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UMLINDI The Watchman

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NATURAL RESOURCES AND ENGINEERING
Soil, Climate and Water

CONTENTS:

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Department: Agriculture
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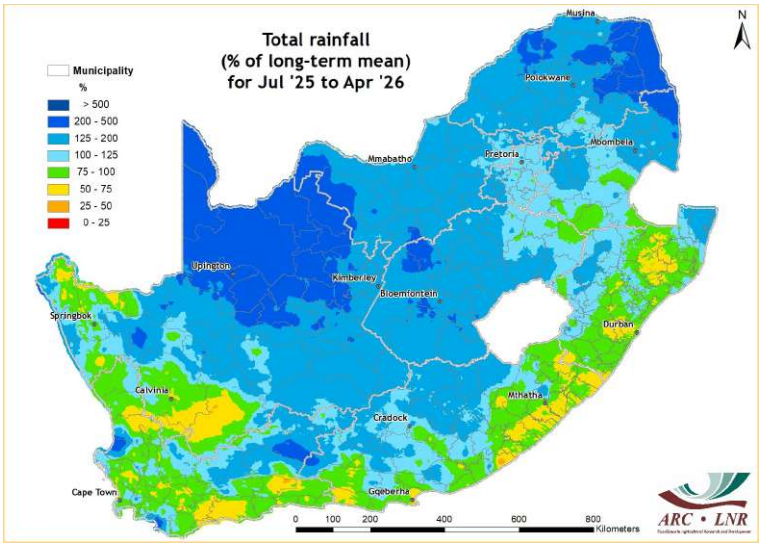
South African Weather Service

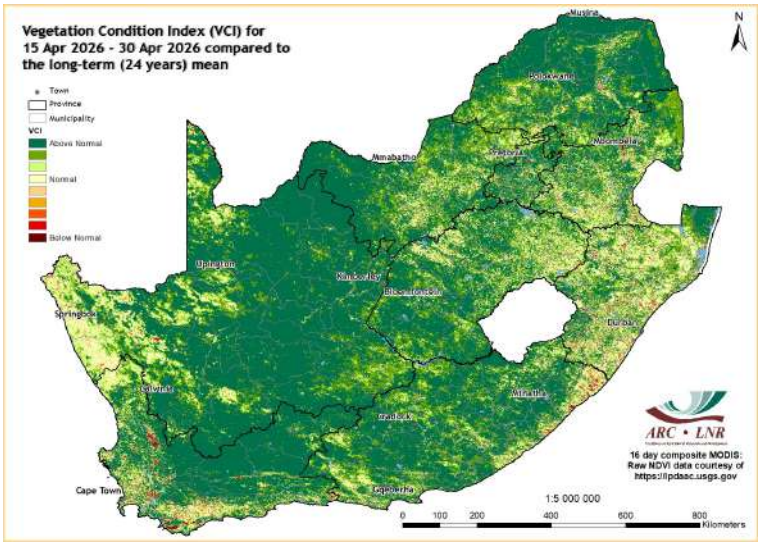
263rd Edition

Images of the Month

Overview of conditions as the 2025/26 summer rainfall season draws to a close

Influenced by La Niña conditions, the 2025/26 summer rainfall season will be remembered as generally wetter than normal across much of South Africa's summer rainfall region, particularly over the eastern, central and northern interior, while isolated eastern coastal areas received 50-75% of normal rainfall (see rainfall map). However, certain rainfall events resulted in flooding, infrastructure damage, soil saturation and agricultural impacts in vulnerable areas. The season had a favourable onset, with near- to above-normal rainfall already established during September 2025, followed by persistent and widespread rains from mid-October onwards. Cooler conditions associated with those events reduced heat stress and supported early crop development. January 2026 was particularly wet over Limpopo and Mpumalanga due to persistent moisture inflow and recurring low pressure systems, and by April the seasonal transition towards autumn became more evident, with frontal systems bringing widespread rainfall, cooler temperatures and increased cloud cover. Overall, the season was characterized by sustained rainfall activity, enhanced soil moisture, and improved vegetation vigour and biomass production (see VCI map). As the season transitions towards the dry winter period and harvesting progresses in summer rainfall areas, farmers are advised to make use of short dry windows to harvest mature crops, particularly in waterlogged and lodging-prone areas. While high biomass supports grazing potential, it may also increase veld fire risk as vegetation dries out. Continued monitoring of weather forecasts, maintenance of firebreaks and proactive planning remain essential for managing evolving seasonal conditions.





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:

The transition towards autumn became more visible in April 2026, as frontal systems and mid-latitude weather systems increasingly influenced weather conditions across South Africa. These systems contributed to more widespread cloud cover, cooler conditions and rainfall across several parts of the country, particularly over the central and western interior and parts of the winter rainfall region. At the same time, convective rainfall over the summer rainfall region weakened compared to the preceding months, although scattered thunderstorms still occurred over parts of the interior. While the highest monthly totals remained concentrated over parts of the northeastern and central interior, many western and interior regions recorded strongly above-normal conditions relative to their climatological April rainfall, which is typically low. Large parts of the Northern Cape, North West, Free State and western interior received 75 to 200 mm during the month, with isolated areas exceeding 200 mm, particularly around the central interior and western Bushveld. Areas surrounding Upington, Kimberley, Bloemfontein and Mahikeng recorded notably wet conditions relative to their normal April rainfall.

The northeastern summer rainfall region, including parts of Limpopo and Mpumalanga, generally received between 50 and 150 mm. However, parts of the eastern escarpment, Lowveld and coastal KwaZulu-Natal recorded comparatively lower totals and below-normal conditions. Despite measurable rainfall activity, some areas between northeastern KZN and the adjacent escarpment received less than 50% of their normal April totals. Moreover, the southwestern and winter rainfall regions, including parts of the Western Cape, began showing increasing frontal rainfall activity, particularly around Cape Town and adjacent areas. Although totals were mostly moderate, these conditions are broadly consistent with the climatological transition towards the winter rainfall season.

