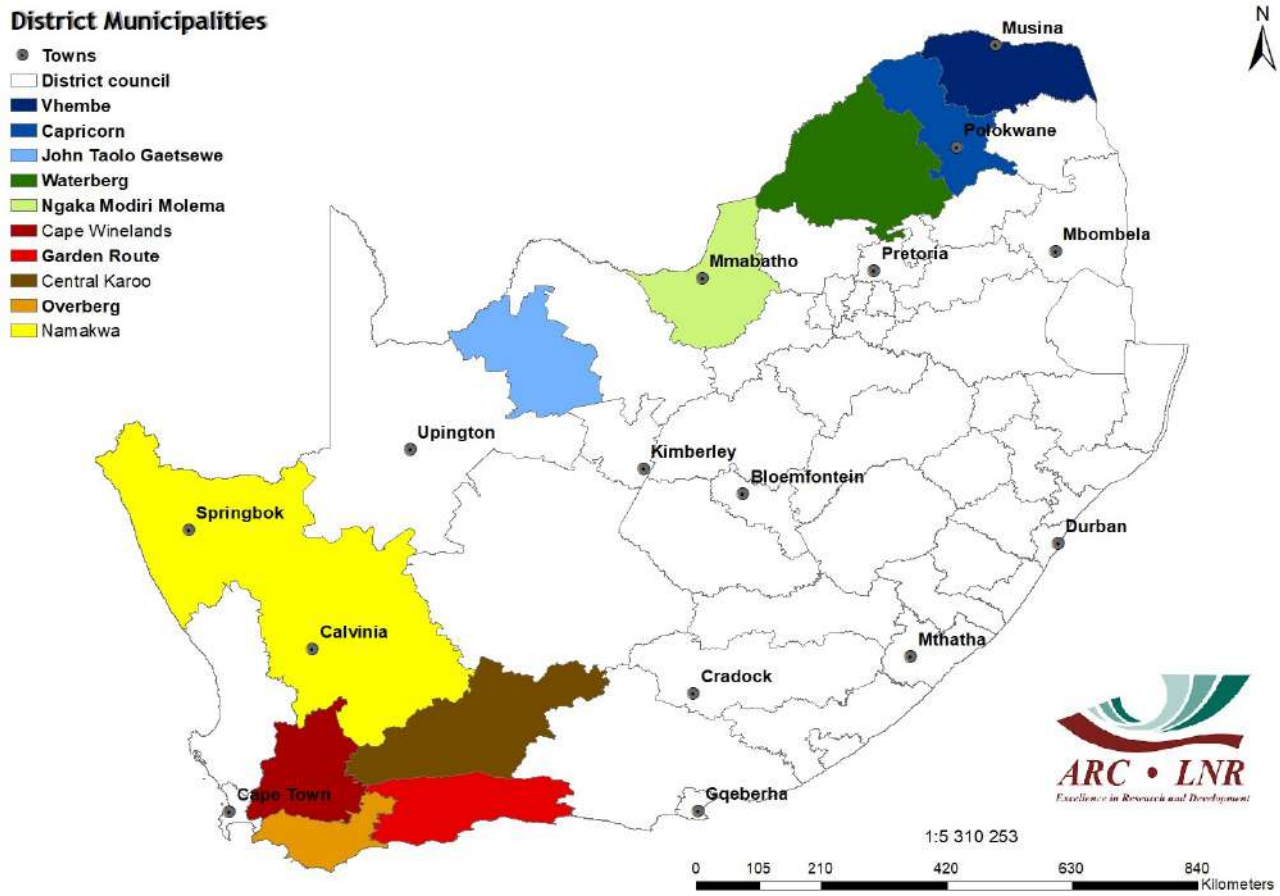


Figure 18

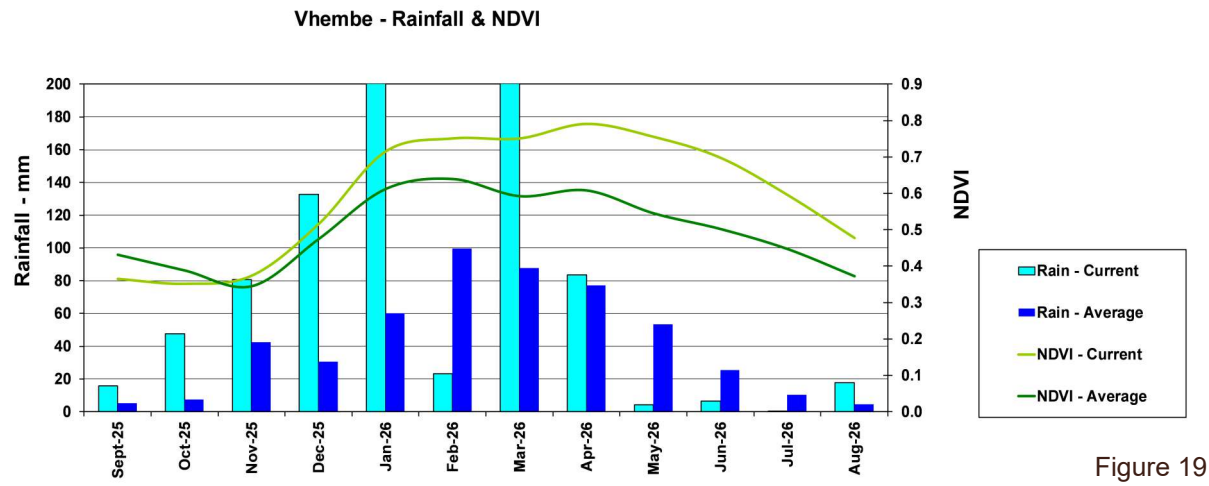
Rainfall and NDVI Graphs

Figure 18:
Orientation map showing the areas of interest for August 2026. The district colour matches the border of the corresponding graph.

Questions/Comments:
GcayiS@arc.agric.za

Figures 19-23:
Indicate areas with higher cumulative vegetation activity for the last year.

Figures 24-28:
Indicate areas with lower cumulative vegetation activity for the last year.



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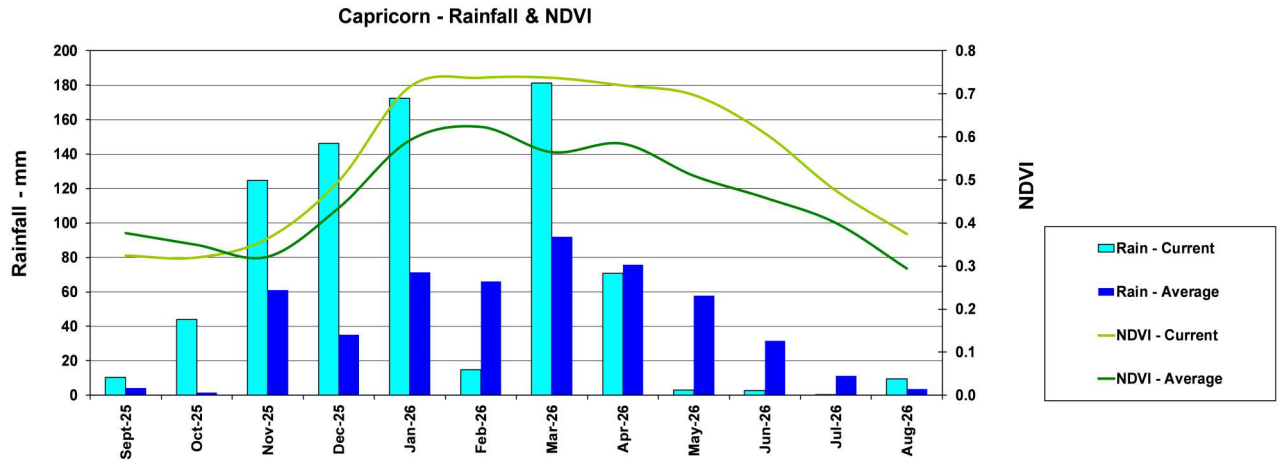

