



agriculture, land reform & rural development

Department:
Agriculture, Land Reform and Rural Development
REPUBLIC OF SOUTH AFRICA

National Agro-meteorological Committee (NAC) Advisory on the 2022/23 summer and autumn seasons Statement from Climate Change and Disaster Risk Reduction 06 DALRRD 2022

06 March 2023

Considering the seasonal climate watch as produced by the South African Weather Service (SAWS), the following advisory guidelines are suggested. It is emphasized that these advisories are broad guidelines and should be interpreted considering the local aspects of the region such as soil types, cultural preferences, and farming systems. Depending on the region, the prioritization of the guidelines will differ. The basic strategy to follow would be to minimize and diversify risk, optimize soil water availability and to manage the renewable resources (rainwater and grazing) to uphold sound farming objectives. Long-term mitigation strategies should be considered by implementing techniques to enhance in-field water harvesting by reducing run-off and improving infiltration. Reduced tillage methods are very important in this regard, as is basin tillage, to capture rainwater in the drier areas. **The provinces should further simplify, downscale and package the information according to their language preference and if possible, use local media and farmers' days to disseminate the information. Users are advised to be on the look-out and act on the daily extreme weather warnings as well as the monthly advisory.**

I. CURRENT CONDITIONS

Figure 1

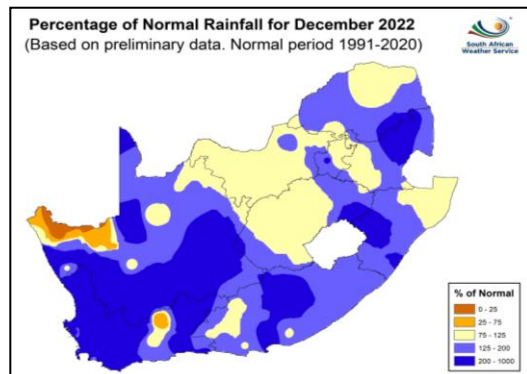


Figure 2

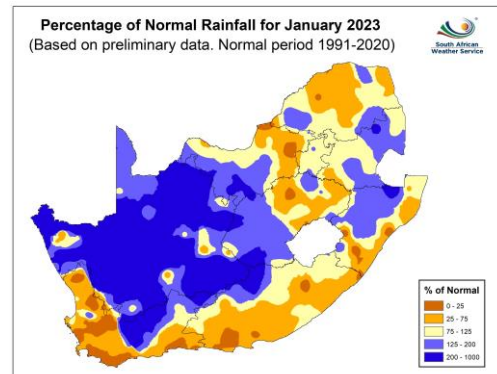


Figure 3

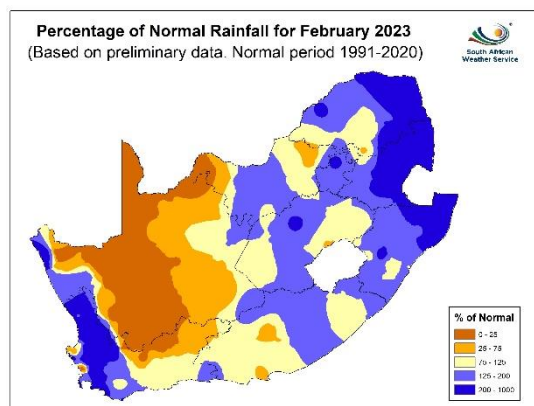
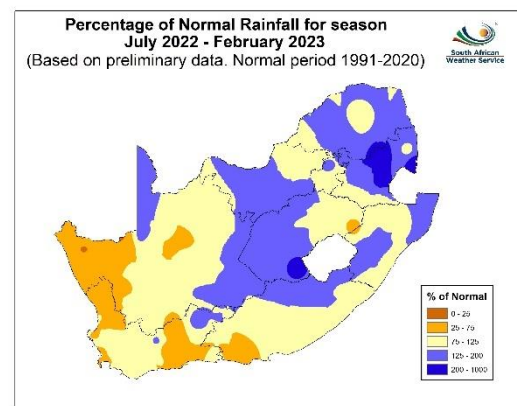
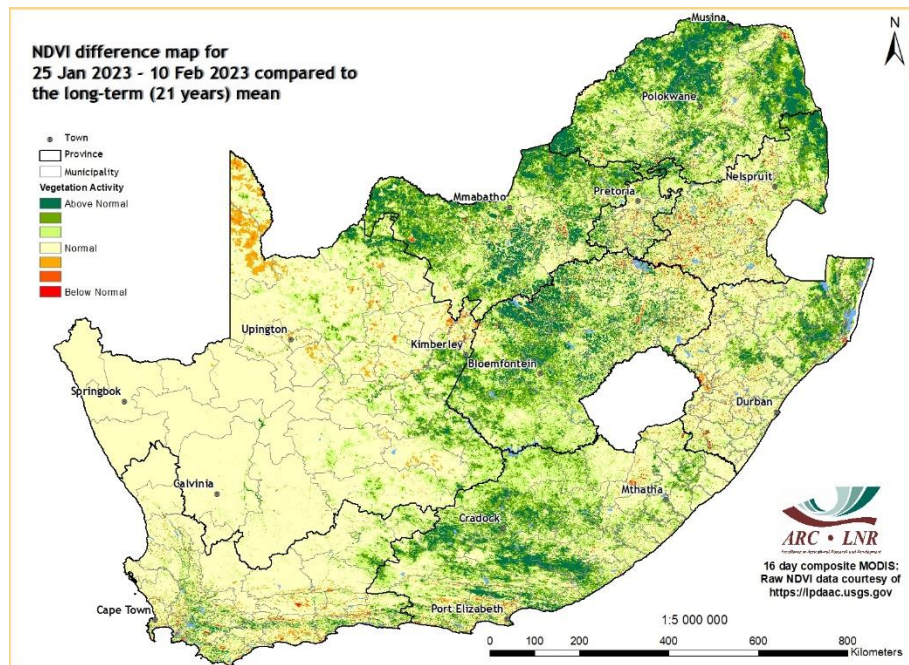


