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UMLINDI The Watchman

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NATURAL RESOURCES AND ENGINEERING
Soil, Climate and Water

CONTENTS:

agriculture
Department: Agriculture
REPUBLIC OF SOUTH AFRICA

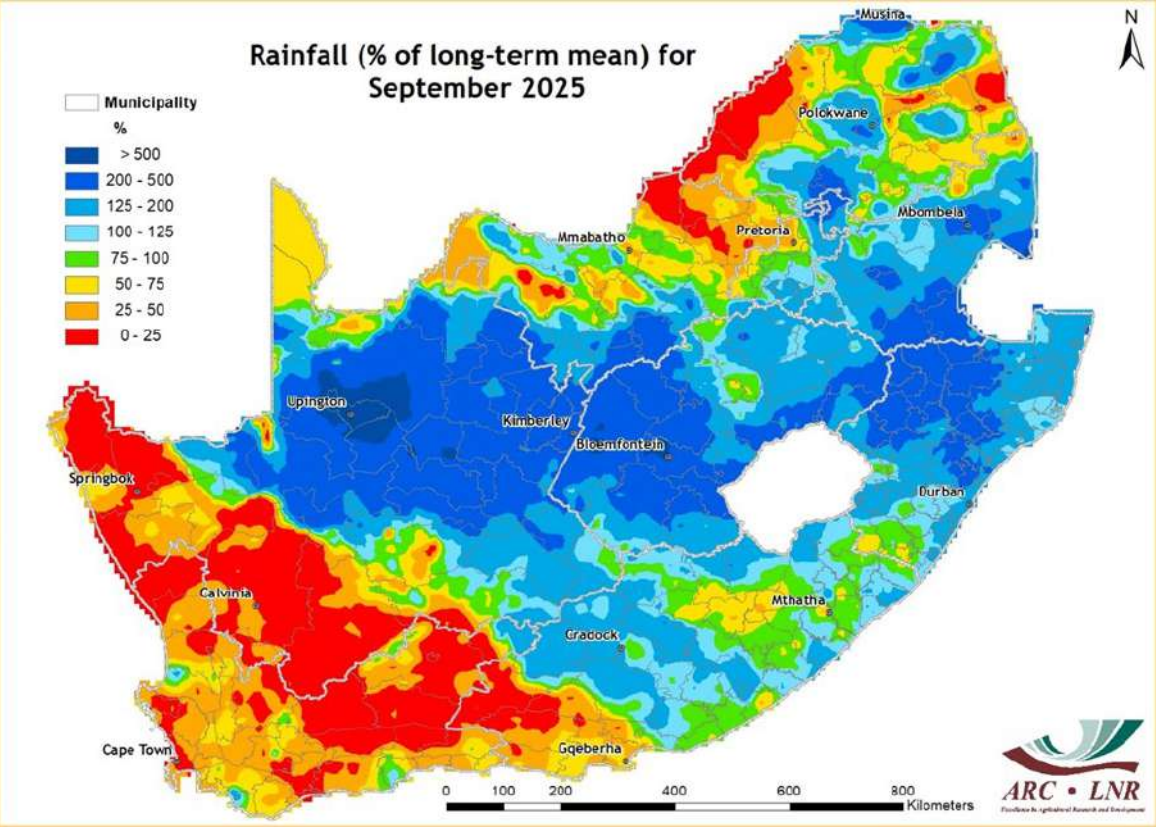
South African Weather Service

256th Edition

Image of the Month

Early spring rainfall and its implications for the 2025/26 summer cropping season

During September 2025, rainfall totals in the Free State, Northern Cape, Mpumalanga, KwaZulu-Natal, and parts of the North West, Eastern Cape and Limpopo provinces exceeded the long-term mean, with some areas receiving 150-200% of their typical September rainfall. These above-normal conditions imply a positive start to the 2025/26 summer cropping season. Enhanced soil moisture is likely to support timely land preparation and early planting, particularly for key summer crops such as maize, sunflower and sorghum. Moreover, improved pasture conditions are also expected, benefiting livestock production and supporting the greening of rangelands ahead of the main summer rains. However, areas with below-normal rainfall, including parts of North West and Limpopo, may require careful monitoring and adaptive management to mitigate potential risks. Continued observation of rainfall patterns and soil moisture levels will be crucial for informed decision making throughout the growing season. Farmers may benefit from adjusting planting dates based on observed conditions, while extension services can provide guidance on optimizing crop establishment and managing potential risks.



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:

September 2025 marked a gradual seasonal shift, with rainfall beginning to move from the winter to the summer rainfall regions. The winter rainfall region, especially the south-western Cape around Cape Town, experienced the tail end of its rainy season, receiving mostly between 10 and 50 mm. This indicates below- to near-normal conditions, as the frequency and intensity of cold fronts decreased towards the end of winter. Although rainfall lessened, soil moisture remained adequate for late-season wheat and pasture growth in parts of the Western Cape. Along the southern coast from the Eastern Cape to KwaZulu-Natal, rainfall continued with light to moderate showers and totals ranging between 25 and 100 mm. These totals reflect a combination of onshore flow and localized convective activity, maintaining good soil moisture and mild temperatures that supported pasture growth across the region.

The summer rainfall region showed early signs of convective activity, with welcome rainfall recorded across parts of the interior. Totals were mostly between 10 and 75 mm, equivalent to 100-200% of the long-term average in several areas. Meanwhile, much of the northern interior, including parts of North West, Gauteng and Limpopo, remained relatively dry, receiving less than 25 mm of rain for the month. Similarly, large parts of the Karoo also experienced dry conditions, which was to be expected as this region generally receives its rainfall later in the season.