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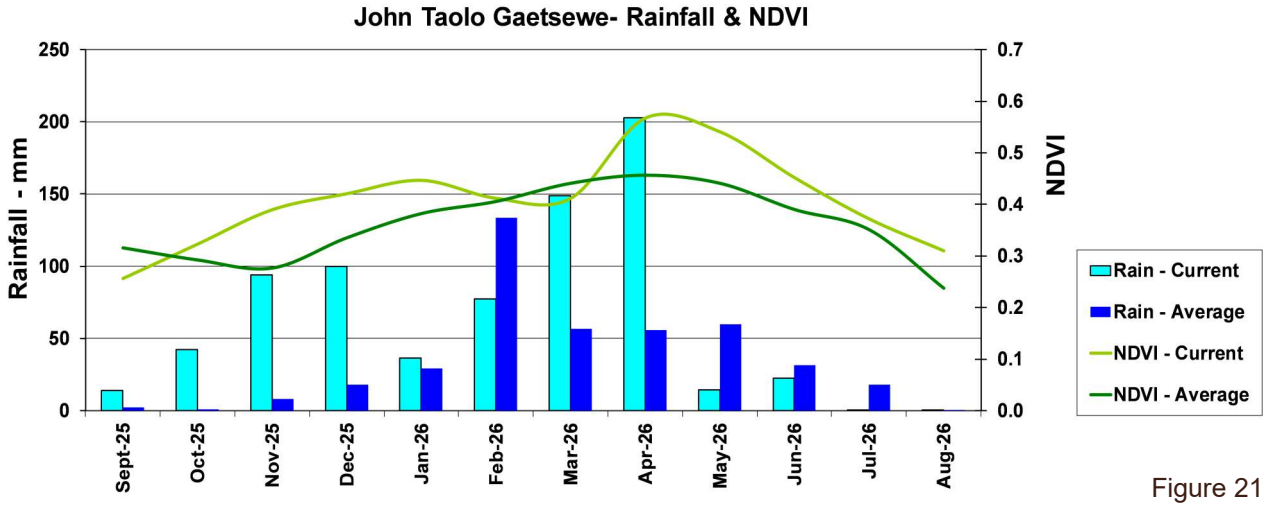

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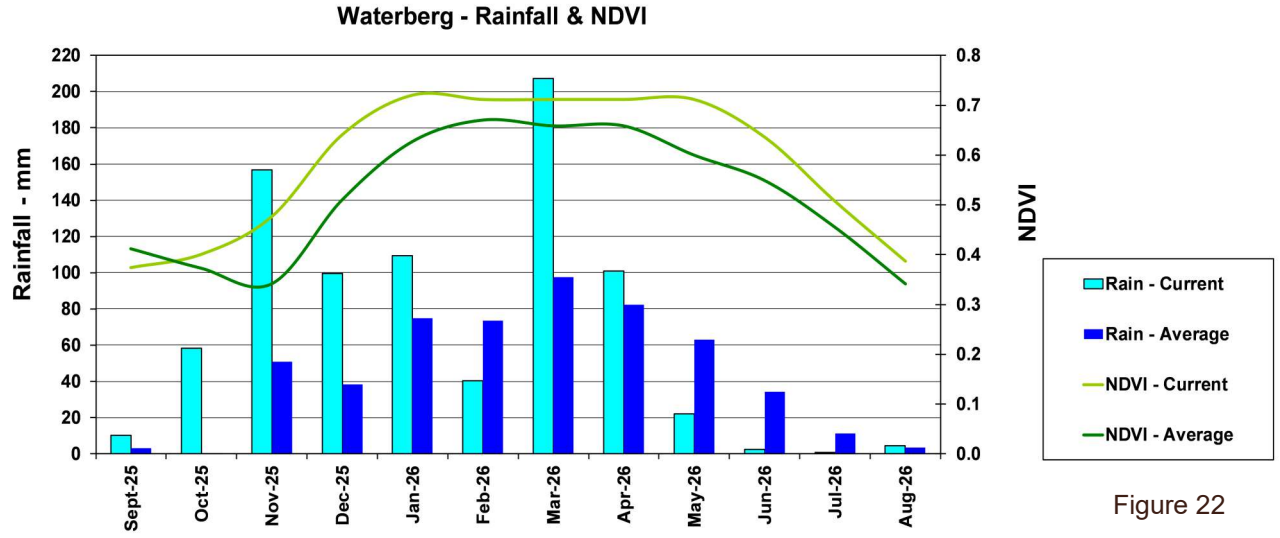

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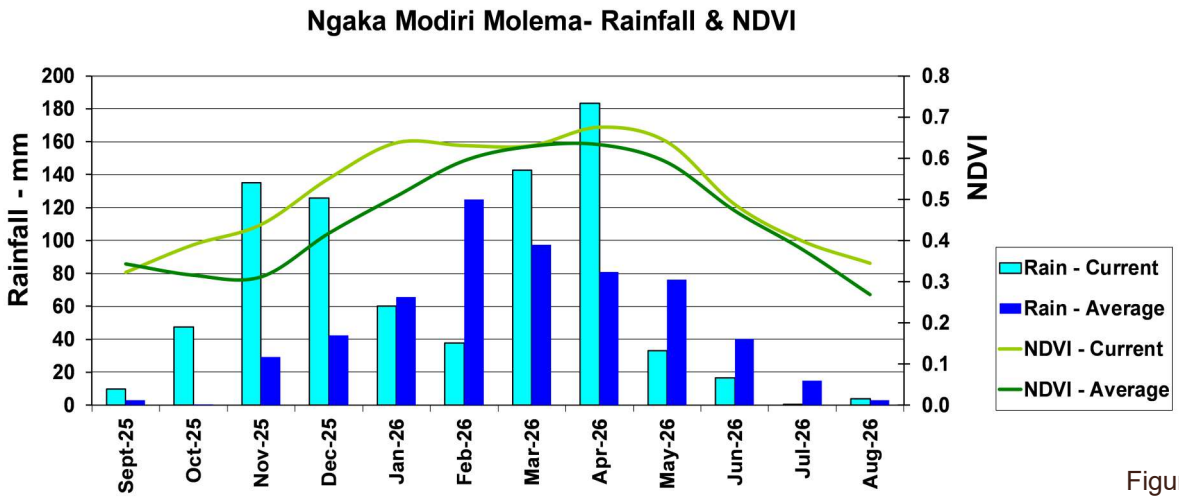