Figure 4



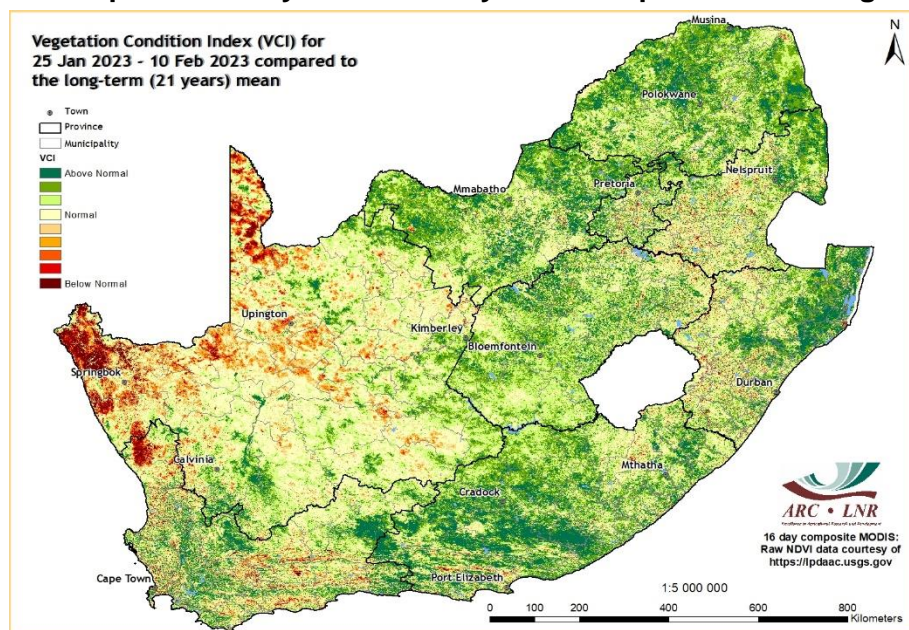
In December 2022, above normal to normal rainfall was received countrywide but below normal in the far north-western parts of the Northern Cape province (**Figure 1**). January received above normal rainfall mainly over the Northern Cape, western North West, western Free State and KwaZulu-Natal (**Figure 2**). The remainder of the country received a mixture of normal to below normal rainfall. Normal to above normal rainfall was received in February becoming below normal over much of the Northern Cape (**Figure 3**). The season July 2022 to February 2023 received normal to above normal rainfall (**Figure 4**). The western parts of the Northern Cape, parts of the Western Cape and some areas of Sarah Baartman District in the Eastern Cape received below normal rainfall.

NDVI map: 25 January – 10 February 2023 compared to the long-term mean



Much of the country experienced normal to above normal vegetation activity towards the end of January into the beginning of February. The far northern parts of the Northern Cape experienced below normal vegetation activity.

VCI map: 25 January – 10 February 2023 compared to the long-term mean



The vegetation conditions at the end of January into early February were below normal in the northern and western parts of the Northern Cape and in parts of the Western Cape. The remainder of the country experienced mainly above normal vegetation conditions.

(The VCI is a better indicator of water stress than the NDVI).