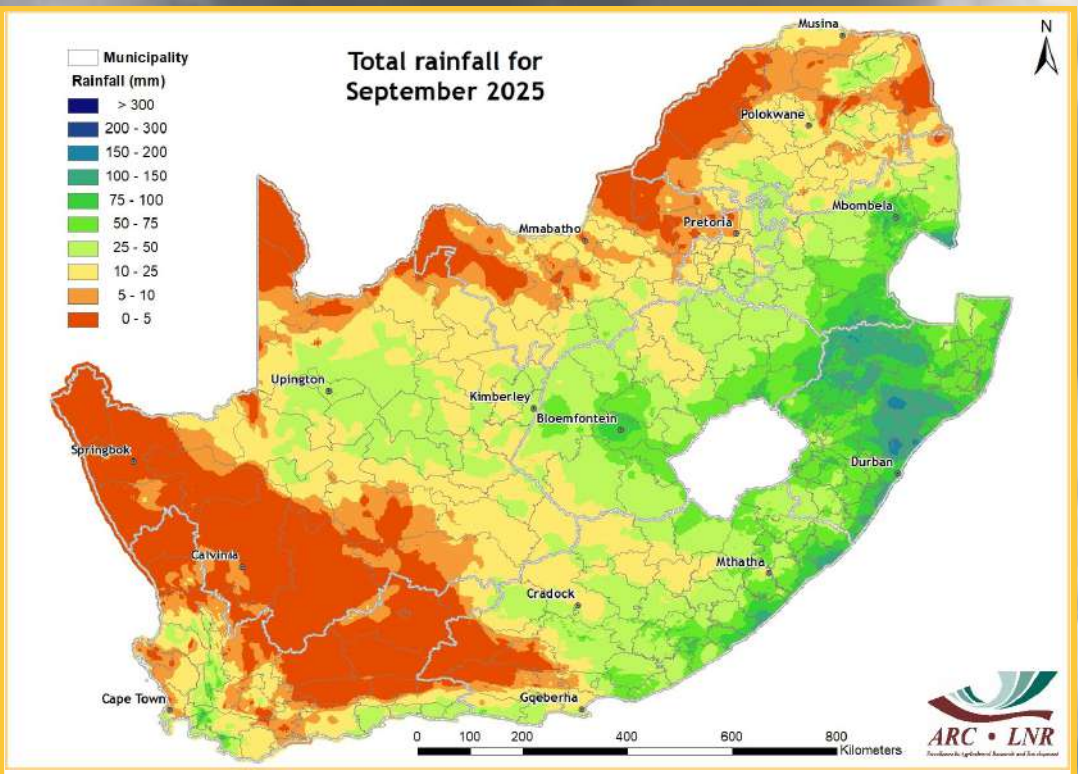


Figure 1

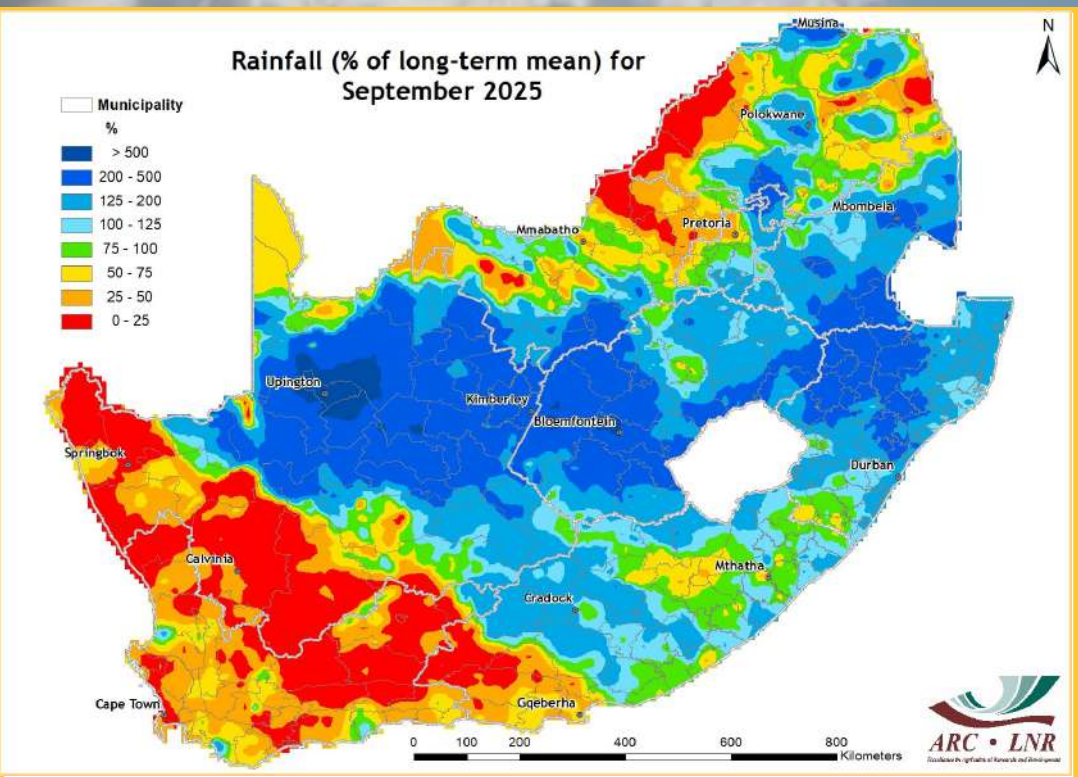


Figure 2

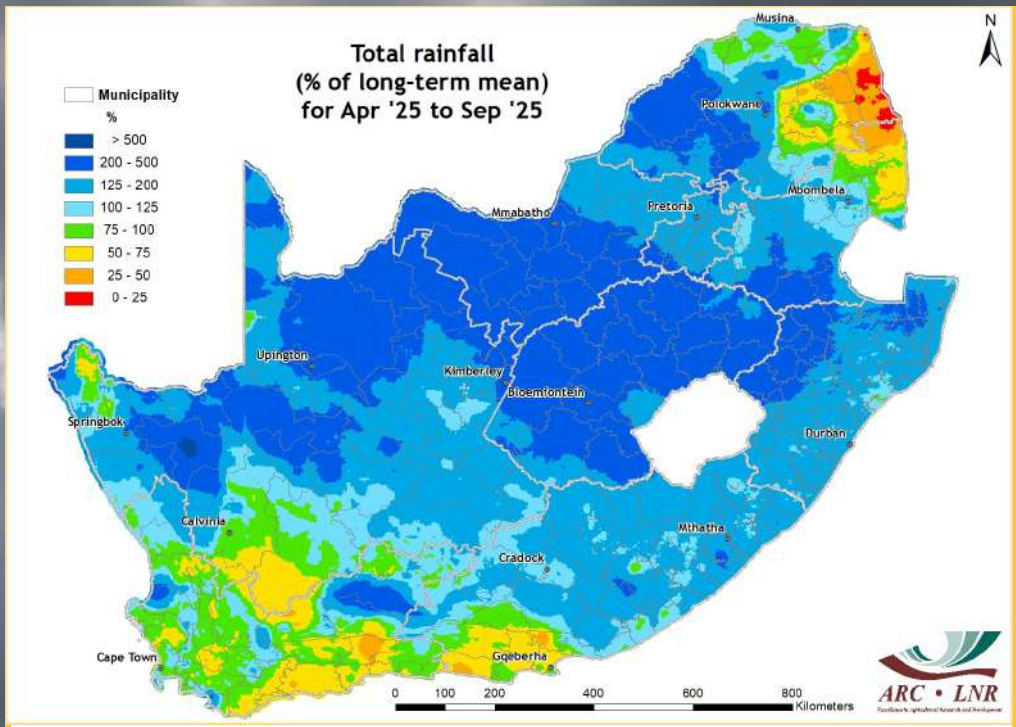


Figure 3

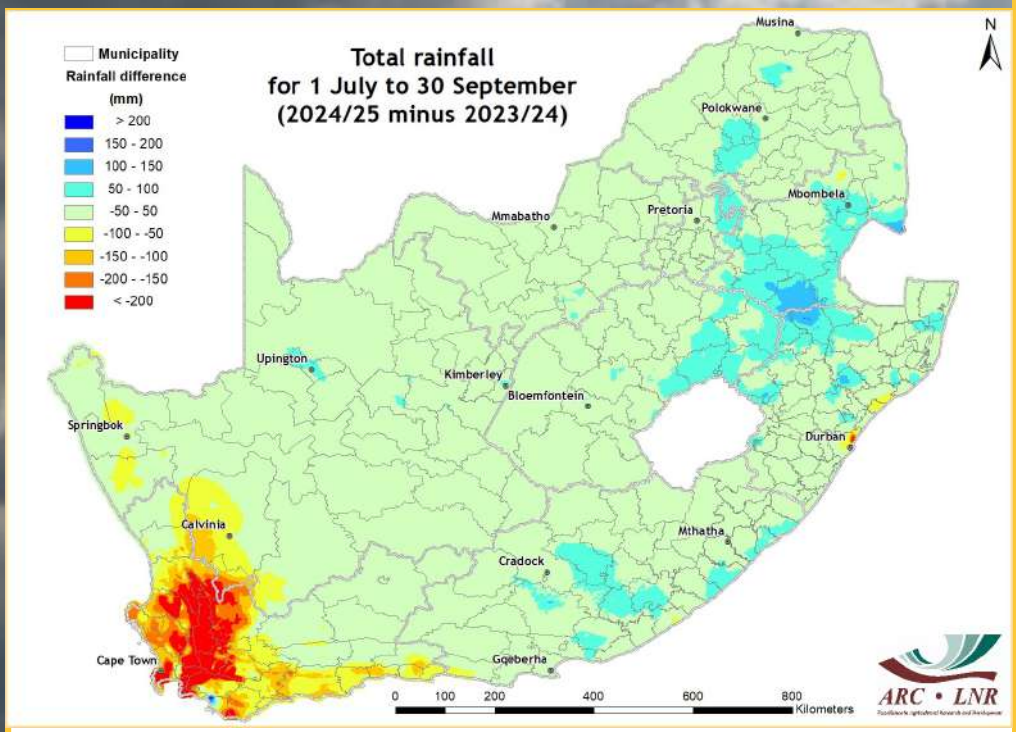


Figure 4

Figure 1:
Total rainfall for September 2025 showed a decline over the winter rainfall region, with amounts ranging between 10 and 50 mm. Moderate to higher totals were recorded over the summer rainfall region with much of this rainfall, ranging from 25 to 100 mm, occurring across the southern coast and central interior.

Figure 2:
When expressed as a percentage of the long-term mean, rainfall for September 2025 indicates below-normal conditions across much of the south-west and northeast of the country, with localized areas of above-normal rainfall observed over parts of the central and northwestern interior.

Figure 3:
The period from April to September 2025 recorded above-normal rainfall over most of the country, except for some areas in the northeastern parts of Limpopo and Mpumalanga which recorded below-normal conditions.

Figure 4:
Rainfall accumulation from July to September 2025 was largely similar to the same 3-month period last year, except for parts of the Western Cape which received less rainfall, while the eastern Free State, Mpumalanga, Gauteng, KwaZulu-Natal and Limpopo recorded higher totals.

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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 September 2025 are shown in Figures 5-8. The short-term SPI map indicates widespread wet conditions across most of the country, with extremely wet conditions dominating the interior, including the North West and adjacent parts of Limpopo, extending through Gauteng, Mpumalanga, the eastern Free State and KwaZulu-Natal. In contrast, moderate to severe drought persists in the eastern parts of Mpumalanga in the Kruger National Park. These dry conditions are not visible on the medium-term map but the wet conditions remain evident. The long-term maps reveal widespread near-normal to wet conditions, with mild drought confined to isolated areas of the Northern Cape, Limpopo and Mpumalanga.