Figure 23

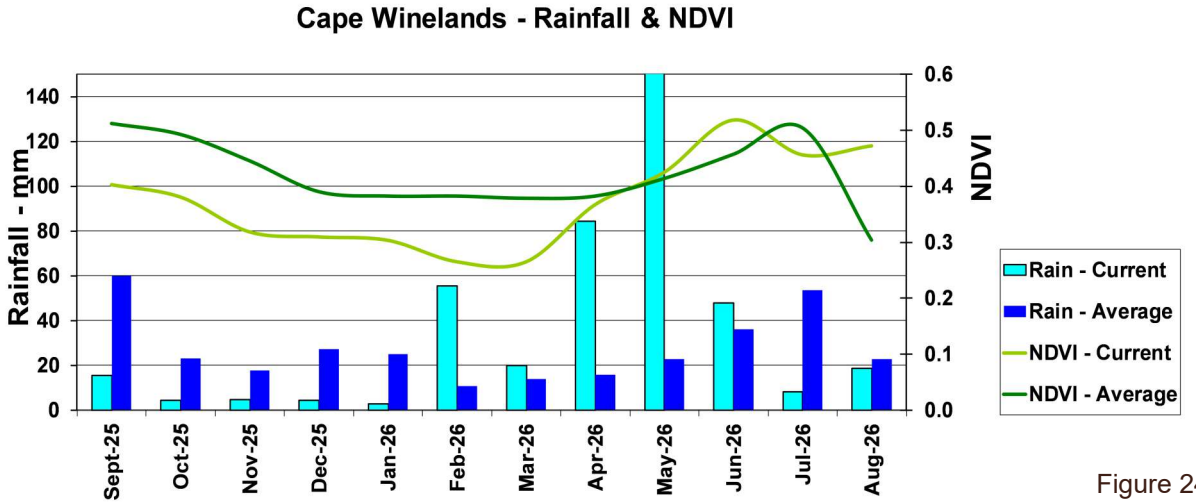

Figure 24

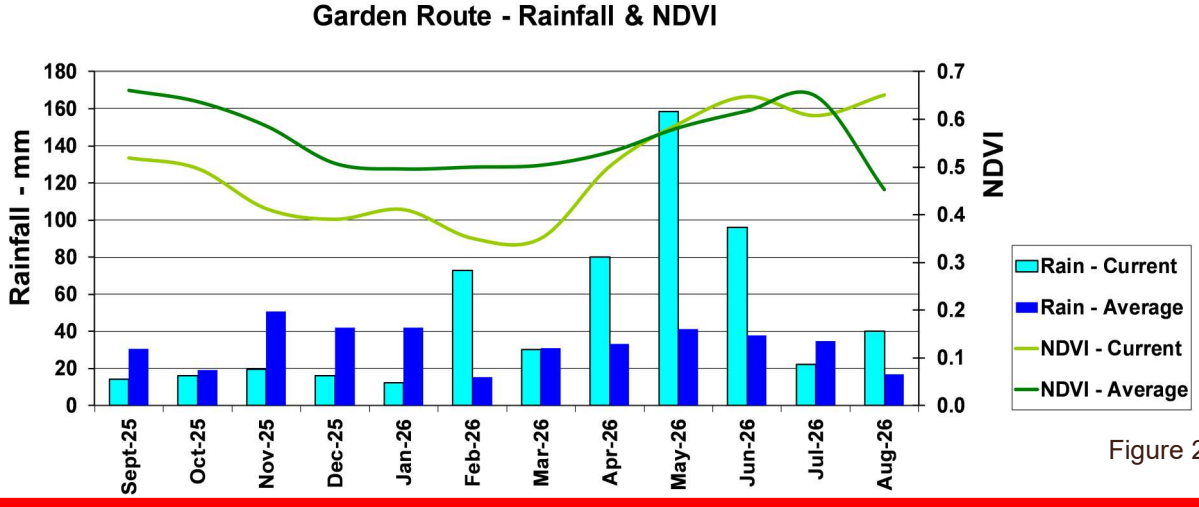

Figure 25

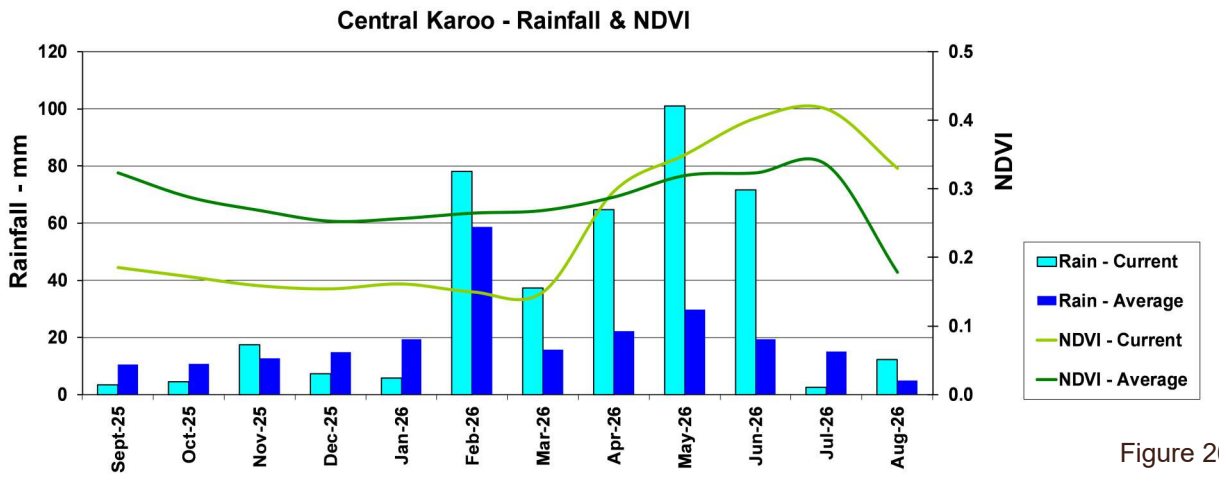

Figure 26

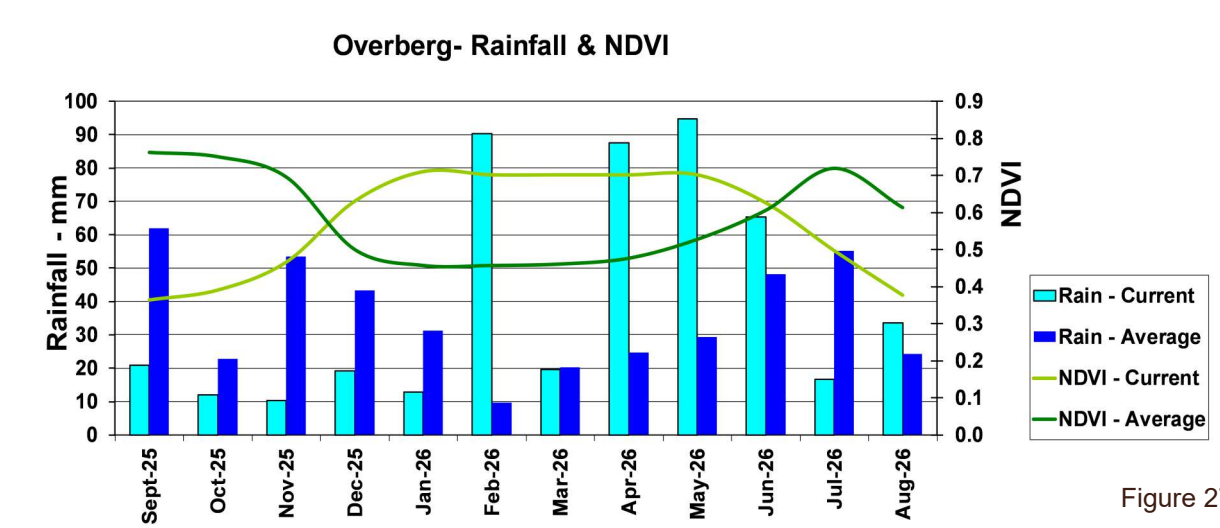

Figure 27

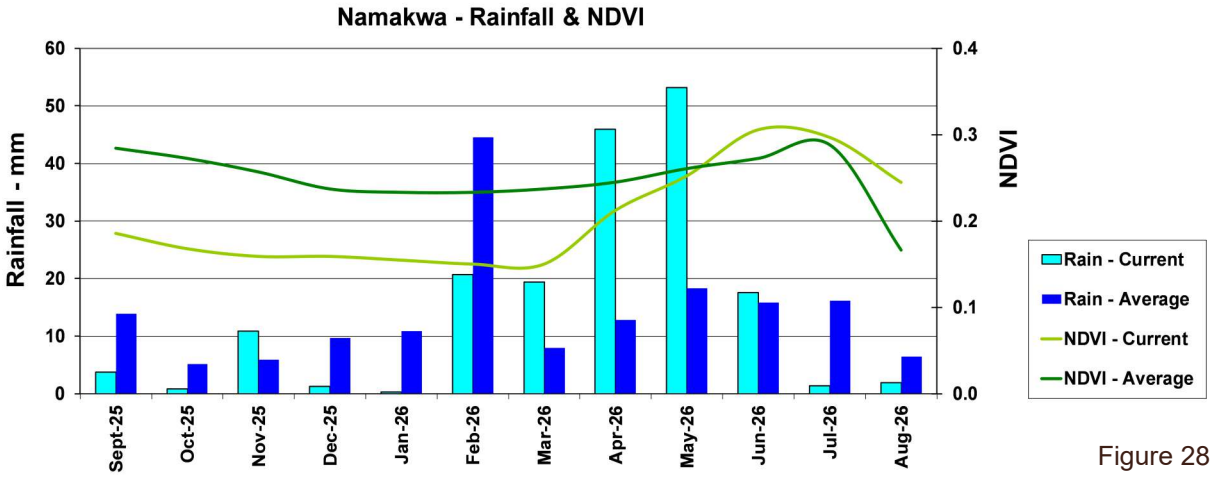

Figure 28

7. Fire Watch

Active Fires *(Provided when data is available)*

Forest and vegetation fires have temperatures in the range of 500 K (Kelvin) to 1000 K. According to Wien's Displacement Law, the peak emission of radiance for blackbody surfaces of such temperatures is at around 4 µm. For an ambient temperature of 290 K, the peak of radiance emission is located at approximately 11 µm. Active fire detection algorithms from remote sensing use this behaviour to detect "hot spot" fires.

Figure 29:
The graph shows the total number of active fires detected from 28 July to 28 August 2026 per province. Fire activity was higher in KwaZulu-Natal and Mpumalanga provinces compared to the long-term average.