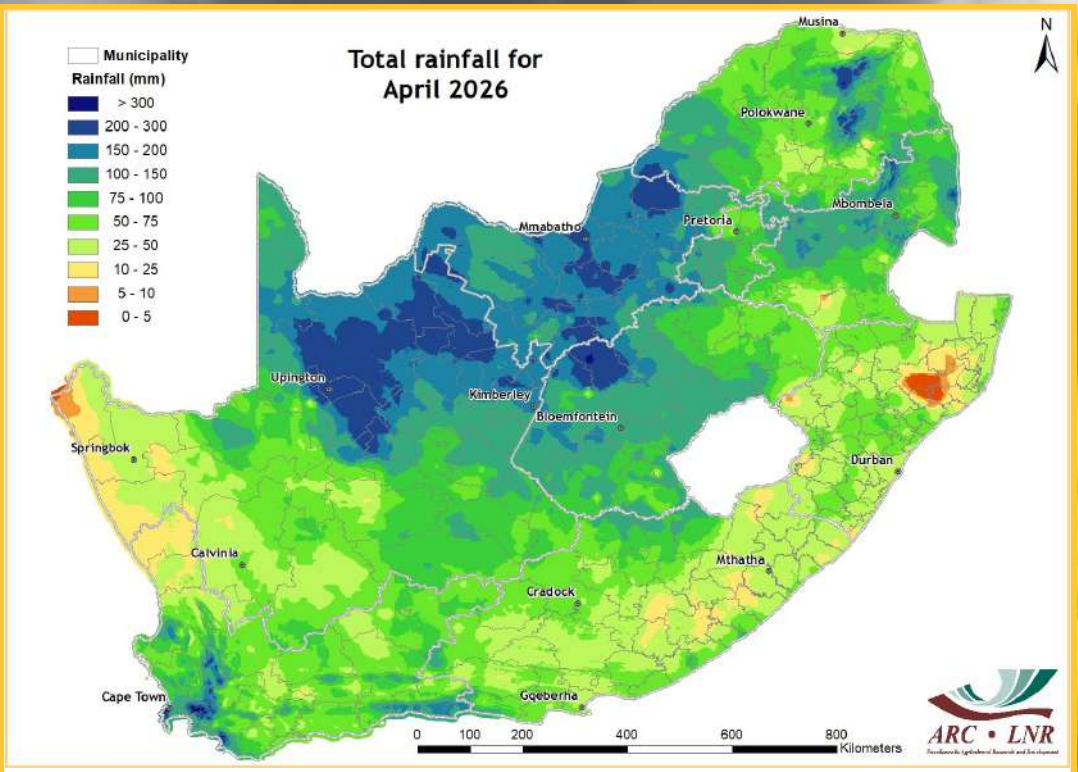


Figure 1

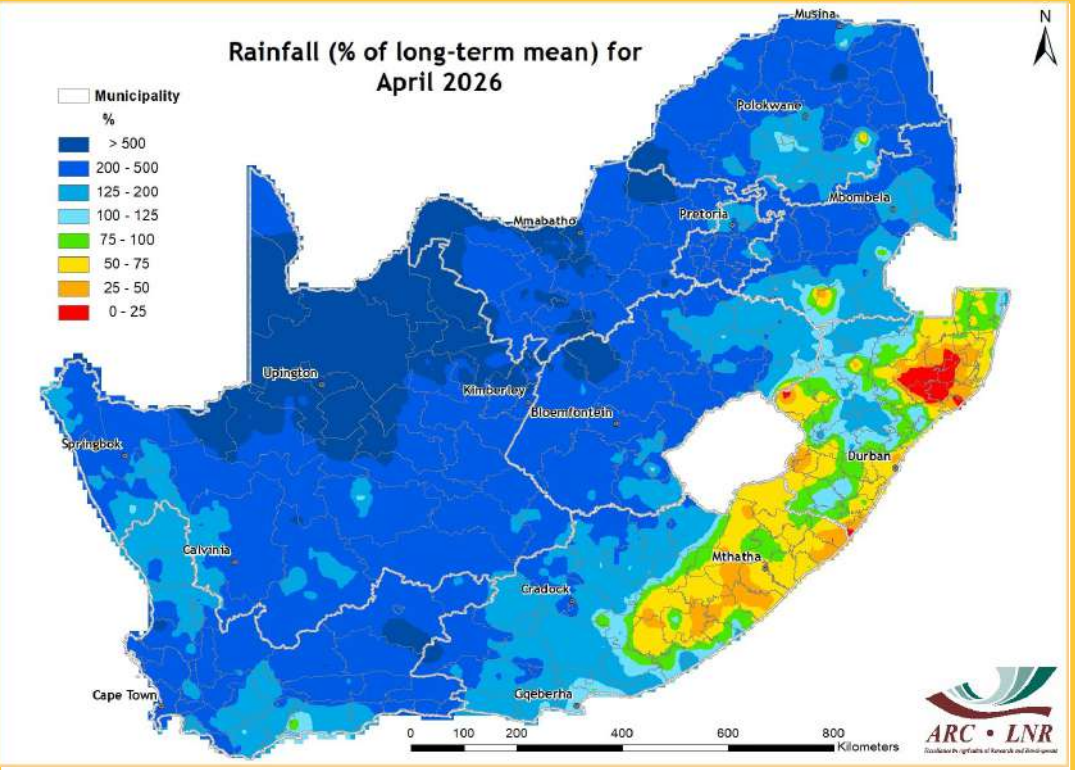


Figure 2

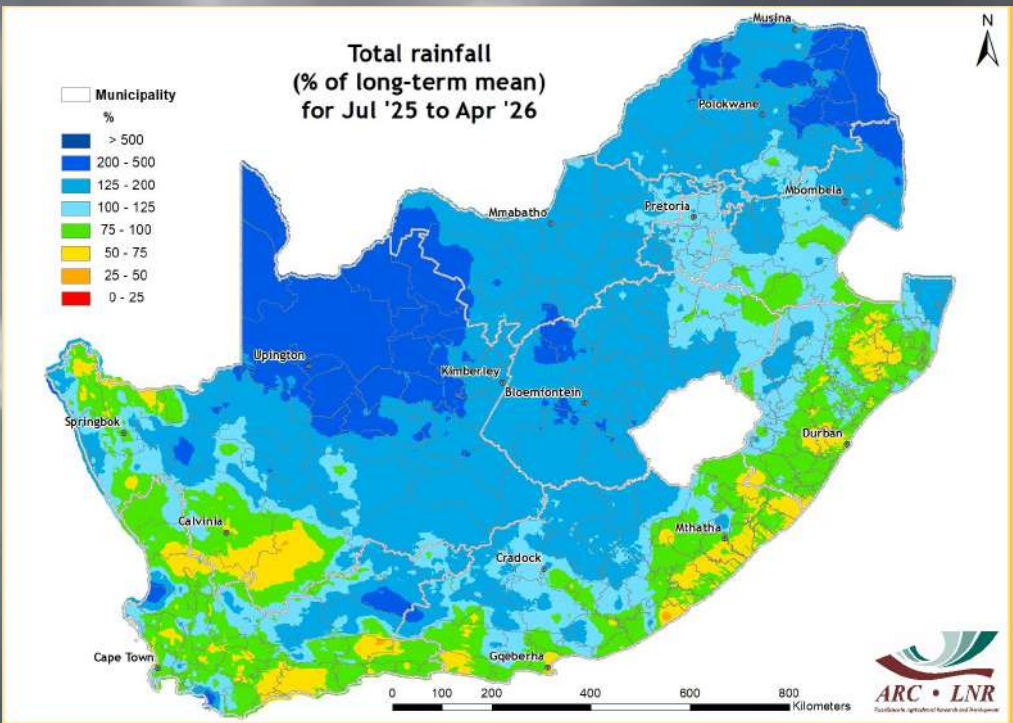


Figure 3

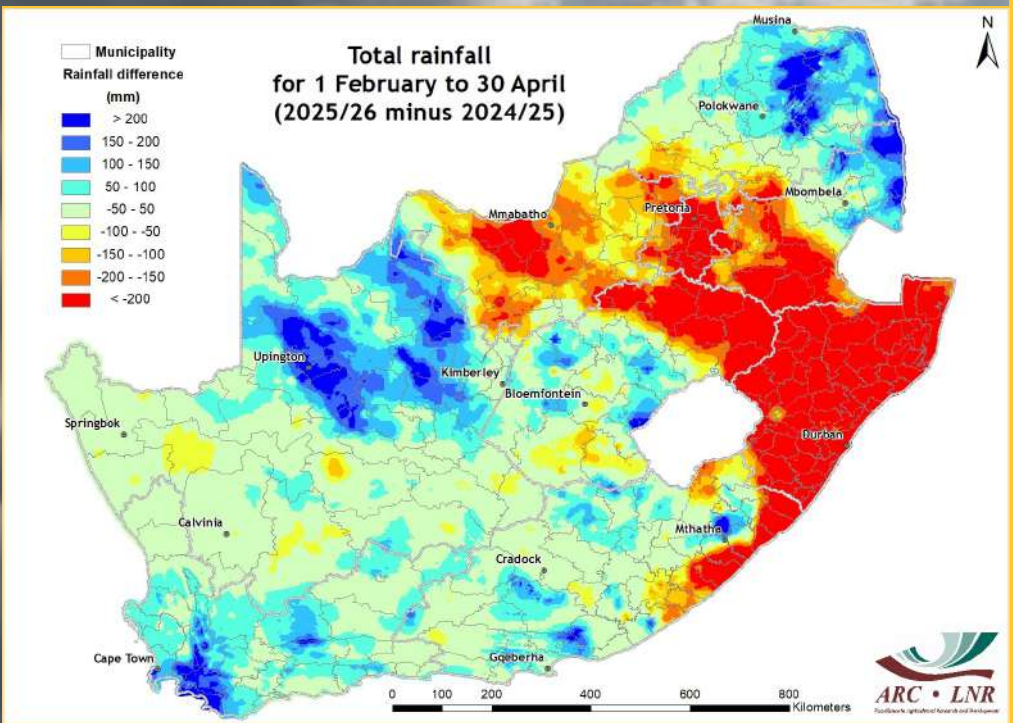


Figure 4

Figure 1:
Rainfall in April 2026 was widespread across the interior, with isolated areas exceeding 200 mm in the western Bushveld and central regions. Lower totals (<25 mm) were confined to the far west, while parts of Limpopo, Mpumalanga and coastal KwaZulu-Natal recorded moderate rainfall.

Figure 2:
Rainfall in April was above normal across greater parts of the country, with many areas exceeding 125% of the long-term mean and isolated areas above 200%. Below-normal conditions were limited to parts of northeastern KZN and the eastern escarpment, where rainfall fell below 50% of the average.

Figure 3:
The period from July 2025 to April 2026 recorded above-normal rainfall over the central to northern interior. Areas that recorded about 50-70% of their normal rainfall for this period include parts of the Cape provinces and isolated areas along the eastern coastline.

Figure 4:
The period from February to April 2026 was notably drier than the same 3-month period in the previous 2024/25 season across much of the Highveld, moving towards KZN and the northern coast of the Eastern Cape. The rest of the country received somewhat similar totals, with areas in the northeast, northern interior and southwestern parts recording in excess of 150 mm.

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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.

The SPI maps revealing short-term (6-month), medium-term (12-month) and long-term (24- and 36-month) drought conditions ending in April 2026 are shown in Figures 5-8. The short-term SPI map indicates widespread wet conditions across much of South Africa following recent rainfall received over large parts of the country, with conditions ranging from moderately wet to extremely wet across the interior and northeastern regions. Short-term drought relief was also observed over parts of the winter rainfall region due to recent frontal rainfall. In contrast, mild to moderate drought conditions persisted over the far eastern parts of the country, including sections of KwaZulu-Natal and the Eastern Cape. The medium-term SPI map reflects a similar pattern, with the dry conditions over the eastern regions becoming more evident, together with dryness across the southwestern parts of the country, particularly the all-year rainfall region. The long-term maps show predominantly near-normal to wetter-than-normal conditions across most parts of South Africa, with isolated parts of the Eastern Cape depicting moderate to severe drought conditions.

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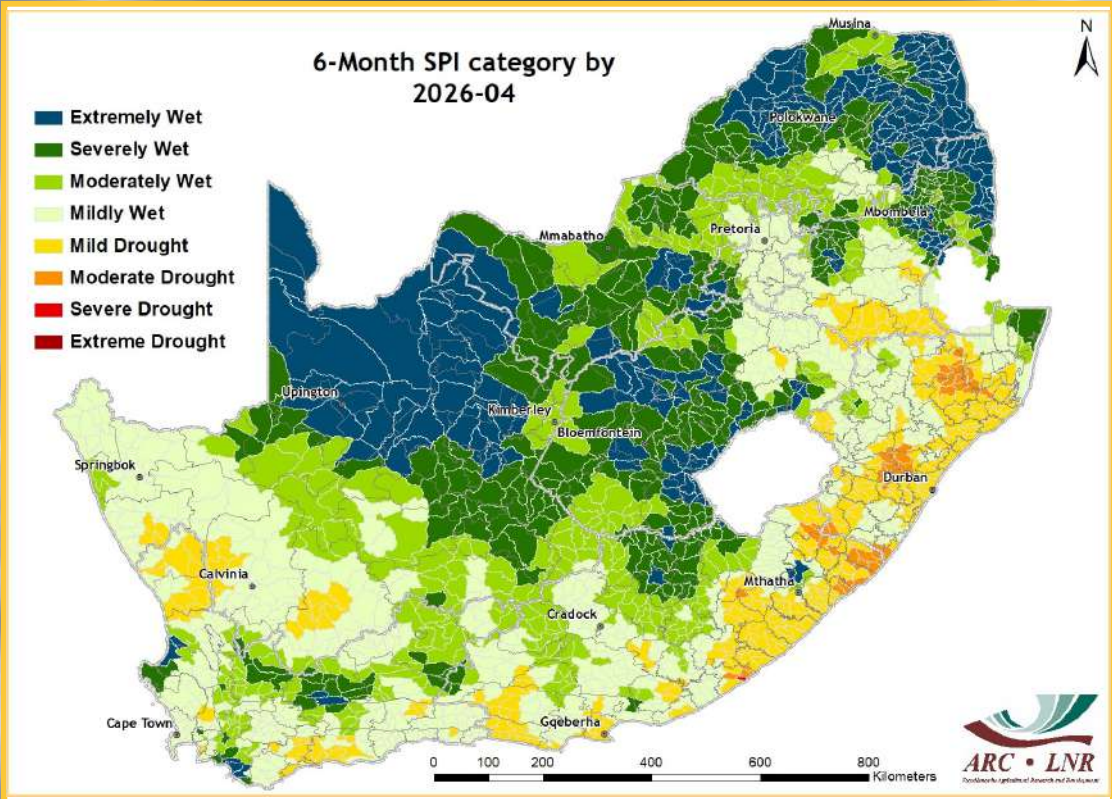