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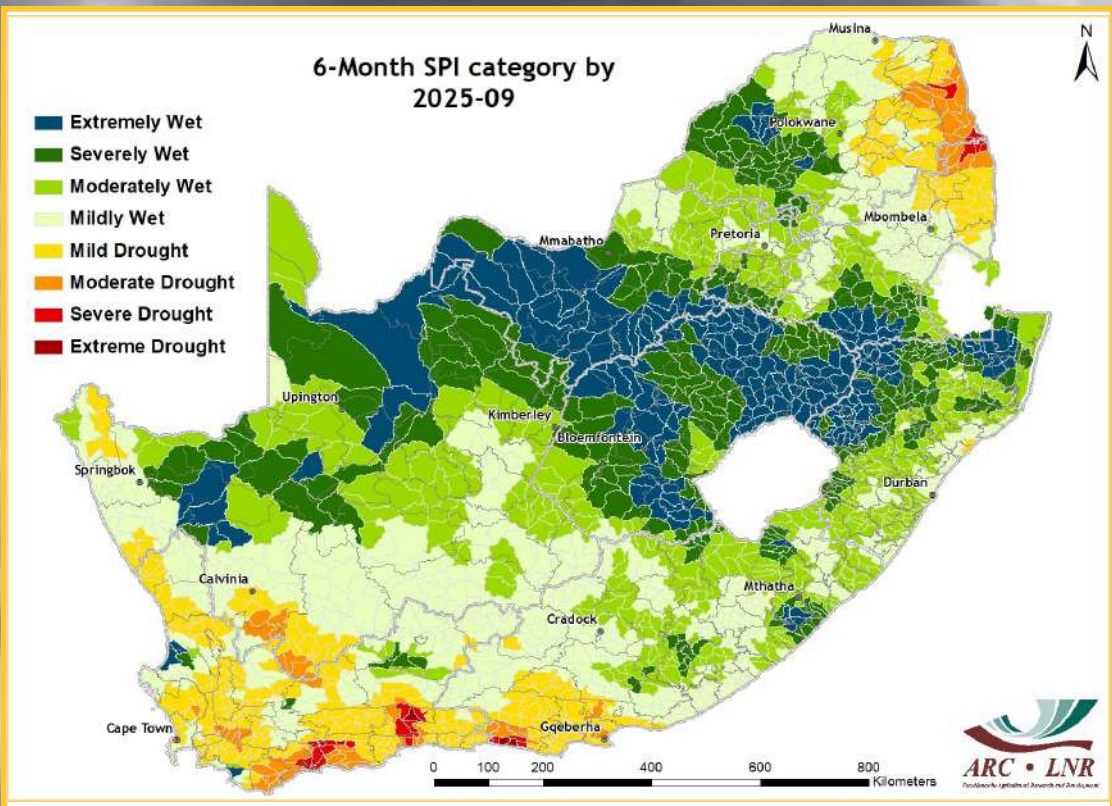