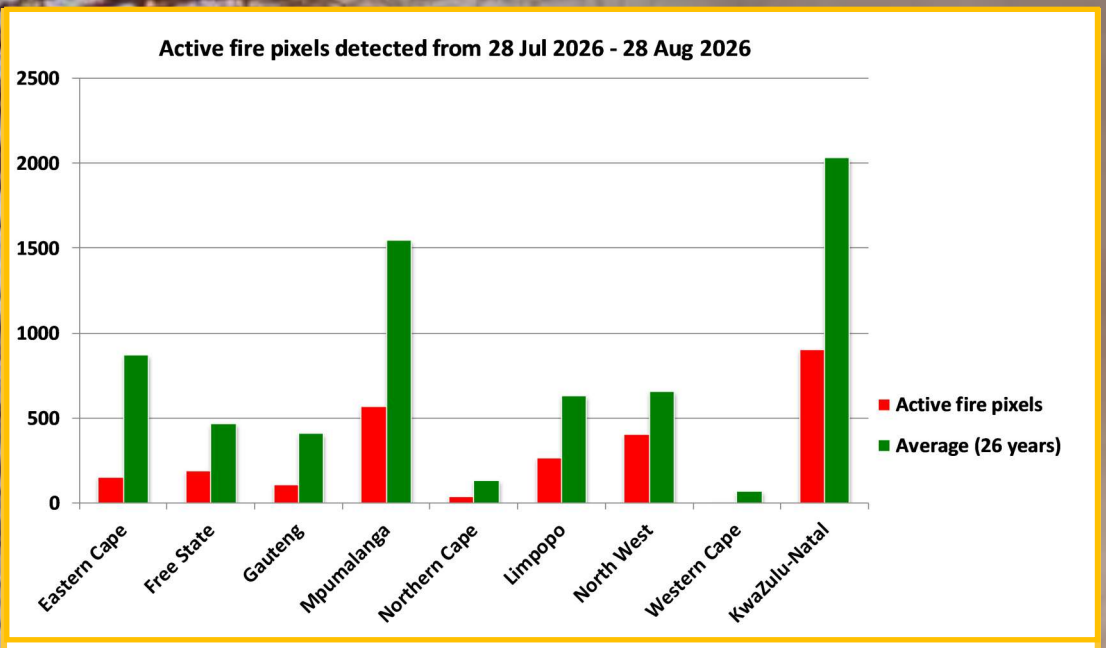

Figure 29

Figure 30:
The map shows the location of active fires detected between 28 July and 28 August 2026.

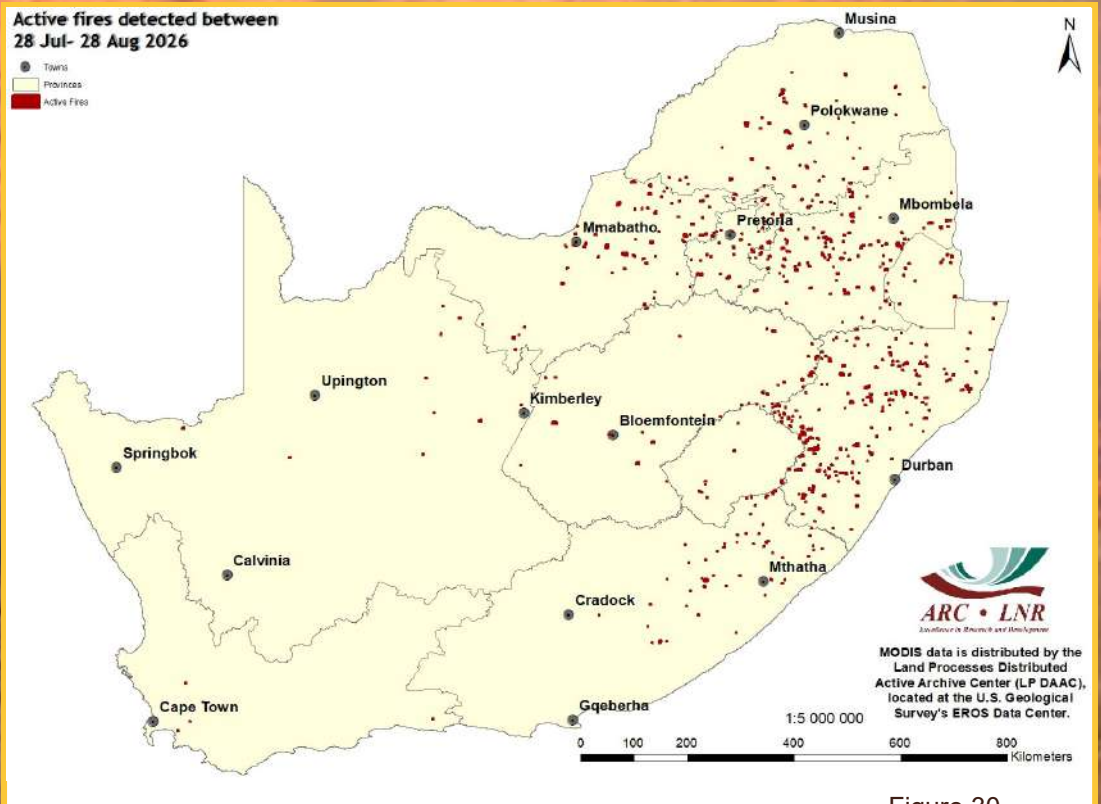

Figure 30

Active Fires *(Provided when data is available)*

Forest and vegetation fires have temperatures in the range of 500 K (Kelvin) to 1000 K. According to Wien's Displacement Law, the peak emission of radiance for blackbody surfaces of such temperatures is at around 4 µm. For an ambient temperature of 290 K, the peak of radiance emission is located at approximately 11 µm. Active fire detection algorithms from remote sensing use this behaviour to detect "hot spot" fires.

Figure 31:
The graph shows the total number of active fires detected from 1 January to 28 August 2026 per province. Fire activity was higher in the KwaZulu-Natal compared to the long-term average.

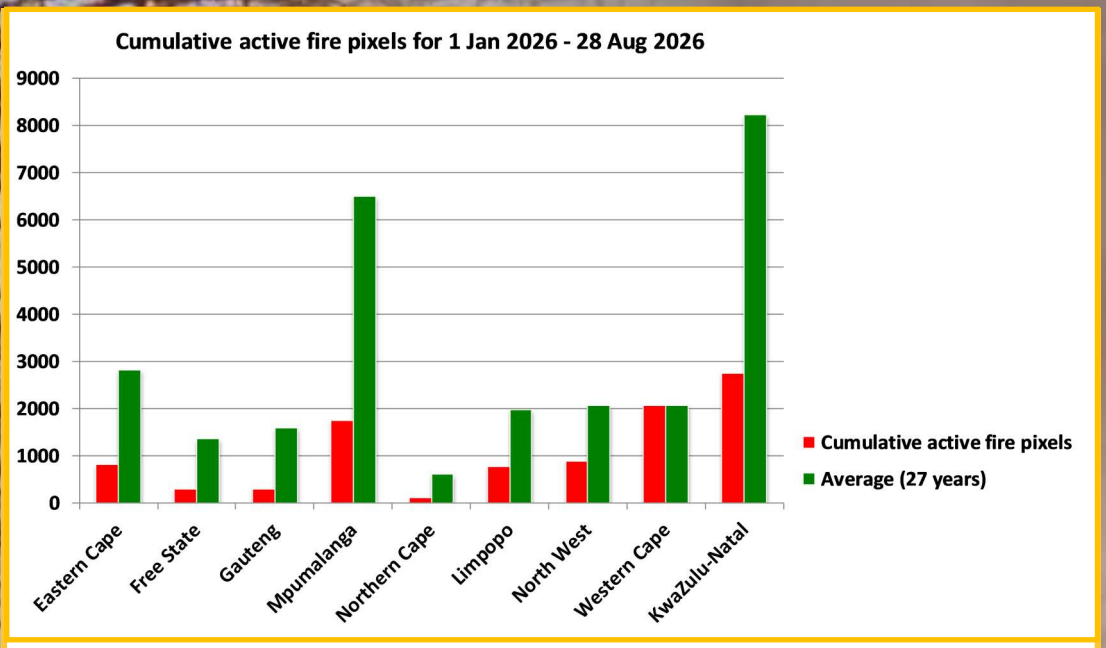

Figure 31

Figure 32:
The map shows the location of active fires detected between 1 January and 28 August 2026.