II. CONDITIONS IN THE PROVINCES DURING JANUARY/FEBRUARY

Eastern Cape

Conditions have improved in the province; however, the western parts continue to experience dry conditions. As a result, the Nelson Mandela Bay Metro has implemented water restrictions. Planted crops are in good condition. Pastures are reportedly in reasonable to good condition. The veld and livestock are in reasonable to good condition but poor in some areas of Sarah Baartman district. Heavy falls of rain were experienced and heatwaves on other days. Brown locust continues to be controlled. Irrigation dams in Sarah Baartman district remain very low. The average level of major dams has increased as compared to the previous year during the same period (78% in 2023; 67% in 2022).

Free State

Normal to above normal rainfall was received. Heavy rainfall was received, and it affected vegetables and other crops such as maize, sunflower and soya beans in Thabo Mofutsanyane and Lejweleputswa districts. Access farm roads and bridges were also damaged in Snymanshoek. The province is in the process of conducting further assessments. The veld and livestock are in reasonable to good conditions. Brown locust continues to be controlled. The average level of major dams has increased as compared to the previous year during the same period (107% in 2023; 102% in 2022).

Gauteng

Heavy rainfall was received in February. Heatwaves in January resulted in wilting of some crops. However, others recovered due to the February rains although some were negatively impacted by flooding. The veld and livestock are in reasonable condition. Redwater was detected in Heidelberg and Three-day Stiff-sickness due to dirty water from streams. The wet conditions have resulted in foot rot and the relevant measures have been put in place. Farms experiencing foot and mouth disease remain under quarantine. There were cases of African swine flu and African Horse sickness and these cases have been attended to. The average level of major dams is the same as in the previous year during the same period at 101%.

KwaZulu-Natal

Normal to above normal rainfall was received. Heavy rains have resulted in waterlogging in many fields, damages to infrastructure and caused livestock mortalities. Pastures, veld, and livestock are in good condition. The average level of major dams has increased as compared to the previous year during the same period (92% in 2023; 85% in 2022).

Limpopo

Normal to above normal rainfall was received and crops are in good condition. The veld and livestock are in reasonable to good condition. Lumpy skin disease affected livestock in Mopani, Capricorn and Sekhukhune districts and fall armyworm was reported in all districts. The average level of major dams has increased to 91% in 2023, as compared to 88% of 2022.

Mpumalanga

Above normal rainfall was received, and flooding caused damages to some crops, infrastructure as well as livestock mortalities. Planted vegetables in Ehlanzeni and Gert Sibande districts are in good condition. Various types of vegetable are at harvesting stage in most parts of the province. The veld and livestock conditions are reasonable to good because of the rains received. Lumpy skin disease was reported, and further investigations are being conducted. The average level of major dams has increased to 100% 2023 compared to 93% in 2022.

Northern Cape

Above normal rainfall was received in January but below normal in most areas in February. However heavy rainfall led to water being released from the Vaal dam and Bloemhof dam that resulted in flooding in areas along the Orange river. Removal of irrigation equipment from the Orange river due to the flooding may result in lower crops yields. The veld and livestock are in reasonable condition but poor in the western parts of the province. Brown locust continues to be controlled. The average level of major dams has increased as compared to the previous year (114% in 2023, as compared to 101% of 2022).

North West

Normal to above normal rainfall was received however, some crops were impacted by water stress associated with high temperatures. The veld and livestock are in reasonable condition. Lightning resulted in livestock mortalities in Kgetleng in Bojanala district. The average level of major dams has increased as compared to previous year during the same period (88% in 2023 and 74% in 2022).

Western Cape

Normal to above normal rainfall was received. Severe thunderstorms with heavy rain, hail and lightning led to flash flooding and localized damage to property, crops, and infrastructure across the province. The average temperatures were normal. The stone fruit and table grape harvest are underway. Veld and planted pasture conditions improved due to the good rainfall, but veld conditions in the West Coast, Central Karoo and Little Karoo remain poor. Livestock is in a reasonable condition as farmers continue to provide supplementary fodder. Cases of rabbit haemorrhagic disease and rabies was reported and have been attended to. Incidences of brown locust swarms were reported, controlled, and monitored in the Central Karoo. The average level of major storage dams has decreased to 49%, compared to 66% in 2022.

Information on level of dams is obtained from the Department of Water and Sanitation

Available: <https://www.dwa.gov.za/Hydrology/Weekly/Province.aspx>

Dam levels as at 2023/02/27

III. AGRICULTURAL MARKETS

Livestock domestic markets

ABSA stated that Class A beef prices continued to trade at levels far below the highs recorded in late December/early January. Prices are now more than 10% lower. The downward trend in lamb and mutton prices apparent since the first week of December continues to gain momentum with A2/A3 lamb prices decreasing by 7%. Local pork prices continued to soften from the highs recorded in December. This is likely the effect of red meat prices trending lower as demand softens on the back of intensifying pressure on consumers. Price movements in the local poultry market were only marginal over the past weeks as global prices eased and the ZAR/USD appreciated.