Figure 5

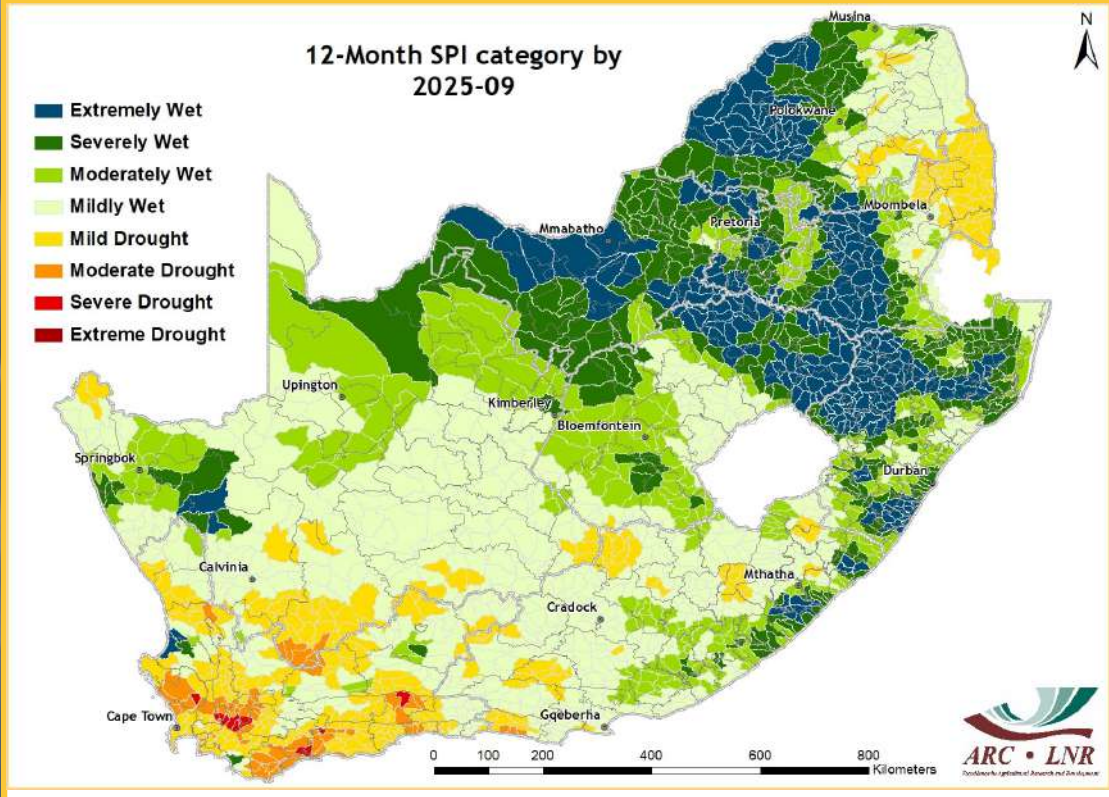

Figure 6

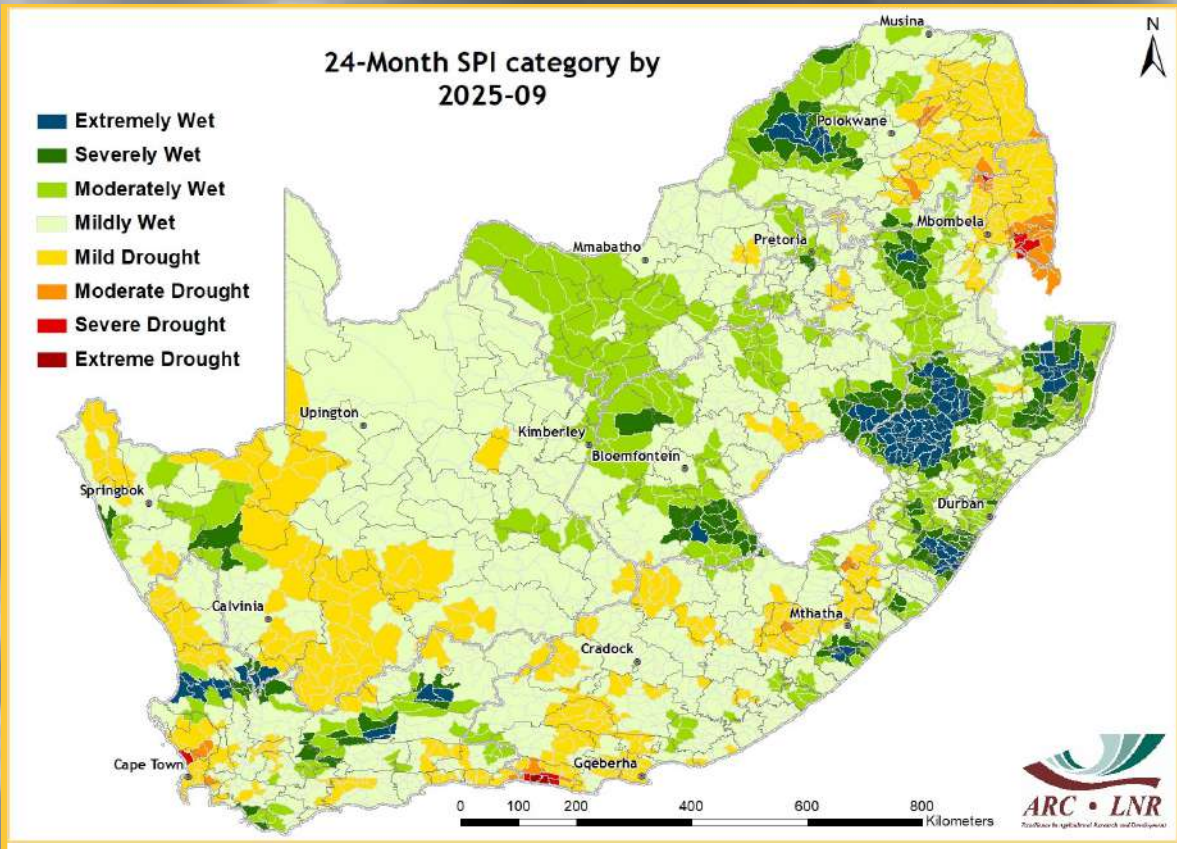

Figure 7

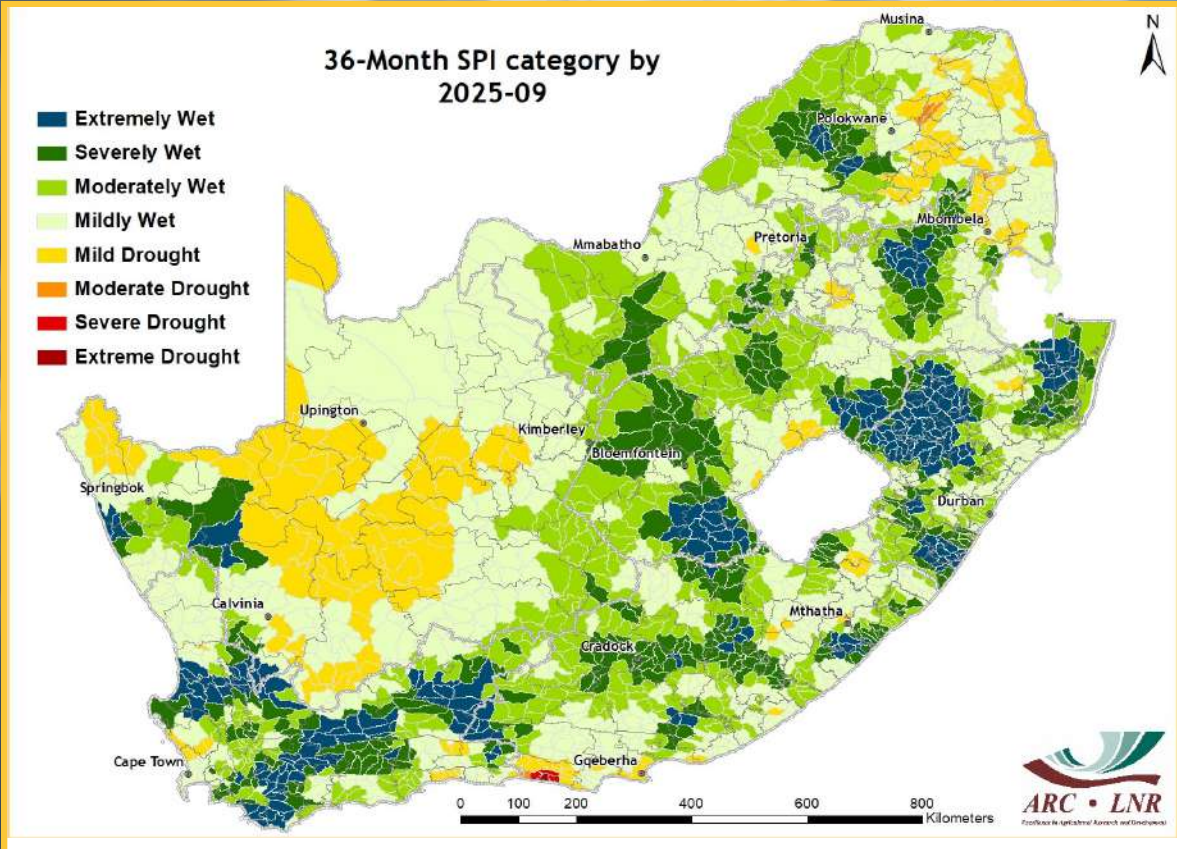

Figure 8

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.