Questions/Comments:
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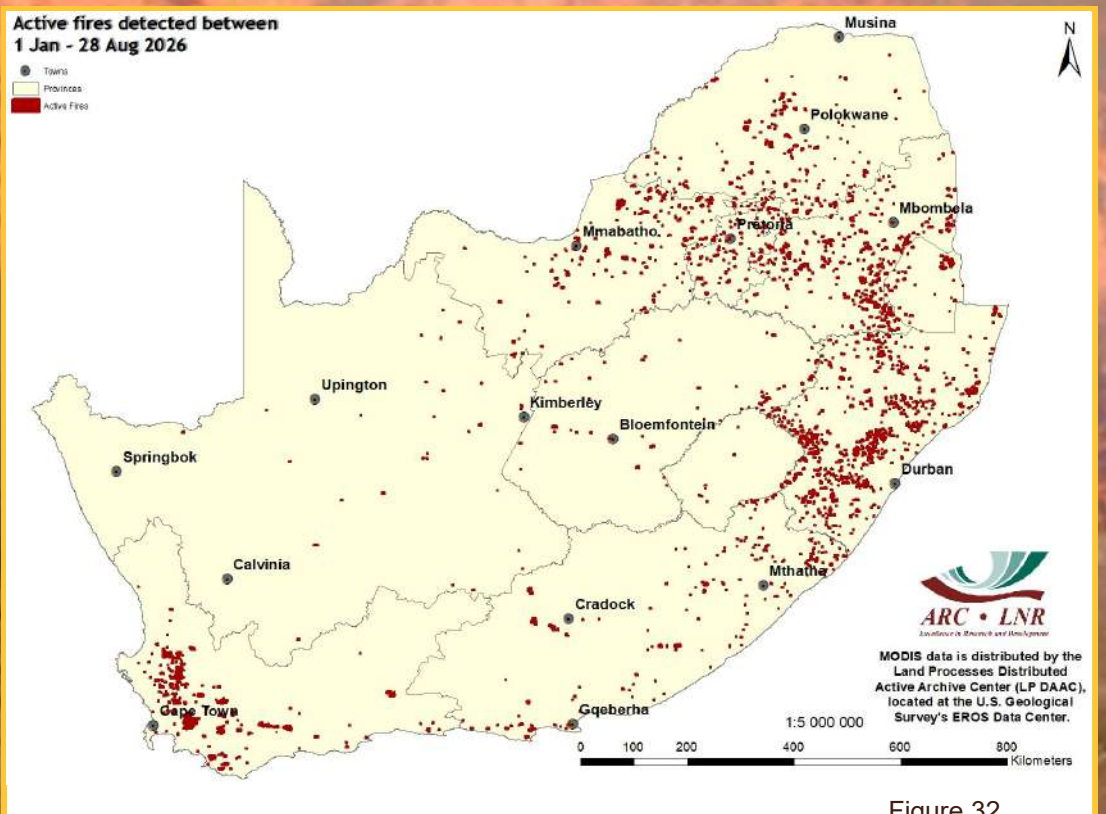

Figure 32

8. Surface Water Resources

Countrywide surface water areas (SWAs) are mapped on a monthly basis by GeoTerraImage using Sentinel-2 satellite imagery from the start of its availability at the end of 2015.

Figure 33 represents a comparison between the area of water available now and the maximum area of surface water recorded in the last 10 years. This 10-year historical window represents the operational period of the satellite from which the water information has been generated. In this map, any value less than 100 represents water catchments within which the current month's total surface water is less than the maximum extent recorded for the same area since the end of 2015.

Figure 34 represents a comparison between the area of surface water now and for the same month last year. In this map, any value less than 100 represents water catchments within which the current month's total surface water is less than that recorded in the same water catchment, in the same month, last year.

The long-term map for August 2026 is nearly identical to that of July 2026, and continues to show near maximum water distribution patterns across most of South Africa, with the exception of a large swath of catchments across the northern section of the Northern Cape, that is now showing a decrease in water levels compared to July long-term conditions.

The comparison between August 2026 and the same month in 2025 also shows very similar water levels to that from July 2026 inter-annual comparisons, with most of the summer rainfall areas ranging between 50 – 150% of previous year levels. The exception is the July indicative reduction in water levels in the central and southern Karoo regions

The SWA maps are derived from the monthly data generated and available through GeoTerraImage's 'Msanzi Amanzi' web information service: https://www.water-southafrica.co.za