Figure 5

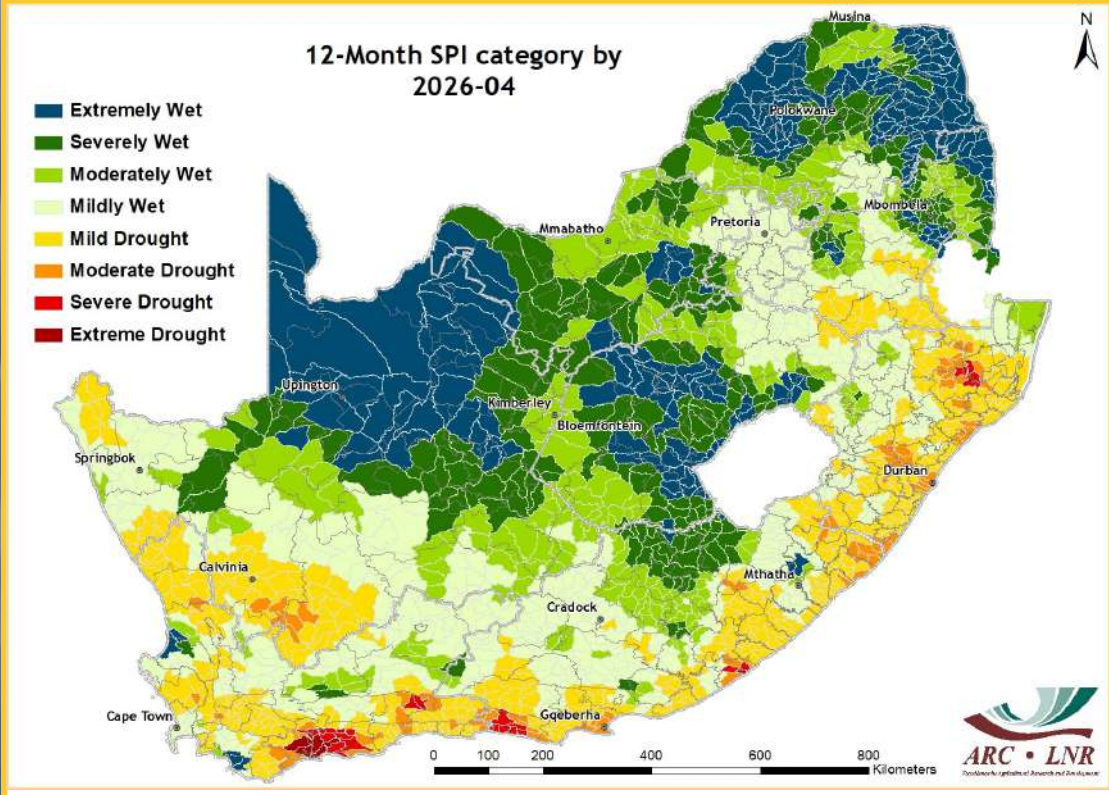

Figure 6

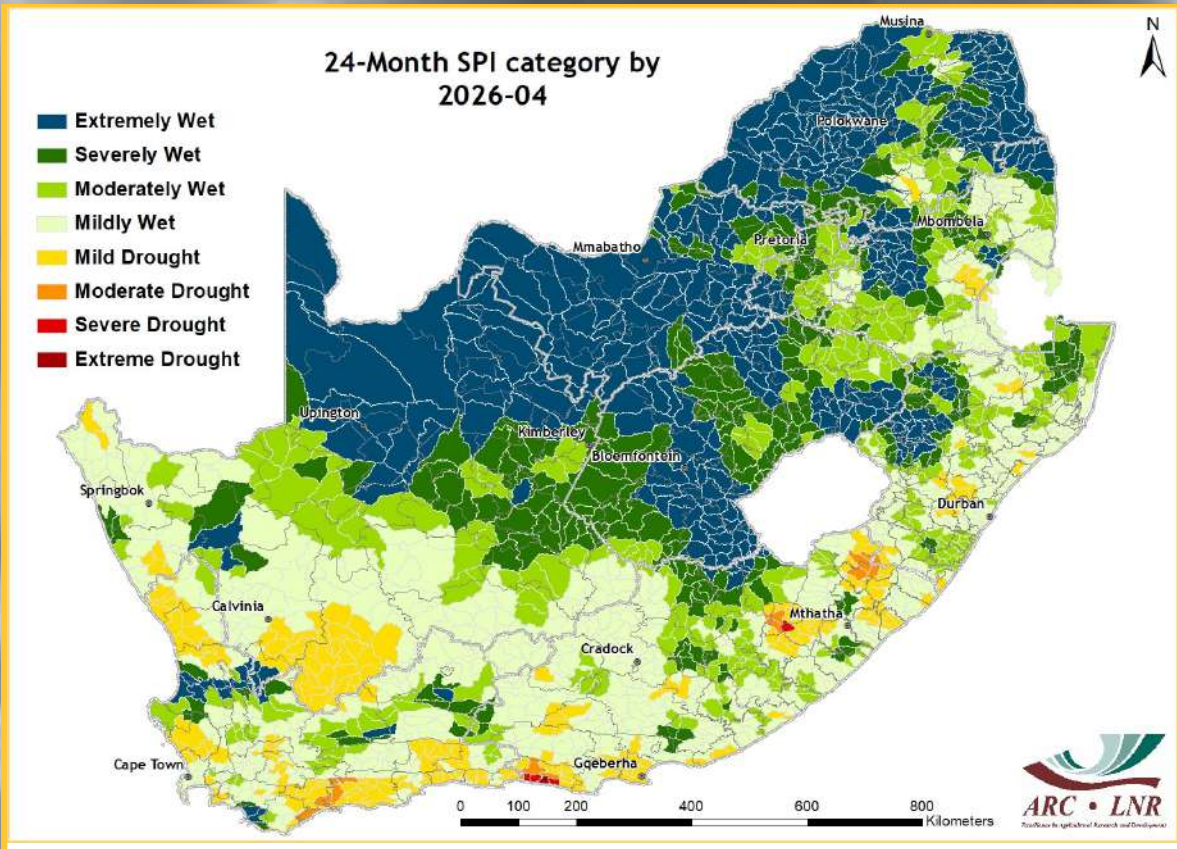

Figure 7

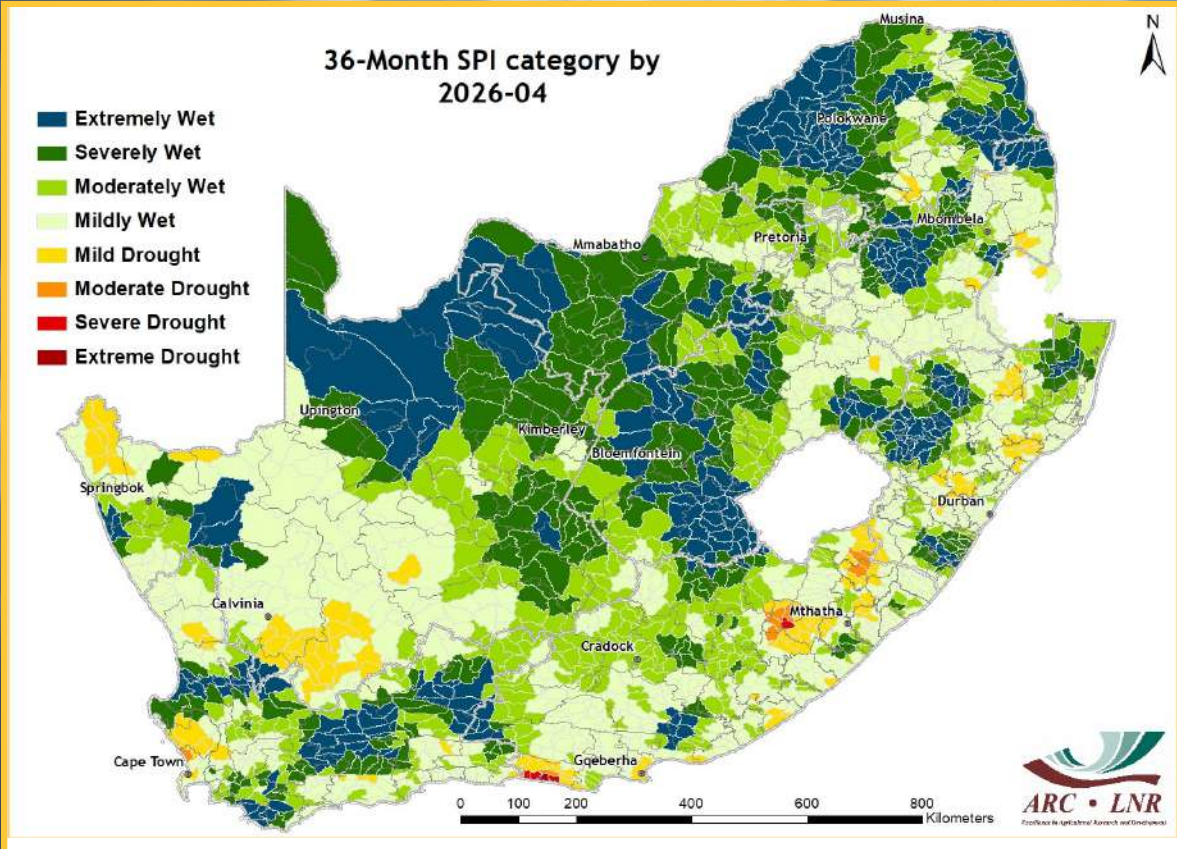

Figure 8

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.

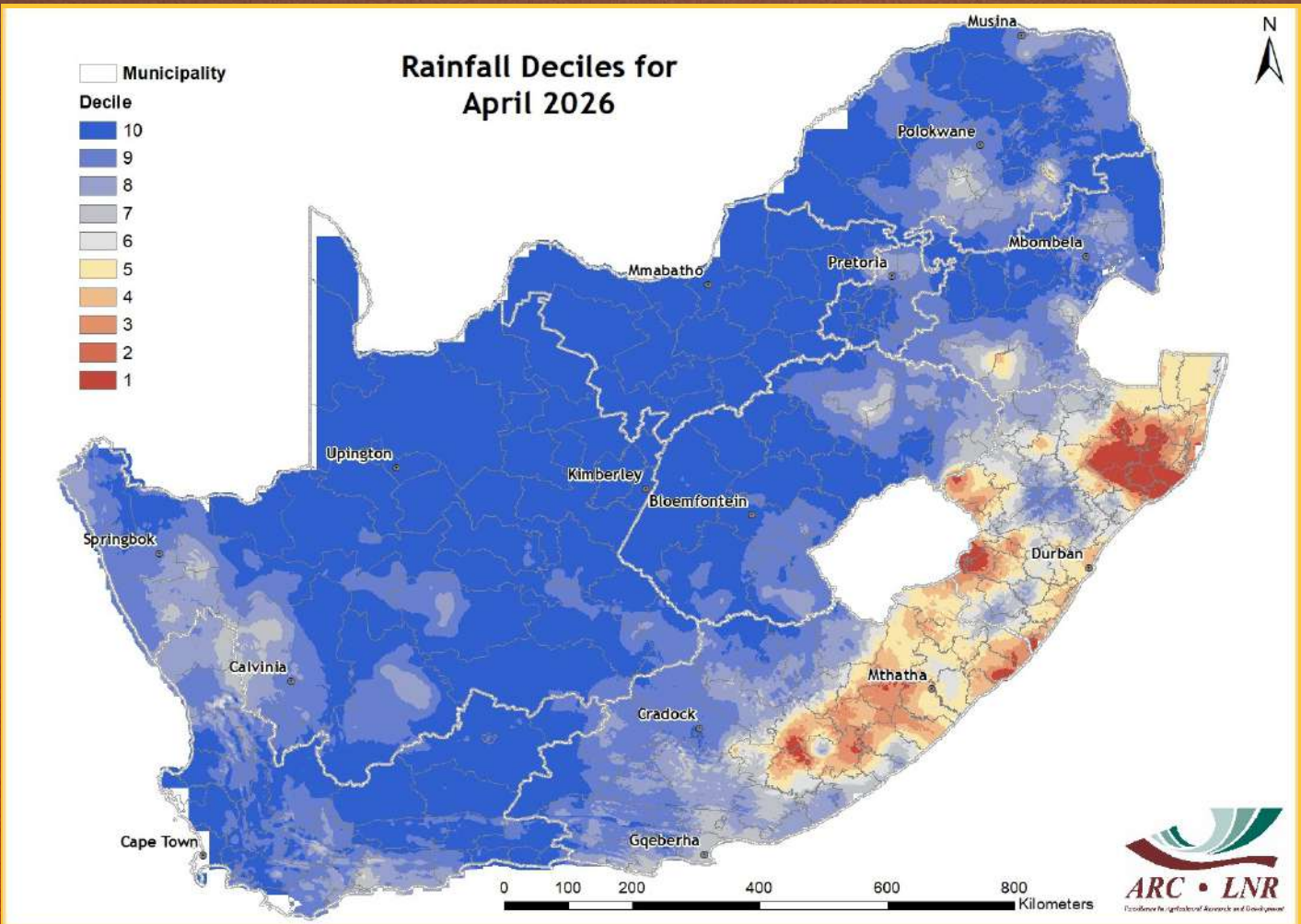

Figure 9

Figure 9:
During April 2026, greater parts of the country recorded rainfall totals that compared well with historically wetter April months. However, parts of the eastern coastline from northern KwaZulu-Natal to the Eastern Cape recorded totals that compared well with historically drier April months.

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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.

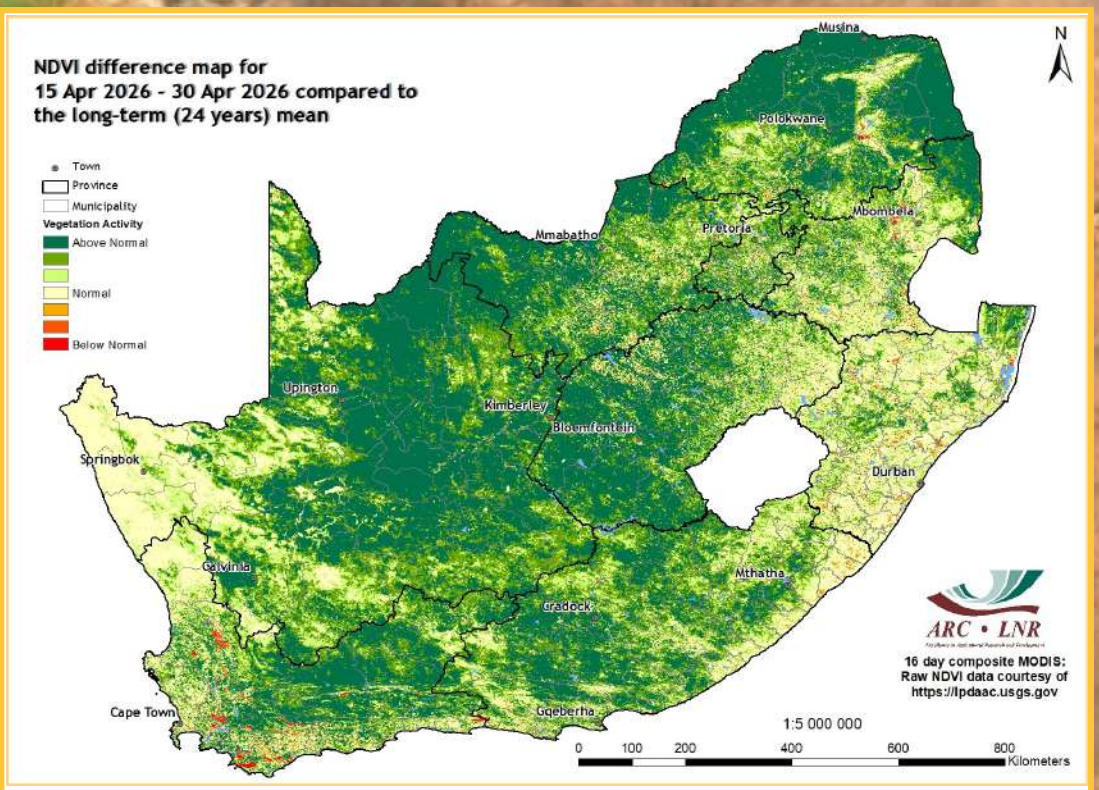

Figure 10

Figure 10:
Compared to the historical averaged vegetation conditions, the 16-day NDVI map for April 2026 shows that above-normal conditions persist in the central interior and far northern parts of the country, with patches of below-normal activity observed in some isolated areas.

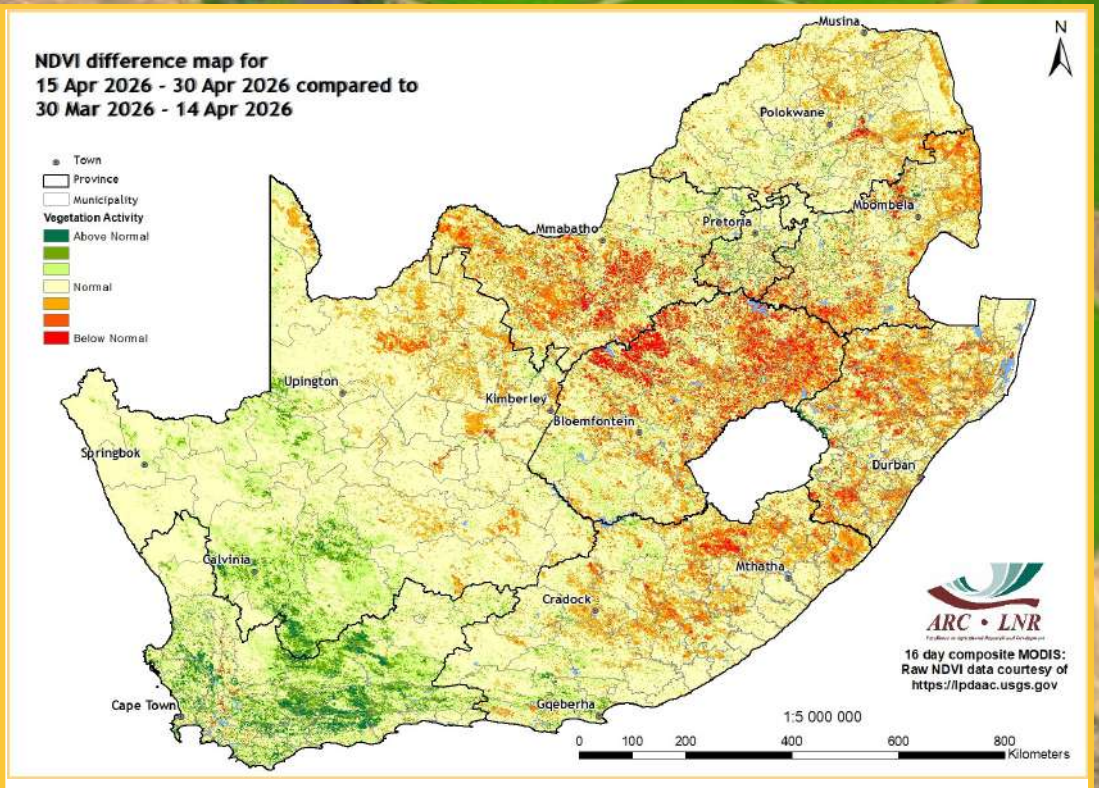

Figure 11

Figure 11:
The 16-day NDVI difference map for April 2026 compared to the preceding 16-day period shows that the central interior and far northern parts of the country experienced mainly below-normal vegetation conditions. Patches of above-normal activity are evident in isolated areas, particularly in the Cape provinces.