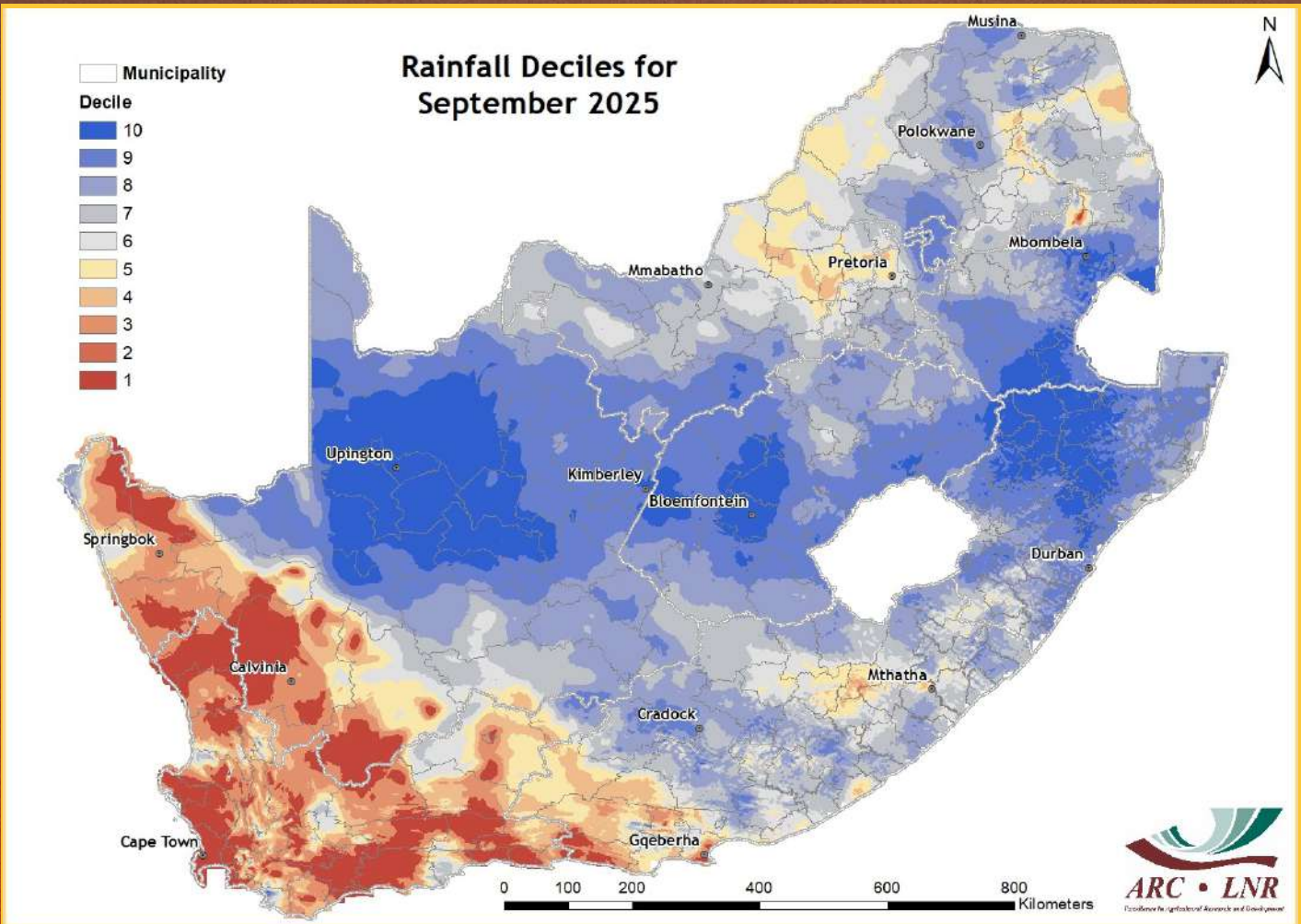

Figure 9

Figure 9:
In September 2025, much of the interior received rainfall amounts comparable to historically wetter September months. In contrast, the southwestern region and adjacent areas of the Eastern Cape remained dry.

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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 10 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 11 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 September 2025 shows a near identical spatial pattern to the previous month and continues to show high water levels across most of the country. Most inland catchments are at levels between 60% and 100%, with a scattering of 40-60% or lower levels restricted to coastal catchments mainly in KwaZulu-Natal.

The comparison between September 2025 and September 2024 also shows a near identical pattern to that observed in the previous month. Normal to high water levels are evident across the central and northern borders of the country, compared to lower levels in the south-west and southern coastal regions. Catchment areas across the northern parts of the Northern Cape, North West and Limpopo provinces continue to show the highest water improvement levels.