Questions/Comments:
mark.thompson@geoterraimage.com

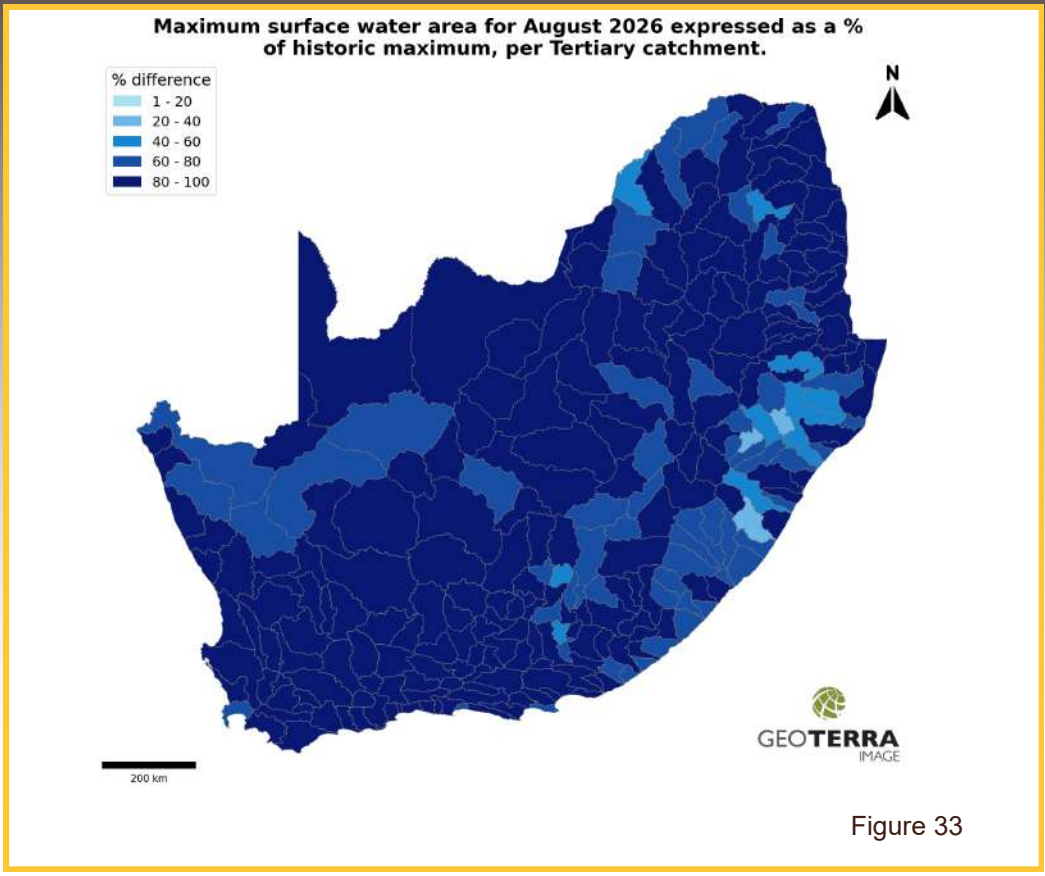

Figure 33

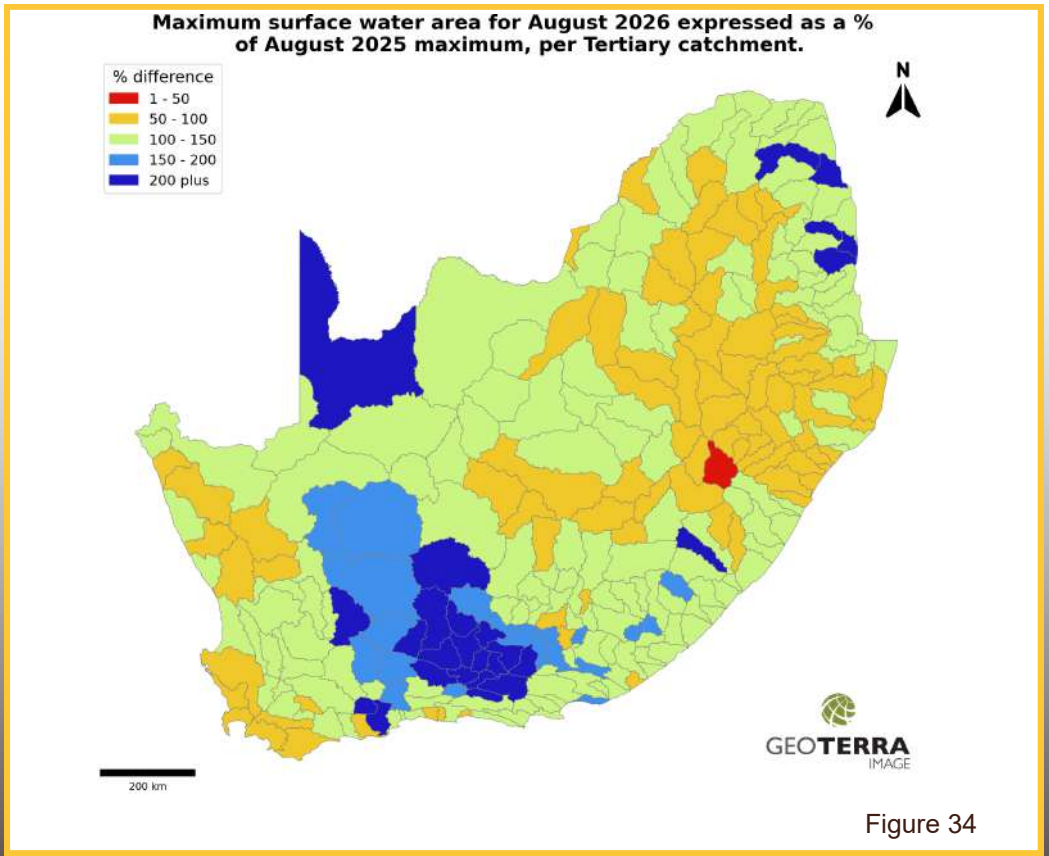

Figure 34

GEOTERRA IMAGE

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SOIL, CLIMATE AND WATER

Agrometeorology

The programme uses weather and climate information for agricultural planning and the enhancement of crop and livestock production systems. The impact of climate variability and change in the agricultural sector is investigated. Due to the increasing pressure to reduce greenhouse gas emissions globally, climate change mitigation is also an important facet of our activities. The Weather Station Network and Climate Database are maintained as a national asset for the benefit of the agriculture sector.

Activities

Agrometeorology and Crop Modelling

- Assessing climate risk for an area in relation to a particular crop
- Agroclimatological analysis of the suitability for crop production at a particular location
- Development of early warning systems for climate hazards (e.g. drought, floods)
- Agrometeorological forecasting and advisory services
- Crop modelling to assess the impact of weather conditions and climate on agriculture
- Conducting crop yield forecasting exercises, hydrological modelling, hydrometeorology and biometereology studies

Climate Change Adaptation and Mitigation

- Conducting research on possible impact of projected climate change on agricultural activities, potential, greenhouse gas emissions from various land use, climate change, mitigation and adaptation strategies for agriculture
- Developing greenhouse gas inventories at farm and national levels
- Conducting research on climate change mitigation and adaptation strategies for agriculture
- Promoting low-carbon technologies

Climate Monitoring, Products and Services

- Developing and maintaining a network of over 500 weather stations distributed all over the country
- Archiving historical and current weather data of good quality with some datasets dating back to 1900
- Developing weather/climate products and services together with stakeholders and clients to meet their specific requirements
- Disseminating weather/climate data, products and services via multiple platforms

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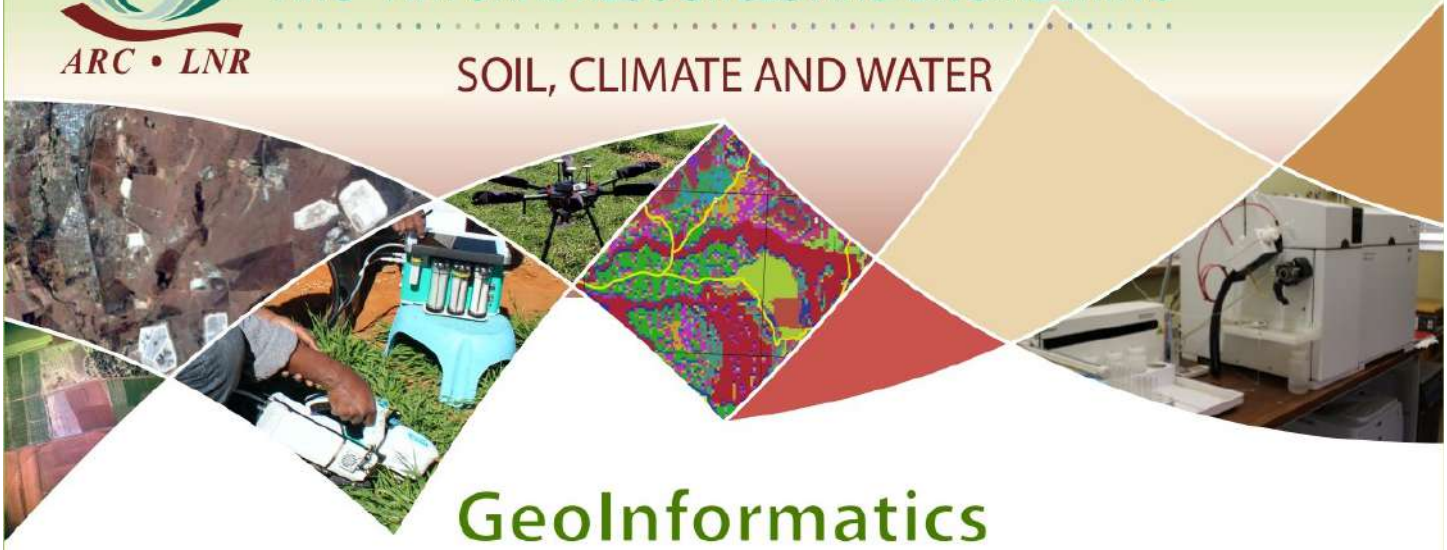

GeoInformatics

The programme focuses on applied Geographical Information Systems (GIS) and provides leadership in GIS products, solutions and decision support systems for agriculture and natural resources management. The Coarse Resolution Satellite Image Archive and Information Database is maintained as a national asset.

Activities

Digital/Smart Agriculture/Drone Platform - Applications

- Yield & production estimation
- Insurance index
- Mapping crop types
- Precision agriculture
- Weed/invasive sp. mapping
- Water requirement
- Smart & digital agriculture
- Disease/pests

Applications in Natural Resources/National Assets

- Early warnings
- National & Provincial advisories
- Crop suitability changes
- Crop statistics
- Crop stress
- Spatially explicit information dissemination systems, e.g. Umlindi newsletter

Applications in Rangelands, Livestock and Wildlife

- Early warnings
- National & Provincial advisories
- Rangeland suitability
- Rangeland dynamics
- Rangeland stresses
- Spatially explicit information dissemination systems, e.g. Umlindi newsletter