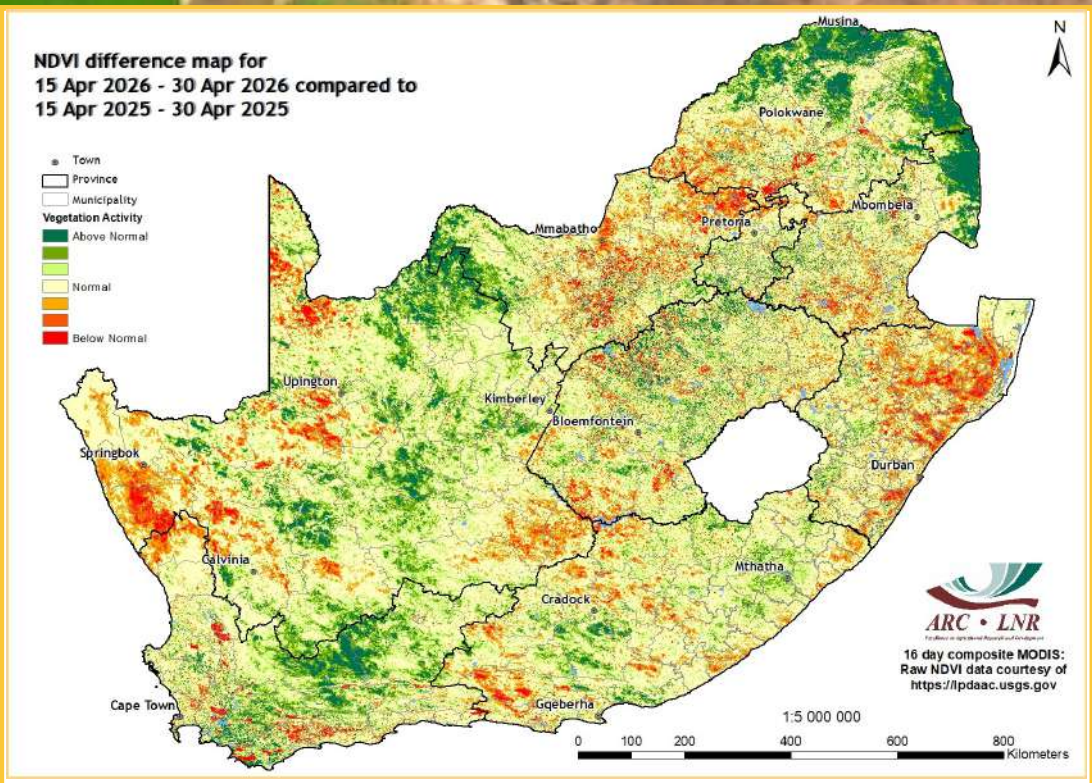

Figure 12

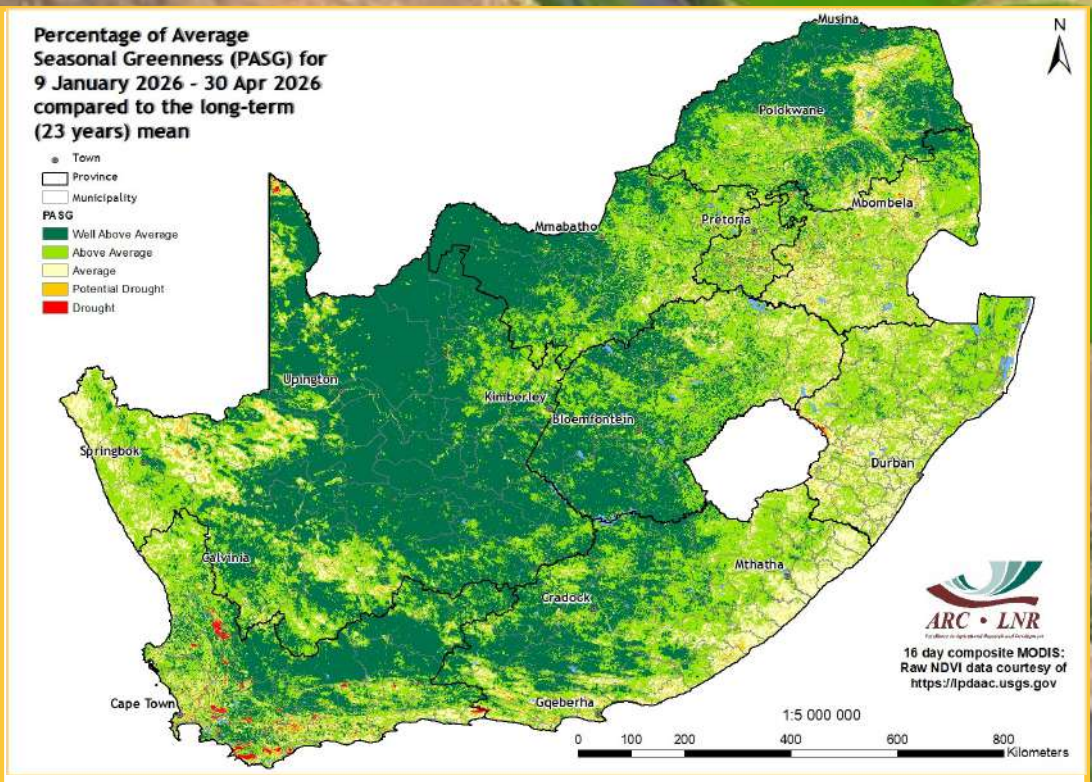

Figure 13

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 April 2026 compared to the same period last year shows that the country continued to experience a mix of vegetation activity. The central parts experienced mainly below-normal conditions, whilst patches of above-normal activity occurred in the far northern and western parts of the country.

Figure 13:
The Percentage of Average Seasonal Greenness (PASG) map for the past 4 months shows that the northern and central parts the country continued to experience above-average vegetation conditions, while a few isolated areas, particularly along the southern coastline, experienced 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.

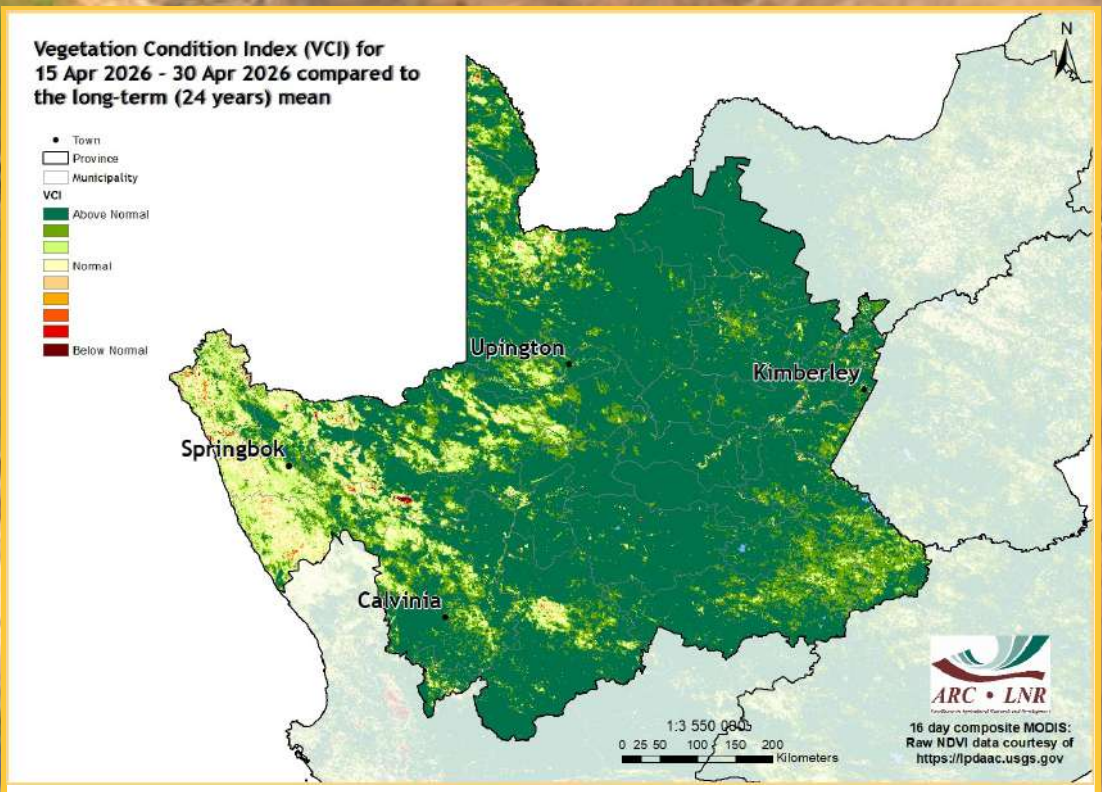

Figure 14

Figure 14:
The 16-day VCI map for April 2026 shows that most parts of the Northern Cape continued to experience mainly above-normal vegetation conditions, while isolated patches of below-normal activity were observed in the far western parts of the province.

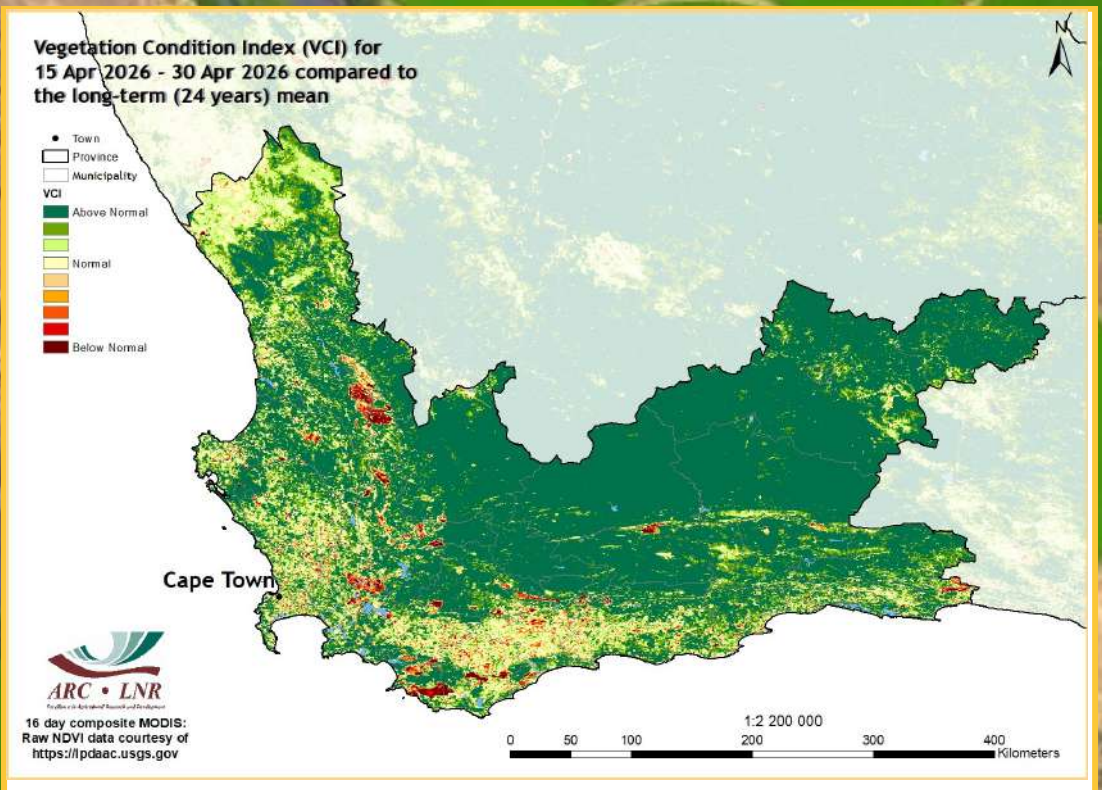

Figure 15

Figure 15:
The 16-day VCI map for April 2026 shows that the inland region of the Western Cape continued to experience mainly above-normal vegetation conditions, while patches of below-normal activity were observed particularly in the coastal parts of the province.