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

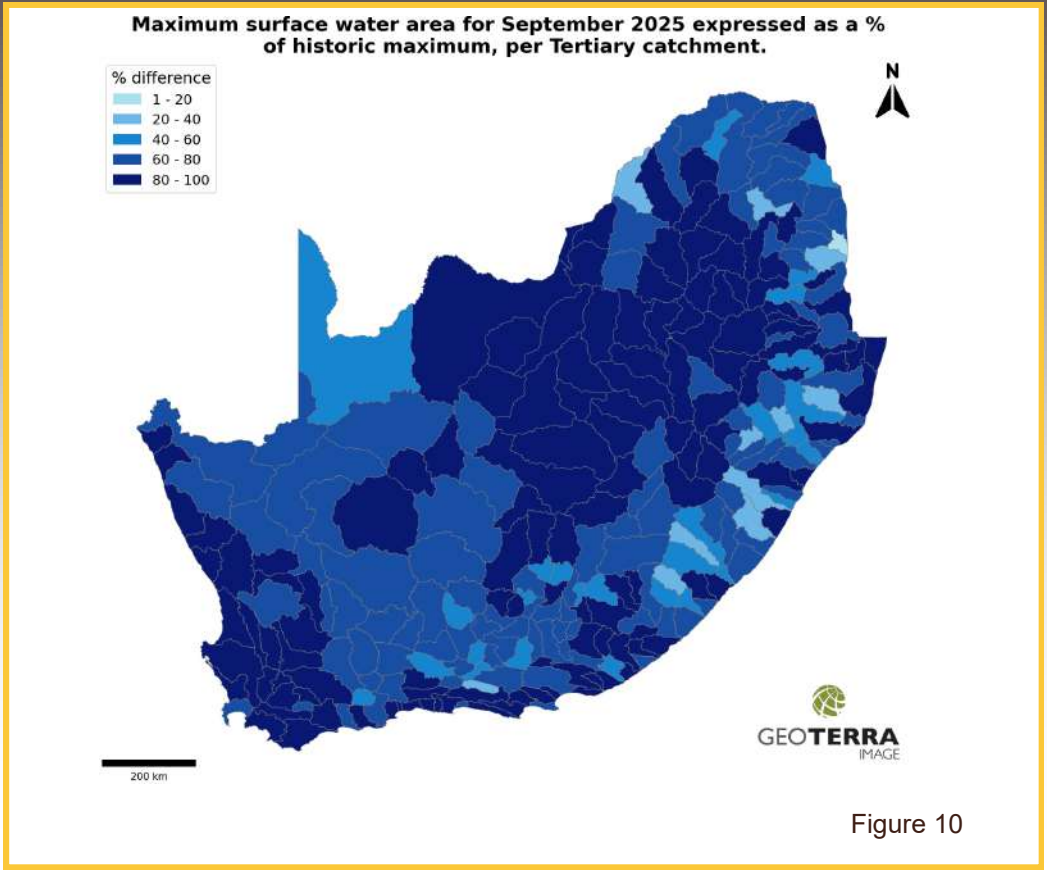

Figure 10

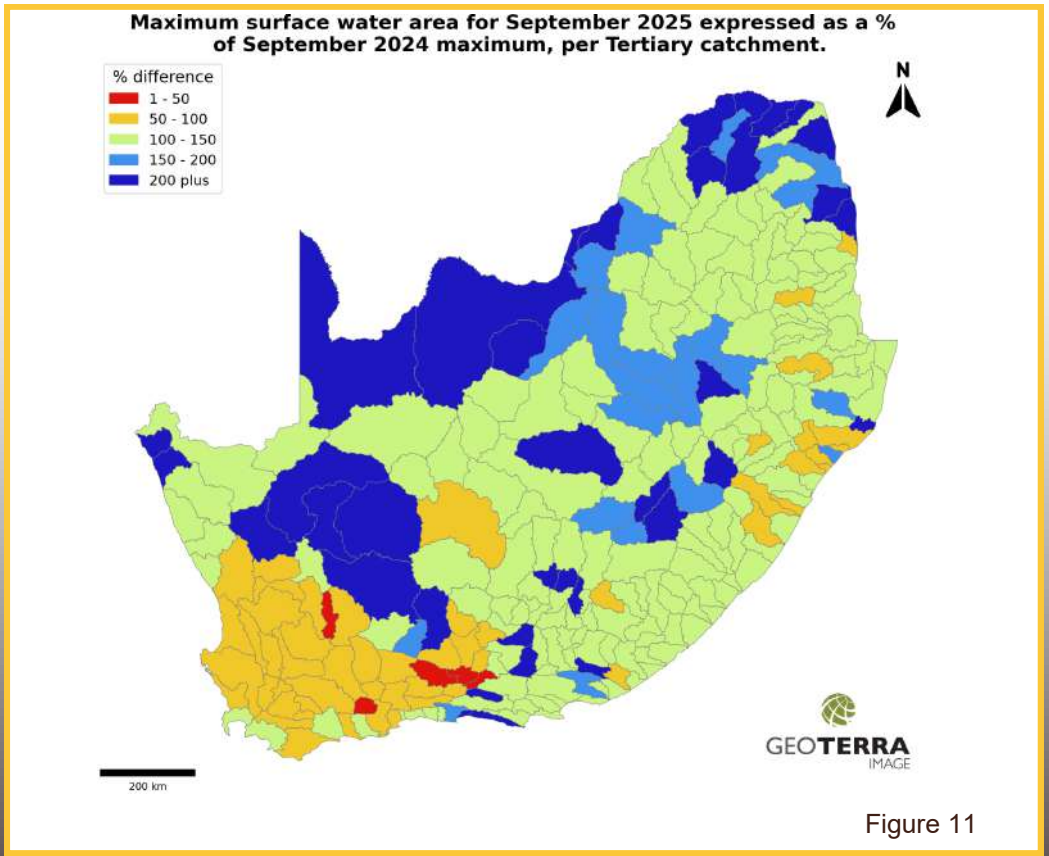

Figure 11

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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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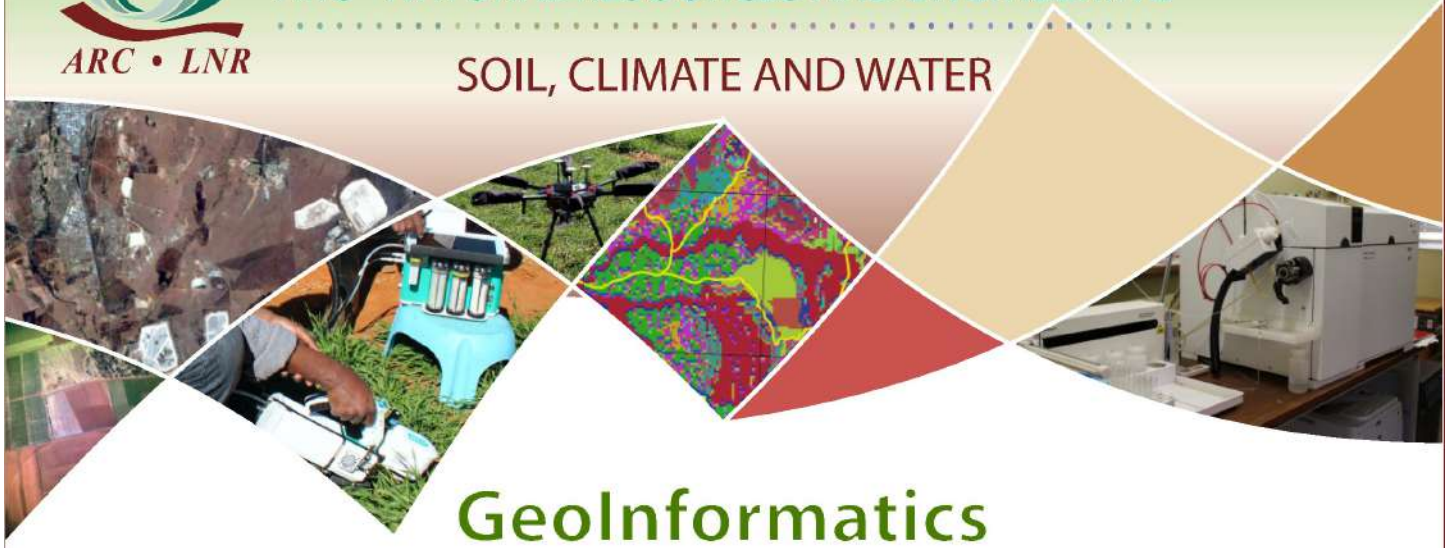