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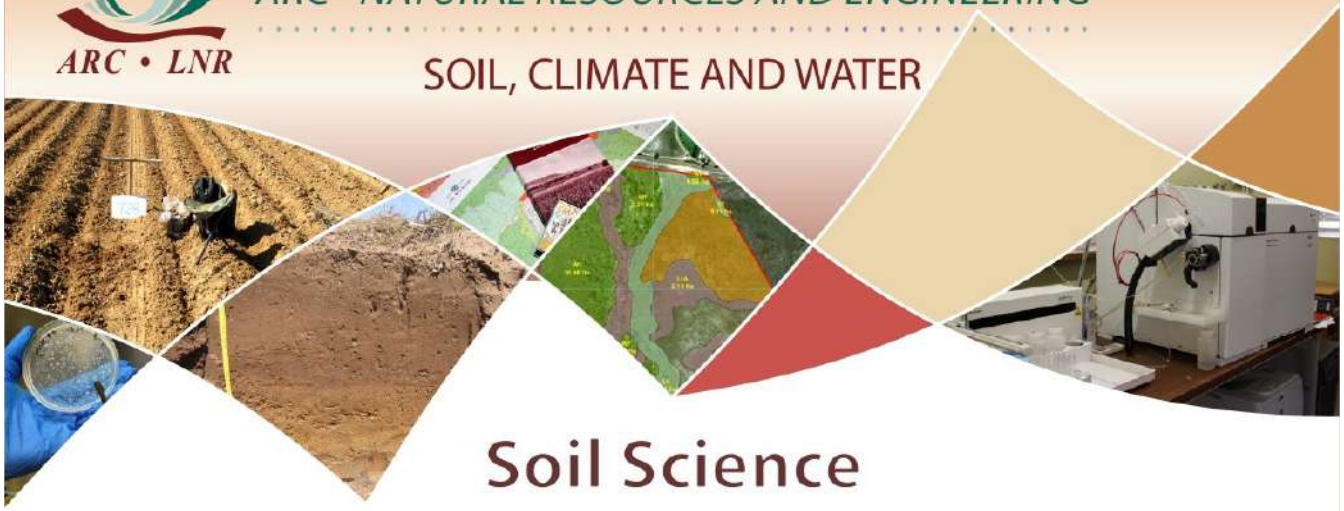

Soil Science

The programme focuses on soil as a natural resource: its formation, classification and mapping; physical, chemical, biological and fertility properties - which are linked to the sustainable use and management of soils. The Soil Information System is maintained as a national asset.

Activities

Soil Resources and Soil Information

- Distribution of soil characteristics
- Land type and soil profile databases
- Interpreted products (maps, models)

Land Use Planning and Advisory Services

- Crop suitability
- Environmental impact assessment
- Training courses

Soil Protection, Rehabilitation and Conservation

- Mine soil rehabilitation
- Erosion control
- Soil carbon enhancement

Soil/Crop Interactions

- Climate-smart agriculture (crops, practices and technologies)
- Conservation Agriculture

Soil Microbiology

- Environmental microbiology

Analytical Services

- Soil, water and plant analysis

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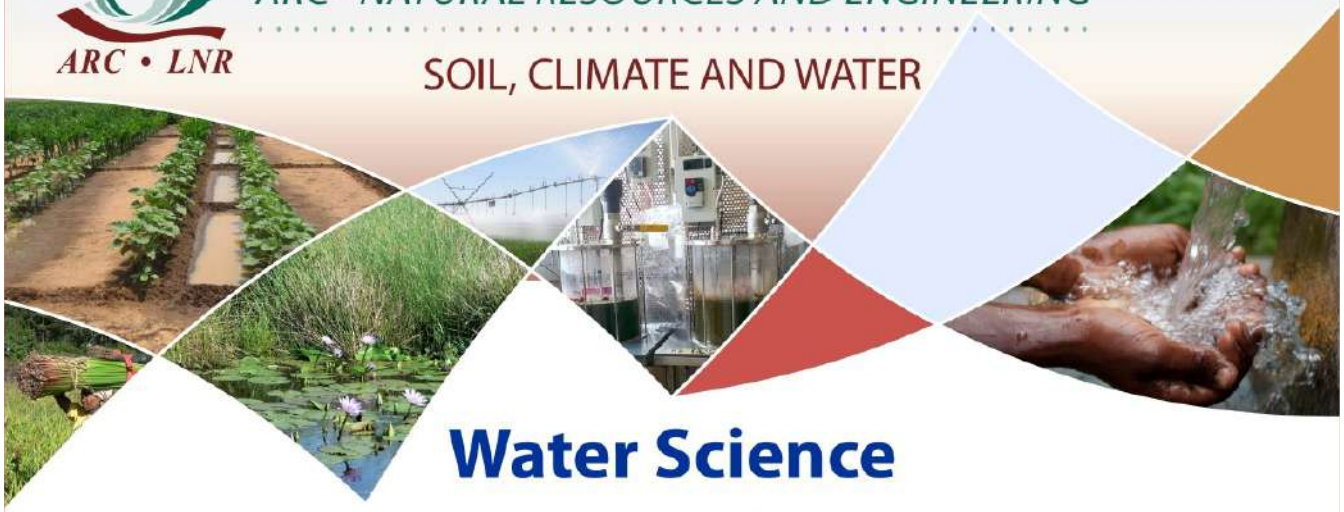

Water Science

The Water Science unit strives to use a multi-disciplinary approach in water resource management and information, applying research and technology development to promote the efficient and productive use of water in agricultural natural resource management and support socio-economic well-being.

The work done by this unit focuses on sustainable natural resource management, in particular water resources, in South Africa, mandated by related legislation including the Conservation of Agricultural Resources Act , National Environmental Management Act and the National Water Act, as well as its relevance to international Multilateral Environmental Agreements.

Activities

Key/ Technologies Tools

Water Information Systems for Agriculture

Agroecology Platform

- Water quality
- Water quantity

Key Research Focus Areas

Efficient Water Use

- **Focal point for Plant-Soil-Water Relations**
  - *Plant Soil Interactions*
  - *Water-Energy-Food Security*
  - *Rain-fed Agriculture (Catchment and Field Scale)*
- **Agricultural Water Resource Management**
  - *Monitoring and Evaluation*
  - *Ecosystem Service Conservation*
  - *Rehabilitation*
  - *Governance*
- **Wetland Management**

Agricultural Water Resource Management

Management

- Promote sustainable management of agricultural resources: soil, water and related vegetation; including land use and climate change impacts in catchments
- Promote sustainable water resource management under dryland crop production and irrigation

Technologies

- Monitor and evaluate applicable climate-smart agriculture (CSA) and conservation agriculture (CA) technologies

Governance

- Assess governance and institutional arrangements for water resource management

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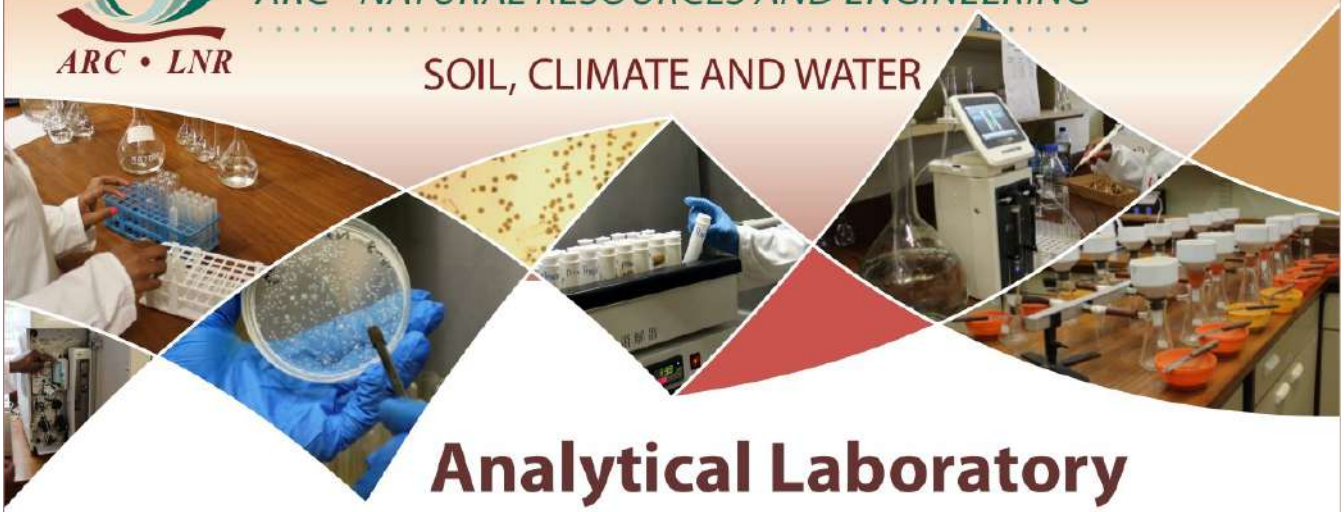

Analytical Laboratory

The unit focuses on the various procedures to analyze and determine the properties of soil, water and associated materials, mainly for agricultural purposes. The laboratory operates a range of equipment and participates in various quality control schemes, both local and international. The water analysis for anions is SANAS-accredited and other accreditations are underway.