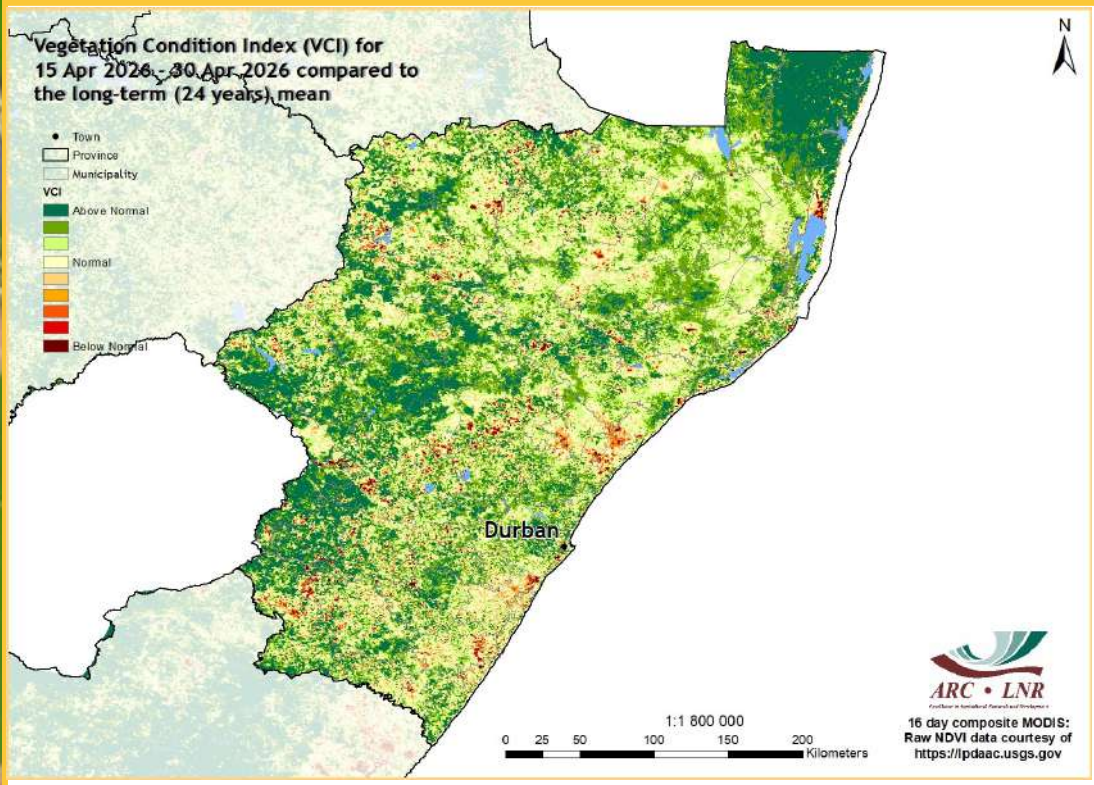

Figure 16

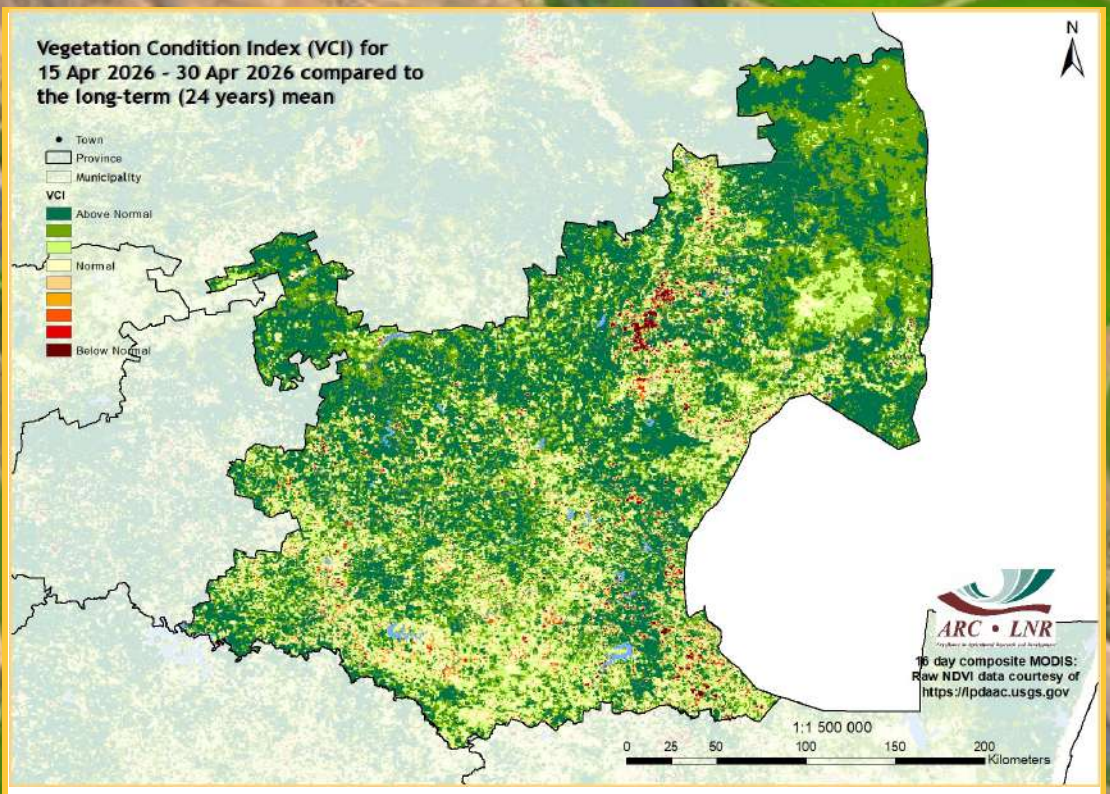

Figure 17

Figure 16:
The 16-day VCI map for April 2026 shows that KwaZulu-Natal continued to experience a mix of vegetation conditions with many parts of the province experiencing above-normal activity.

Figure 17:
The 16-day VCI map for April 2026 shows that most of Mpumalanga experienced a mix of below- and above-normal vegetation conditions, with patches of below-normal activity in isolated parts of the province.

Questions/Comments:
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6. Vegetation Conditions & Rainfall

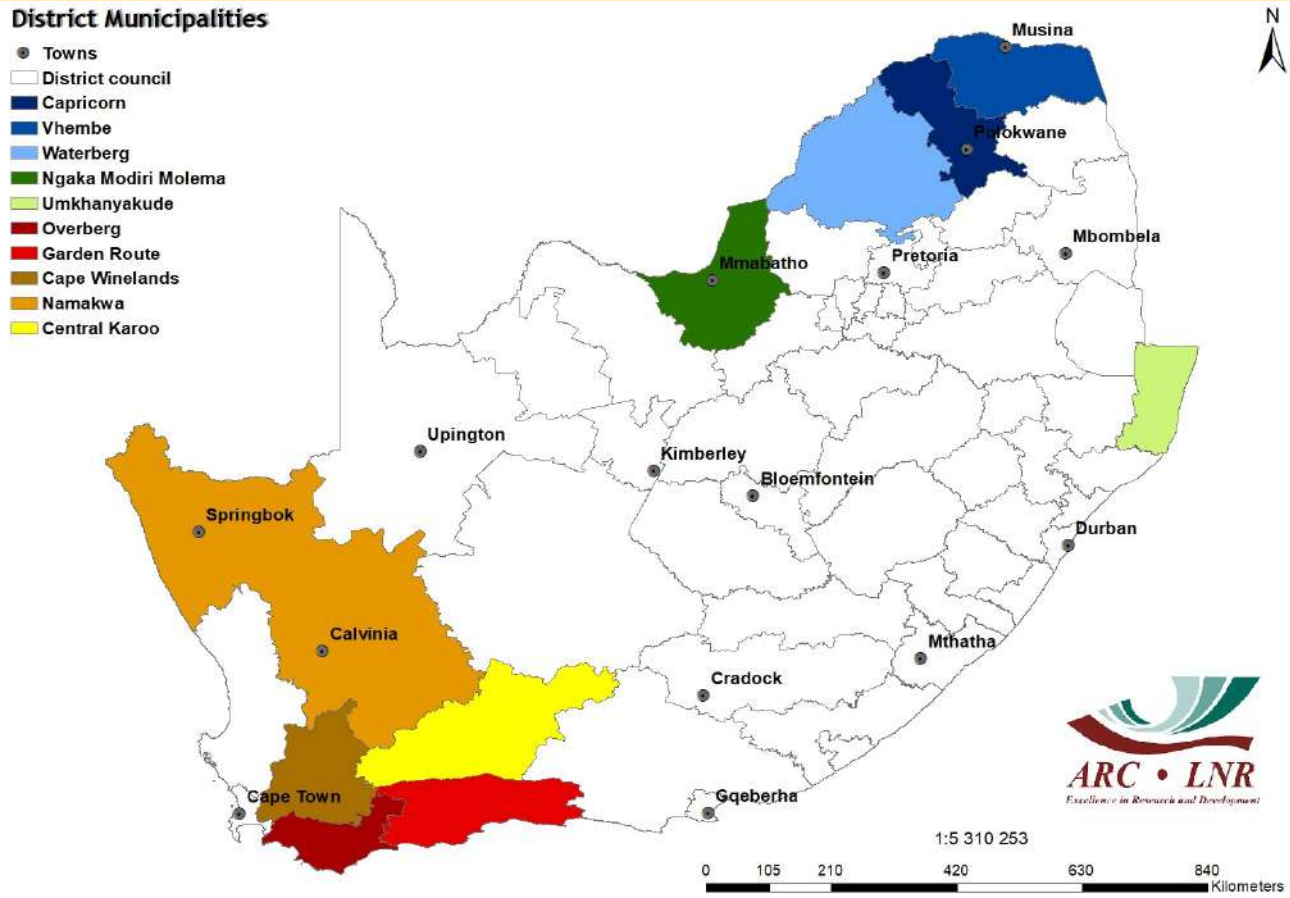

Figure 18

Rainfall and NDVI Graphs

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

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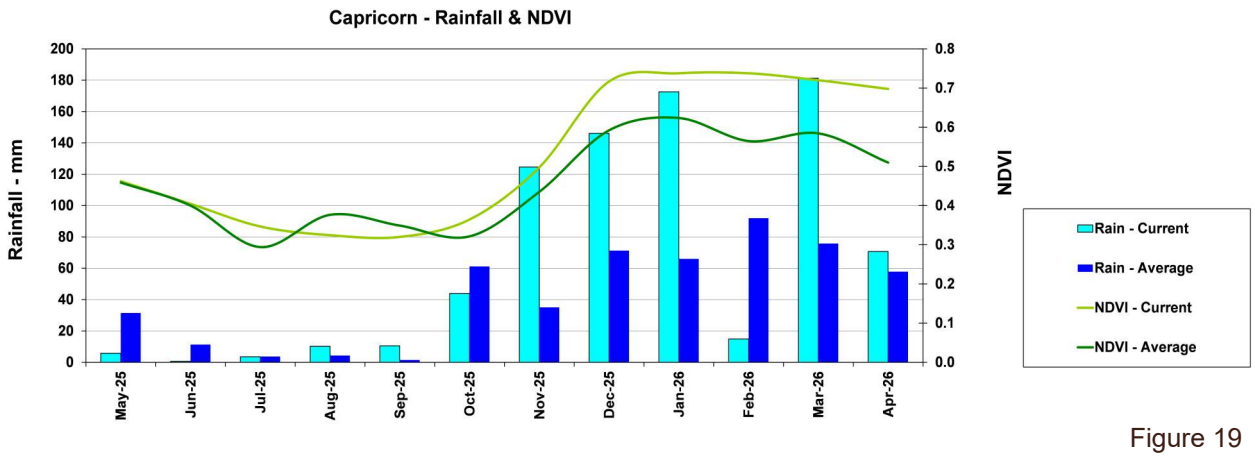
Figures 19-23:
Indicate areas with higher cumulative vegetation activity for the last year.

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



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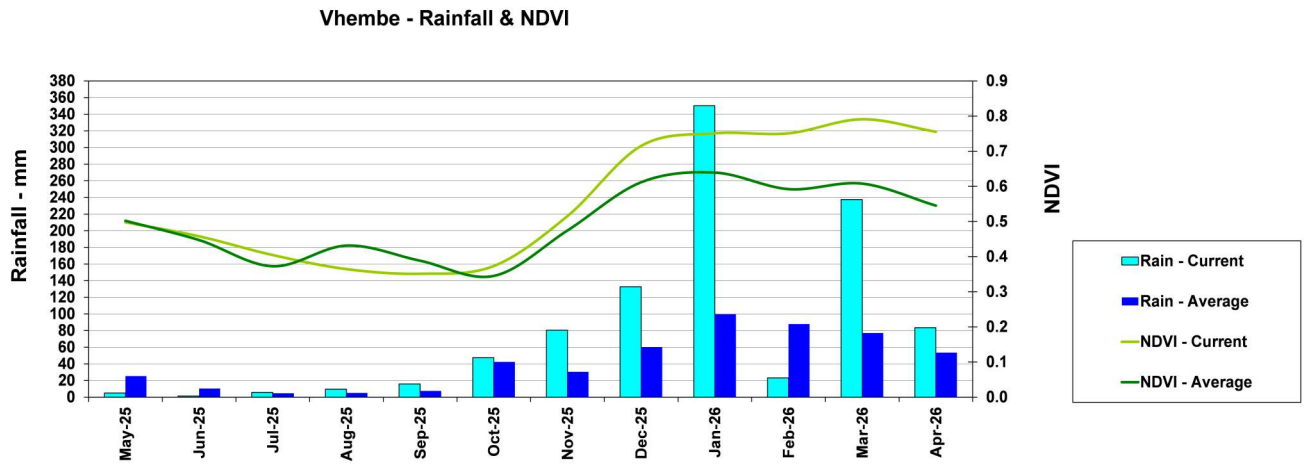