GeoInformatics

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
- 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

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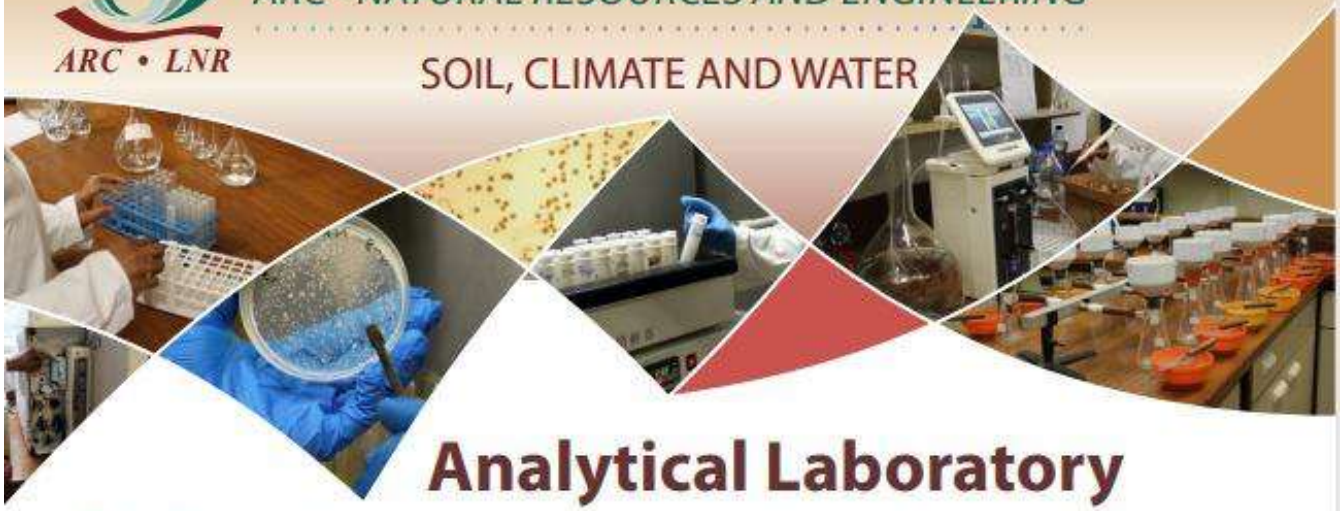

Analytical Laboratory

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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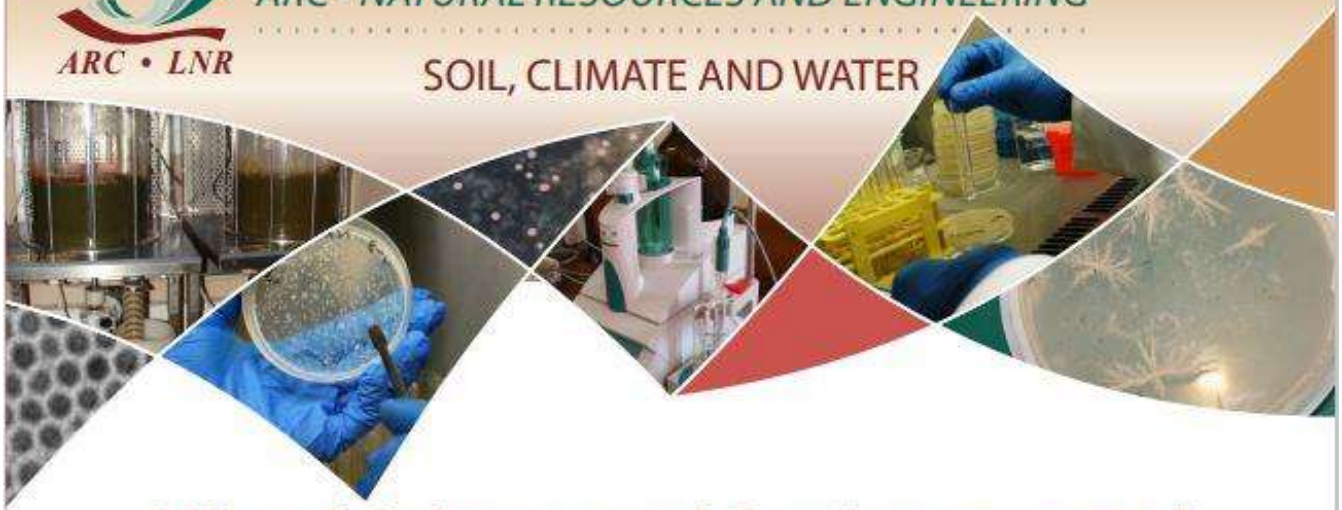

Microbiology and Environmental Biotechnology Laboratory

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
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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.

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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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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.

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https://forms.office.com/r/YhBLkxXXp7

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