Analyses and Services

Soil Physical Analysis

- Texture (sand, silt and clay content)
- Water-holding capacity
- Soil moisture content
- Bulk density
- Shrink-swell capacity

Soil Chemical Analysis

- pH
- Exchangeable and extractable cations
- Acidity
- Soil Organic Carbon
- Nitrogen content and C/N ratio
- Phosphorus
- Micronutrients

Soil Fertility

- Analysis package for farmers & gardeners
- Fertilizer recommendations for specific crops

Water Analysis

- pH, EC, anions, cations
- Water quality

ICP Scan

- Semi-quantitative scan for a range of elements (Li, Be, Ti, V, Cr, Mn, Co, Ni, Cu, Zn, As, Se, Rb, Sr, Mo, Cd, Sn, Sb, Te, Cs, Ba, La, W, Pt, Hg, Tl, Pb, Bi, U), can be done on soil, water and plant

Plant Material Analysis

For example: leaves, roots, growth media, etc. – drying, milling, pH, EC, C, N, nutrients and toxic elements

Special Sample Analysis

- For example: sludges, compost, fertilizers – composition and other properties
- Elemental analysis of animal tissue (e.g. hair, bones, liver, muscle, milk)

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In order to assist clients who wish to send samples to ARC, the courier costs can be borne by ARC for analysis packages of R10 000 or more.

Contact the Laboratory Manager for details.

For more information or to obtain prices or quotation, contact the Laboratory Manager: *Ms. Zanele Hlam*
Tel: 012 310 2531 • E-mail: HlamZ@arc.agric.za

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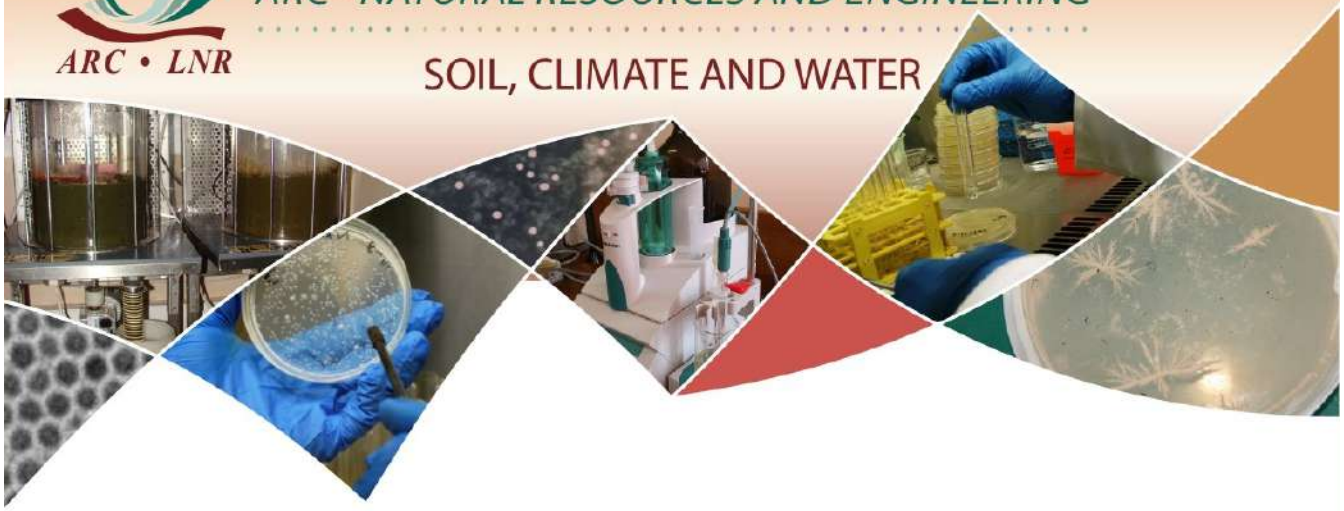

Microbiology and Environmental Biotechnology Laboratory

The Microbiology and Environmental Biotechnology Research Group forms part of the Soil Science Programme at ARC-SCW. The research group utilizes both fundamental as well as applied microbiology and biotechnology approaches to address soil, climate and water related problems in a sustainable and eco-friendly manner.

Analyses and Services

Renewable energy generation

- Gas Chromatography analysis of biogas - methane and carbon dioxide content measurements

Nanotechnology

- UV-Visible spectrophotometer analysis for colloidal nanoparticle synthesis

Phytochemical extraction

- Hotplate extraction of phytochemicals
- Soxhlet extraction of phytochemicals
- Microwave-assisted extraction of phytochemicals

Community-Level Physiological Profiling (CLPP)

- Microbial functional analysis using Biolog 31C plates

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For information on microbiological analyses
Contact the Laboratory Manager for details.

In order to assist clients who wish to send samples to ARC, the courier costs can be borne by ARC for analysis packages of R10 000 or more.
Contact the Laboratory Manager for details.

The Coarse Resolution Imagery Database (CRID)

NOAA AVHRR

ARC-NRE has an archive of daily NOAA AVHRR data dating from 1985 to 2004. This database includes all 5 bands as well as the Normalized Difference Vegetation Index (NDVI), Active Fire and Land Surface Temperature (LST) images. The NOAA data are used, for example, for crop production and grazing capacity estimation.

MODIS

MODIS data is distributed by the Land Processes Distributed Active Archive Center (LP DAAC), located at the U.S. Geological Survey's EROS Data Center. The MODIS sensor is more advanced than NOAA with regard to its high spatial (250 m^2 to 1 km^2) and spectral resolution. ARC-NRE has an archive of MODIS (version 4 and 5) data.

- MODIS v4 from 2000 to 2006
- MODIS v5 from 2000 to present

Datasets include:

- MOD09 (Surface Reflectance)
- MOD11 (Land Surface Temperature)
- MOD13 (Vegetation Products)
- MOD14 (Active Fire)
- MOD15 (Leaf Area Index & Fraction of Photosynthetically Active Radiation
- MOD17 (Gross Primary Productivity)
- MCD43 (Albedo & Nadir Reflectance)
- MCD45 (Burn Scar)

Coverage for version 5 includes South Africa, Namibia, Botswana, Zimbabwe and Mozambique.
More information:
http://modis.gsfc.nasa.gov

VGT4AFRICA and GEOSUCCESS

SPOT NDVI data is provided courtesy of the VEGETATION Programme and the VGT4AFRICA project. The European Commission jointly developed the VEGETATION Programme. The VGT4AFRICA project disseminates VEGETATION products in Africa through GEONETCast.

ARC-NRE has an archive of VEGETATION data dating from 1998 to the present. Other products distributed through VGT4AFRICA and GEOSUCCESS include Net Primary Productivity, Normalized Difference Wetness Index and Dry Matter Productivity data.

Meteosat Second Generation (MSG)

ARC-NRE has an operational MSG receiving station. Data from April 2005 to the present have been archived. MSG produces data with a 15-minute temporal resolution for the entire African continent. Over South Africa the spatial resolution of the data is in the order of 3 km. ARC-NRE investigated the potential for the development of products for application in agriculture. NDVI, LST and cloud cover products were some of the initial products derived from the MSG SEVIRI data. Other products derived from MSG used weather station data, including air temperature, humidity and solar radiation.

Rainfall maps

- Combined inputs from 450 automatic weather stations from the ARC-NRE Soil, Climate and Water weather station network, 270 automatic rainfall recording stations from the South African Weather Service (SAWS), satellite rainfall estimates from the Famine Early Warning System Network: **http://earlywarning.usgs.gov** and long-term average climate surfaces developed at the ARC-NRE.

Solar Radiation and Evapotranspiration maps

- Combined inputs from 450 automatic weather stations from the ARC-NRE Soil, Climate and Water weather station network.
- Data from the METEOSAT Second Generation (MSG) 3 satellite via GEONETCAST: **http://www.eumetsat.int/website/home/Data/DataDelivery/EUMETCast/GEONETCast/index.html**.

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The operational Coarse Resolution Imagery Database (CRID) project of ARC-NRE is funded by the Department of Agriculture (DoA). Development of the monitoring system was made possible at its inception through LEAD funding from the Department of Science and Technology.

For further information please contact:
Siphokazi Gcayi – 012 310 2570, GcayiS@arc.agric.za

To subscribe to the newsletter, please click on the following link:
https://forms.office.com/r/YhBLkxXXp7

What does Umlindi mean?
UMLINDI is the Zulu word for "the watchman".

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