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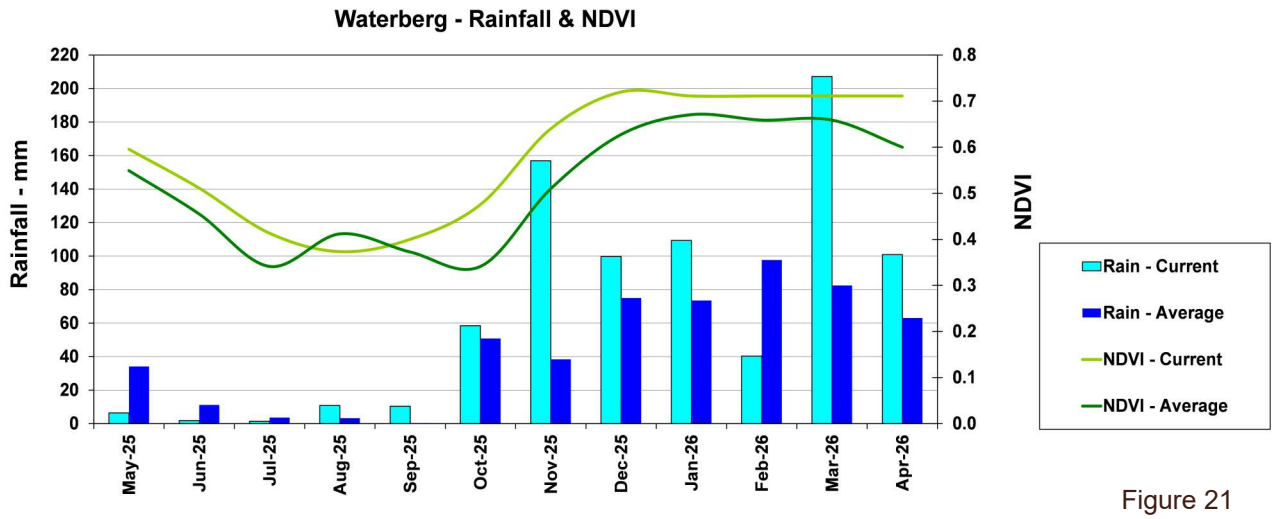
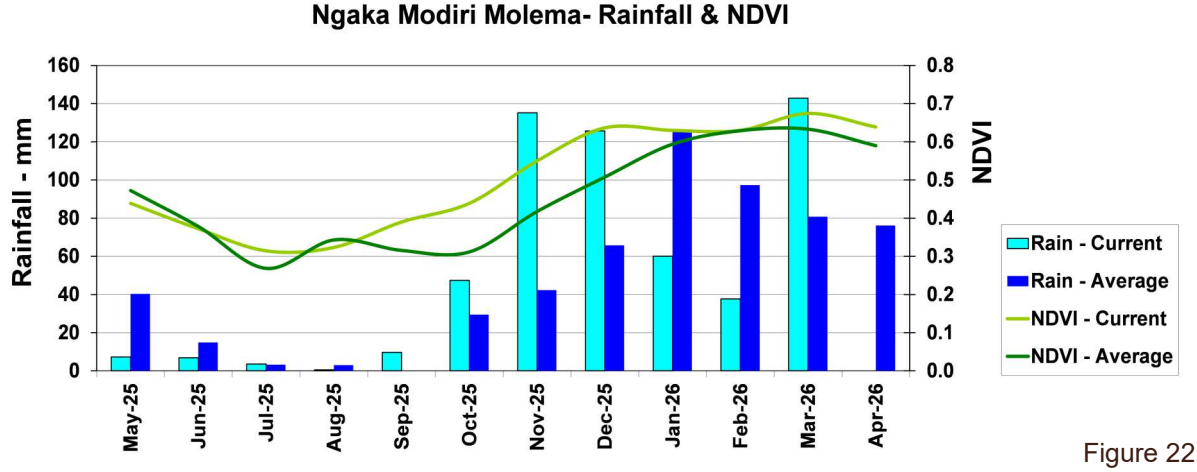


Figure 21



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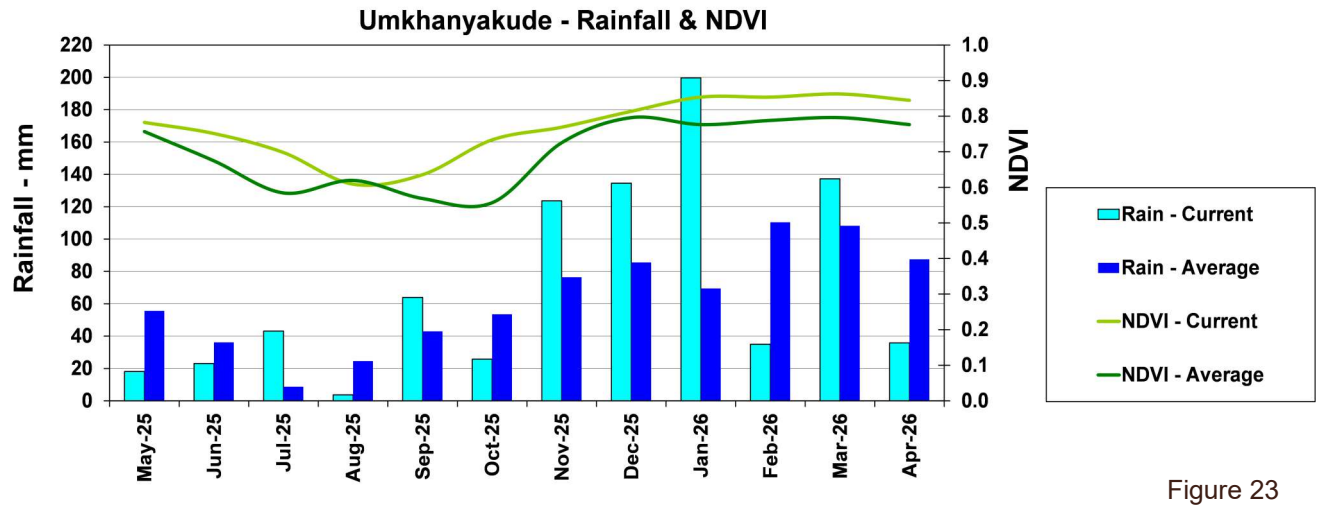

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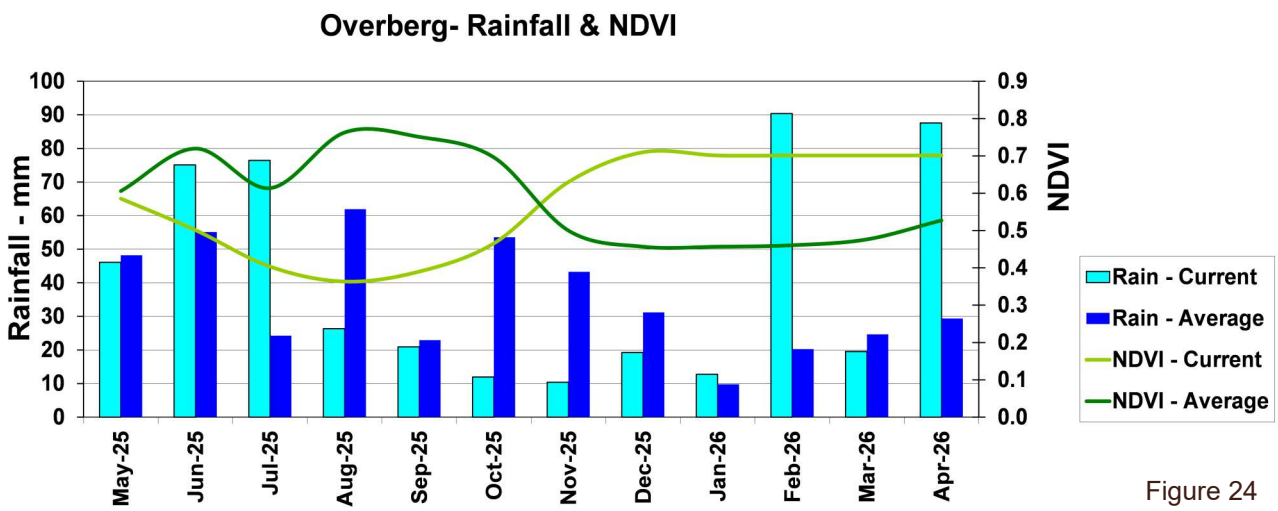

Figure 24

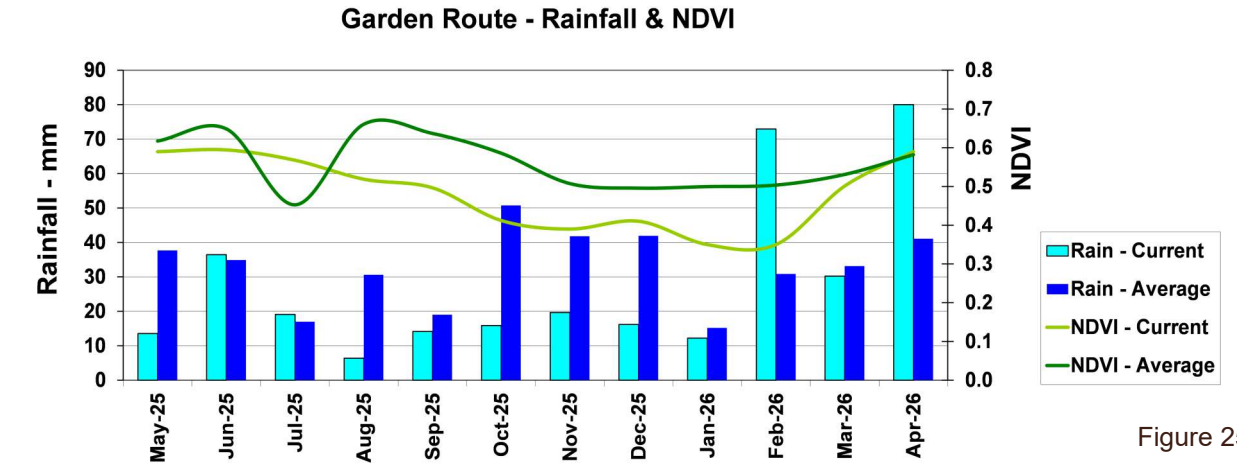

Figure 25

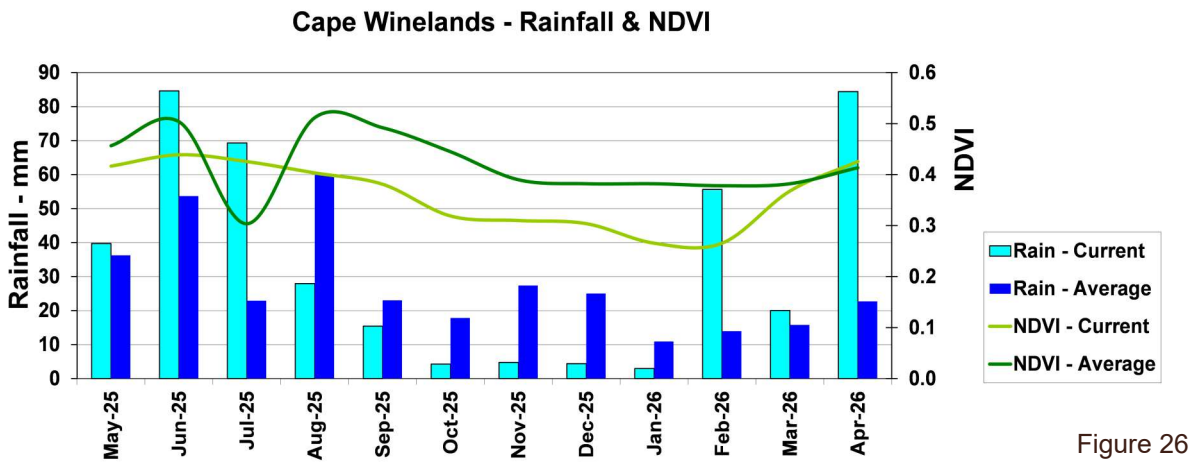

Figure 26

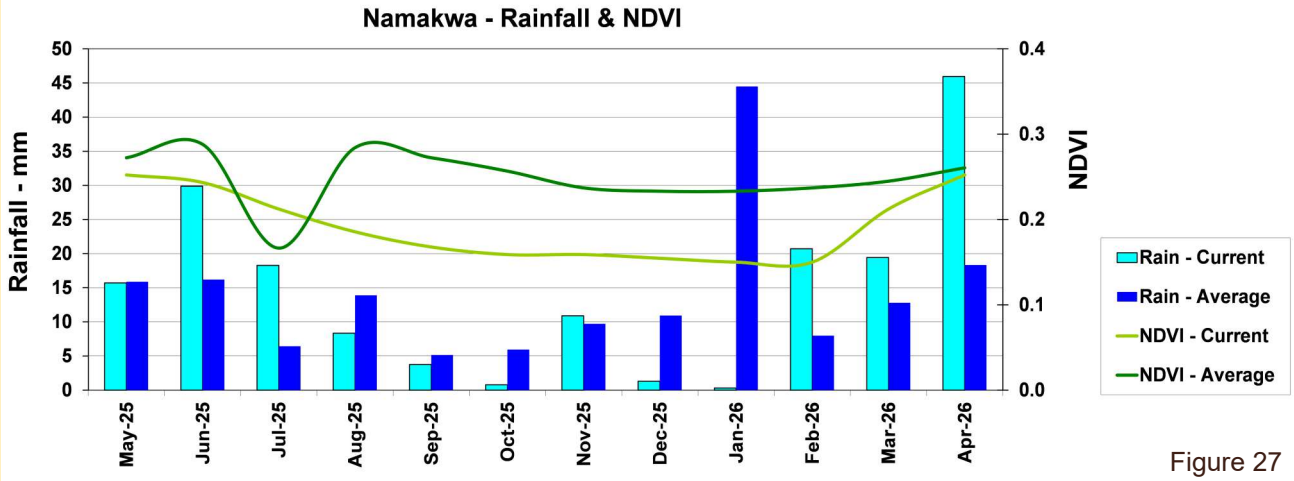

Figure 27

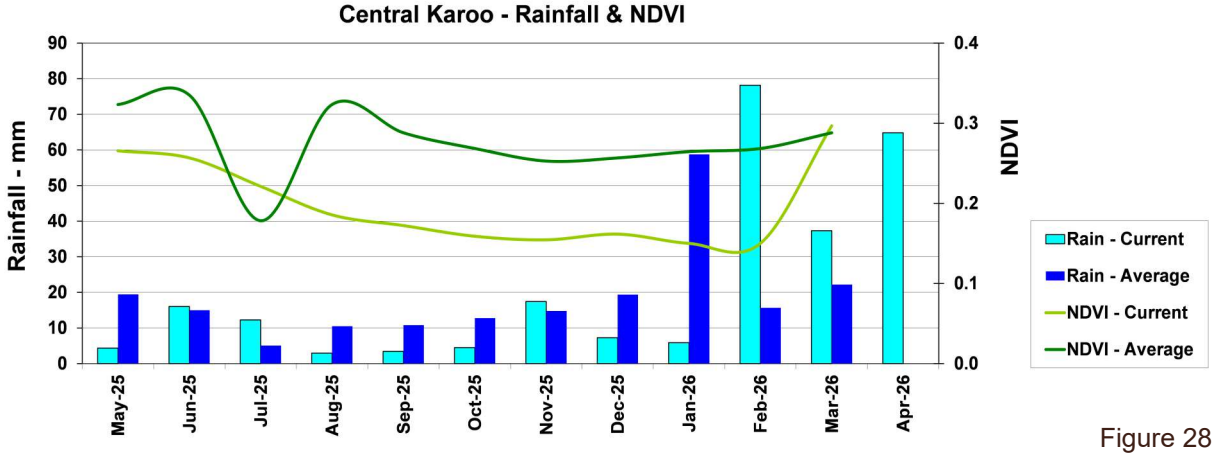

Figure 28

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 30 March to 30 April 2026 per province. Fire activity was higher in the Northern Cape compared to the long-term average.

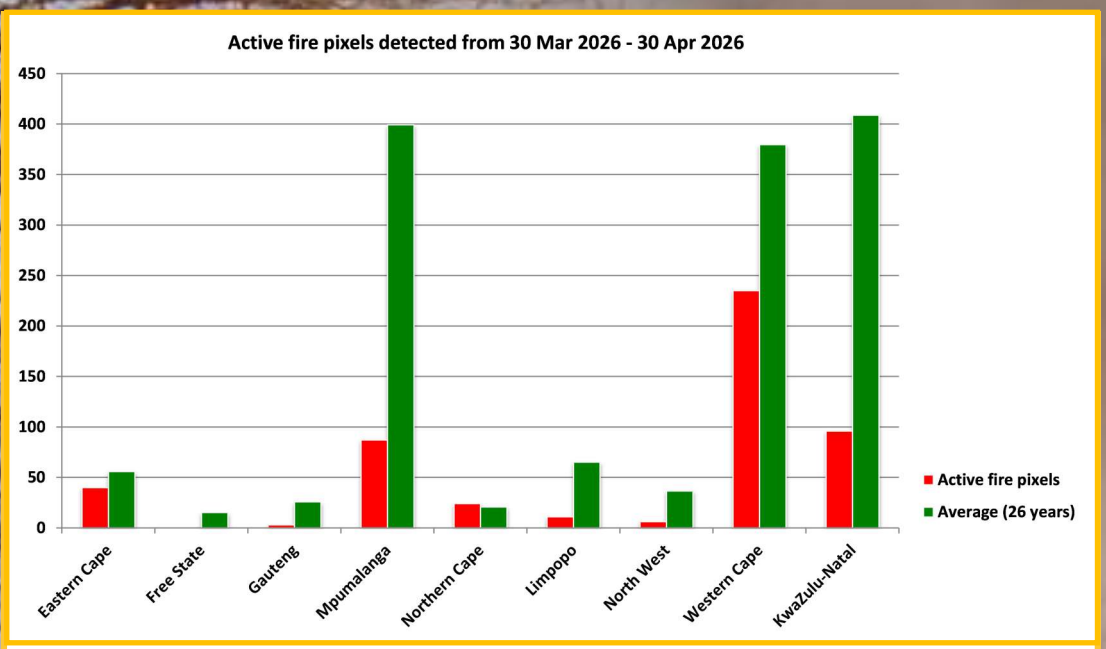

Figure 29

Figure 30:
The map shows the location of active fires detected between 30 March and 30 April 2026.

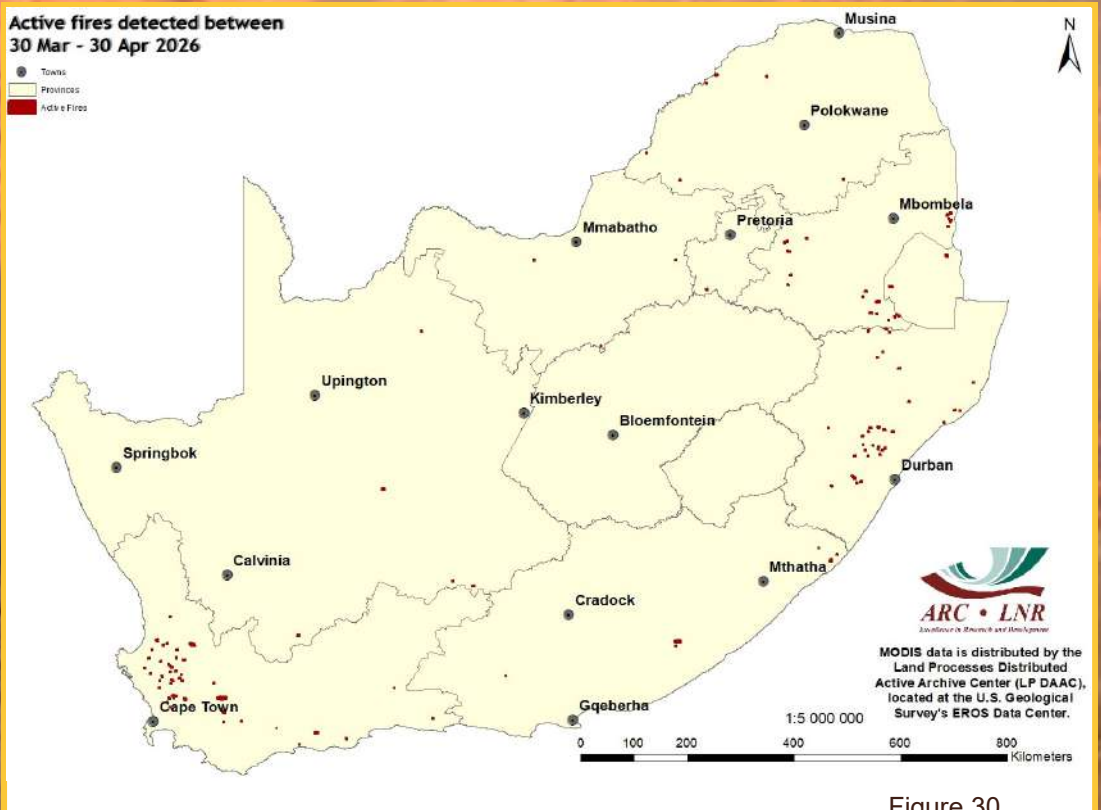

Figure 30

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 30 April 2026 per province. Fire activity was higher in the Eastern Cape compared to the long-term average.

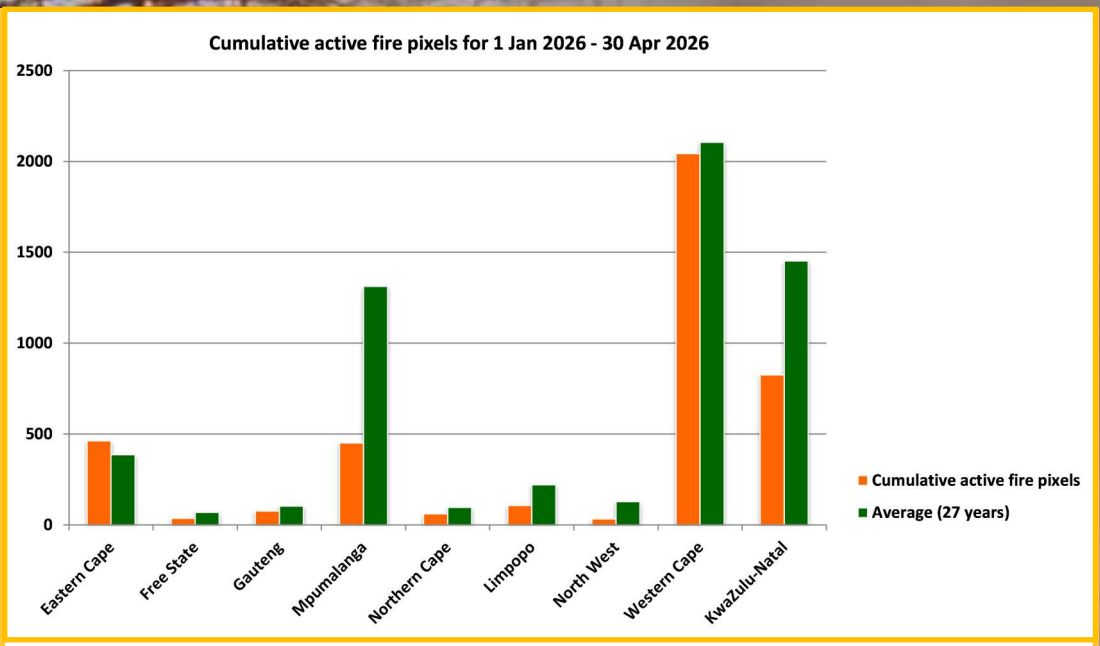

Figure 31

Figure 32:
The map shows the location of active fires detected between 1 January and 30 April 2026.

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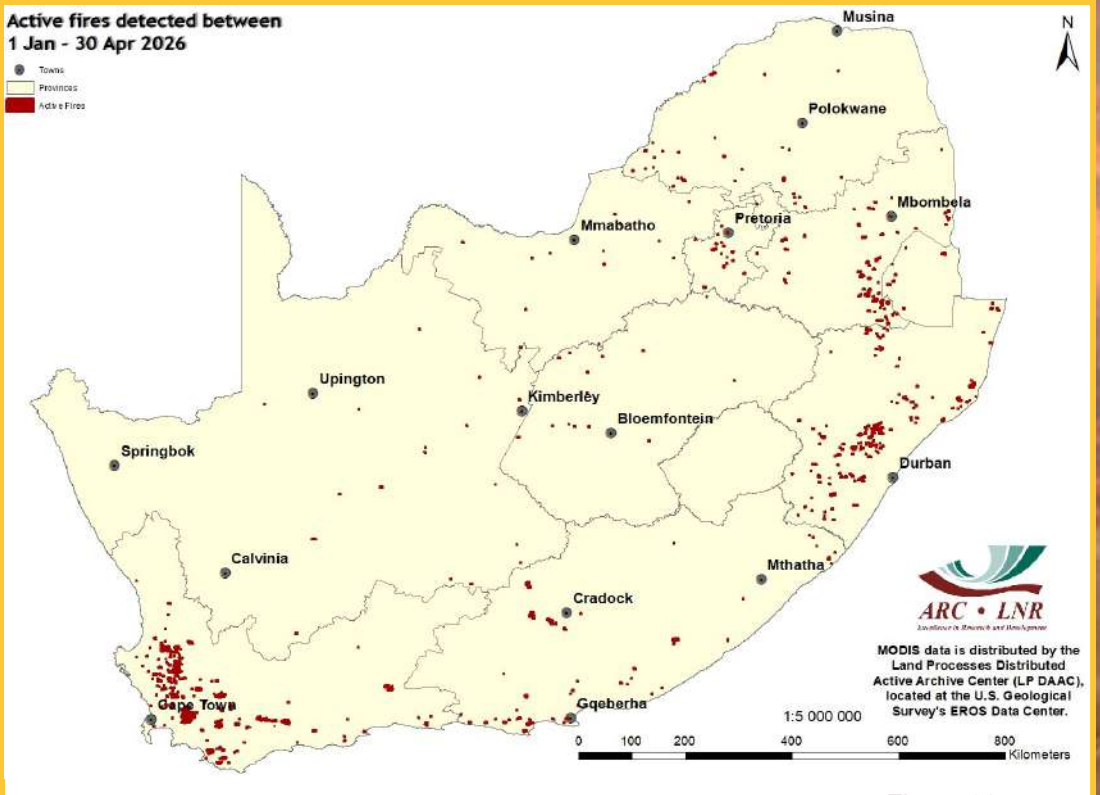

Figure 32

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 9 years. This 9-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 April 2026 is nearly identical to that for the previous month and continues to show a marked improvement in water distribution patterns since February in both winter and summer rainfall regions. Winter rainfall catchments are still lower than summer rainfall areas, but show an improvement on the February long-term conditions.

The comparison between April 2026 and April 2025 continues to show significantly higher water levels this year in several catchments in the Mpumalanga lowveld area bordering Mozambique, as well as in the central Karoo. Across the central parts of South Africa, specifically in the Northern Cape and Free State, water levels are slightly lower than last year.

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

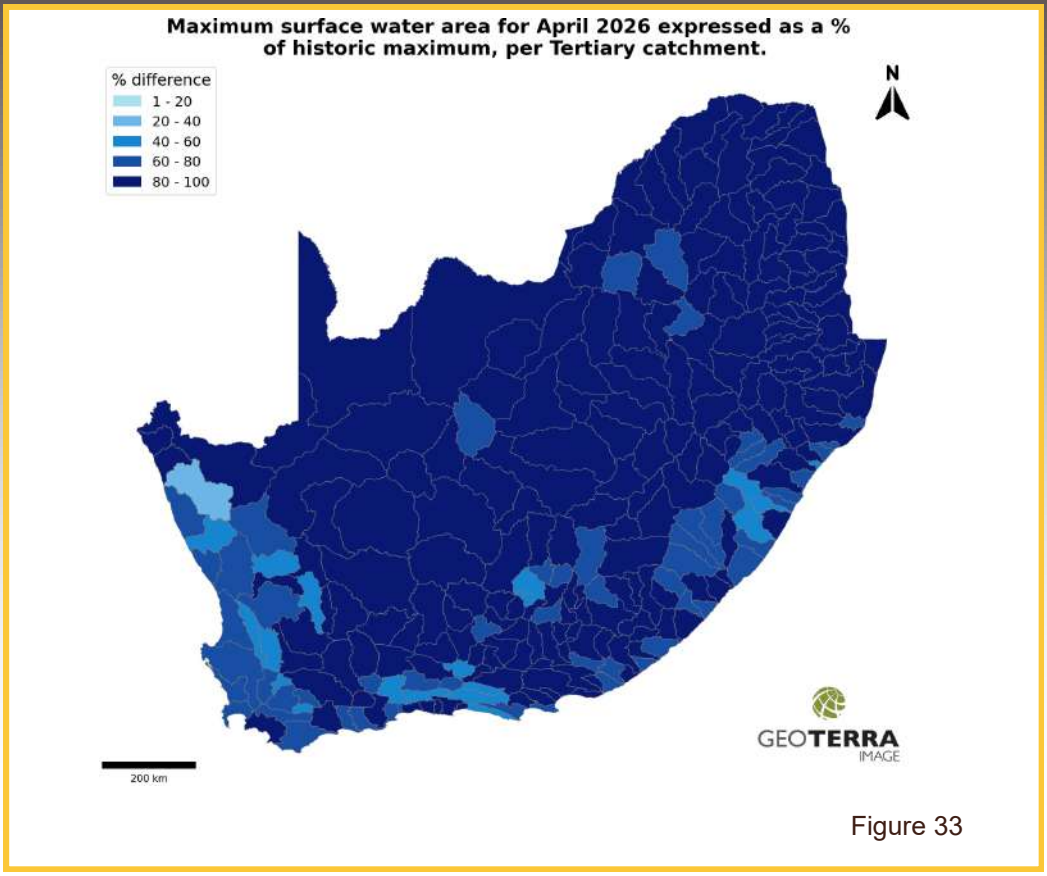

Figure 33

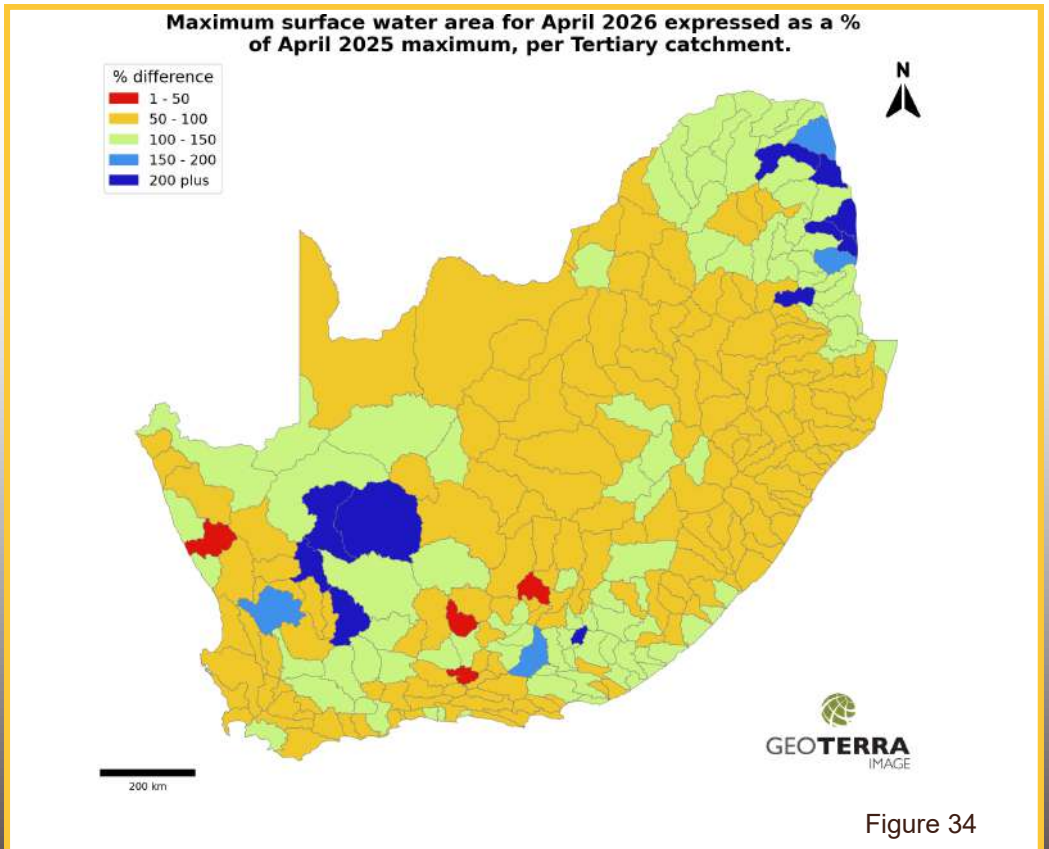

Figure 34

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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

Contact Person: *Dr Mokhele Moeletsi*
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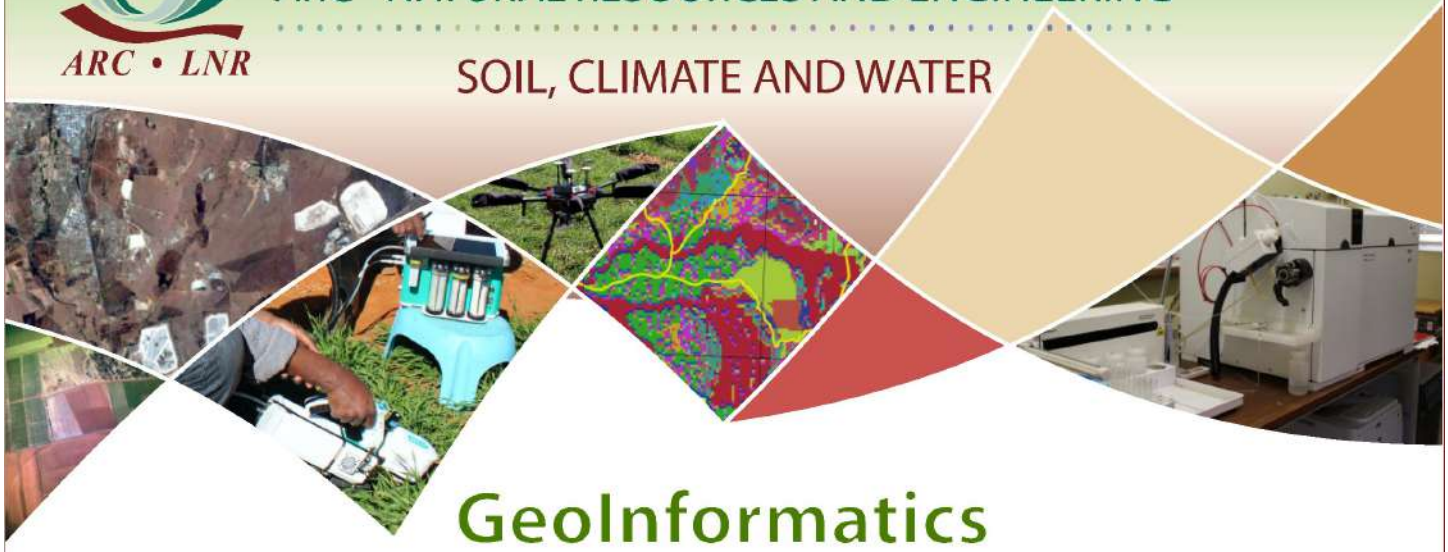
SOIL, CLIMATE AND WATER



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
- Monitoring growth stages
- 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

Contact Person: *Dr George Chirima*
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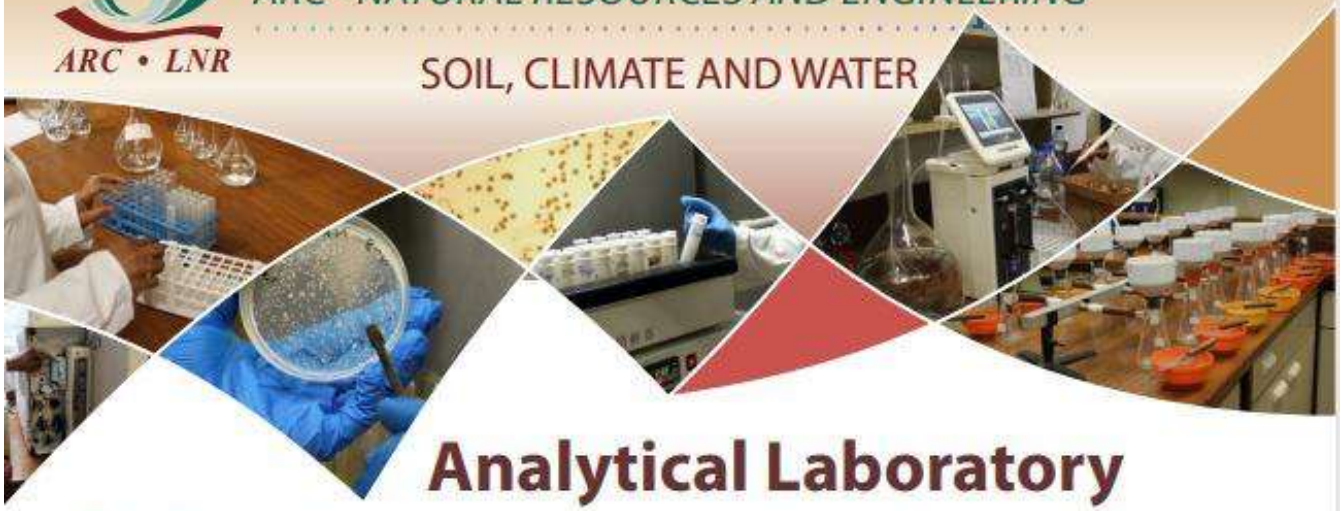

Analytical Laboratory

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)

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

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.

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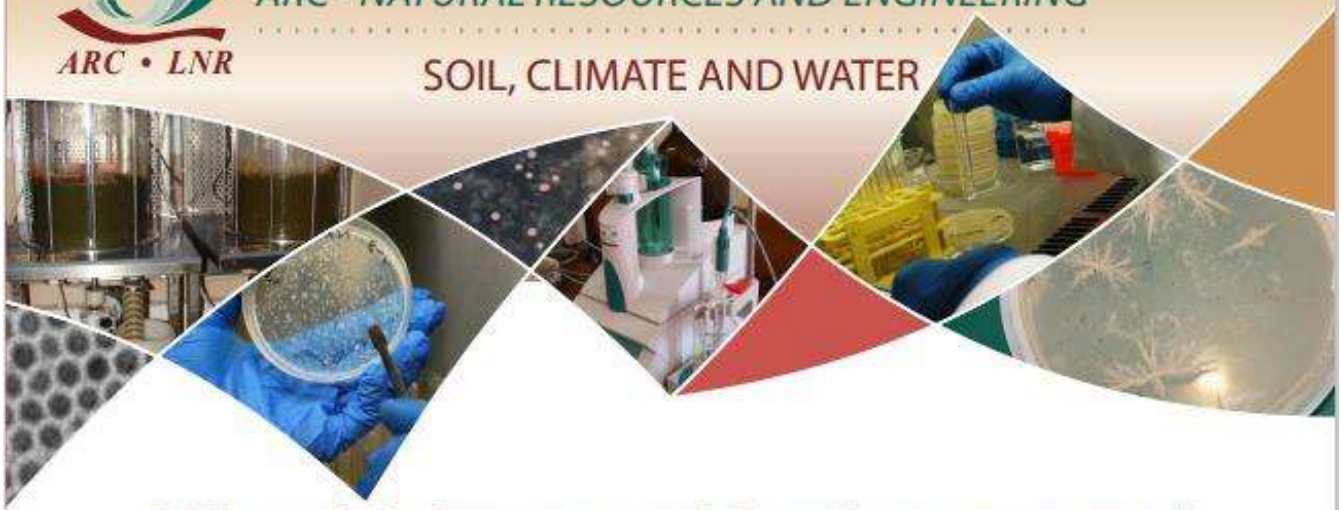

Microbiology and Environmental Biotechnology Laboratory

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

For information on microbiological analyses contact
Dr Ashira Roopnarain
Tel: 012 310 2650 • E-mail: RoopnarainA@arc.agric.za

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.

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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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Soil, Climate and Water

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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:
Reneilwe Maake – 012 310 2533, MaakeR@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".