Producer prices for selected livestock commodities	Beef	Mutton	Pork	Poultry
Open market: Class A / Porker / Fresh whole birds (R/kg)	56.7	-	33.86	34.60
Open market: Class C / Baconer / Frozen whole birds (R/kg)	50.9	65.51	35.31	34.59
Contract: A2/A3* / IQF (*includes fifth quarter) (R/kg)	56.70	84.30	-	31.66
Weaner Calves / Feeder Lambs (R/kg)	35.33	35.50	-	-

ABSA: 2023/02/13

Major grain commodities

According to ABSA maize prices decreased by 7.9% and 3.8% for white and yellow maize respectively compared to a month ago following the downward trend of the global prices. Wheat prices traded sideways and increased by 1.0%. Prices were 12.9% higher compared to a year ago. Soybean prices followed a decreasing price trend from the beginning of the month, decreasing by 7.8%.

Commodity	Future Prices (2023/02/28) R/ton				
	Mar-23	May-23	Jul-23	Sep-23	2023/12
White maize	4 202.00	4 205.00	4 148.00	4 232.00	4 334.00
Yellow maize	4 305.00	4 325.00	4 308.00	4 382.00	4 469.00
Wheat	6 830.00	6 877.00	6 926.00	6 898.00	6 621.00
Sunflower	10 414.00	9 850.00	10 017.00	n/a	10 192.00
Soybeans	9 549.00	8 970.00	9 124.00	9 230.00	9 479.00

SAGIS: 2023/03/02

IV. SADC REGION

The January Famine Early Warning Systems Network (FEWS NET) reported that following a timely start to the rainy season in November across much of southern Africa, localized dry spells in December likely impacted planting and delayed agricultural operations, particularly in southern Mozambique and southern Zimbabwe. Cumulatively below-average rainfall has also been recorded in south-eastern Angola and northeastern areas of Madagascar. However, forecast average to above-average rainfall through the remainder of the agricultural season will likely support crop production for the upcoming harvest. As the lean season progresses, household food stocks are dwindling, increasing market demand, and resulting in seasonal increases to maize grain prices across monitored markets. In December 2022, maize grain prices were 30 to 122 percent higher than respective prices in 2021 due to regionally lower maize stocks than in 2021, higher production costs, and weaker exchange rates in 2022. Maize grain prices are expected to rise seasonally, peaking in February. However, in April, prices will likely begin declining with the start of the main 2023 harvest season. Cereal prices in 2023 are expected to remain higher than prices in 2022 due to the high cost of fuel, energy, and fertilizer.

FEWS NET further said that in December, inflation levels slowly tapered downwards but remained elevated, with several countries continuing to register double-digit inflation rates, driven by high food, transportation, and utility prices. Additionally, domestic currency depreciations and foreign exchange shortages have exacerbated inflationary pressures in the region. In 2023, inflation rates will likely remain high enough to drive central banks to continue tightening monetary policies, which will likely further reduce household purchasing power. However, the upcoming 2023 harvest will likely improve food access for very poor and poor households. Demand for agricultural labor is improving as households are engaged in weeding and fertilizer application across most of the region. However,

overall labor demand is below normal levels due to increased costs of agricultural inputs, such as fertilizer, and elevated inflation, eroding better-off households' hiring power. Additionally, agricultural labor wage rates remain low due to lower-than-normal liquidity for better-off households. Below-normal labor opportunities and lower-than-normal wage rates are driving below-average incomes from agricultural labor, one of the major sources of income for poor households during the main agricultural season.

[The Integrated Food Security Phase Classification (IPC) is a set of standardized tools that aims at providing a "common currency" for classifying the severity and magnitude of food insecurity.]

Source: <http://www.fews.net/southern-africa>

Summary of the reports

Heavy rains in many summer rainfall areas resulted in damages to crops, infrastructure and caused livestock mortalities. The veld and livestock are in reasonable to good condition. The average level of major dams has increased in all provinces except the Western Cape where it has decreased. Cases of African swine fever, African horse sickness Three-day Stiff-sickness and foot rot were reported in Gauteng. Lightning caused mortalities in North West province. Lumpy skin disease and fall armyworm were reported in Limpopo. Brown locust continues to be controlled in the Eastern Cape, Free State, Northern Cape, and Western Cape provinces. Over SADC, as the lean season progresses, household food stocks are dwindling, increasing market demand, and resulting in seasonal increases to maize grain prices across monitored markets.

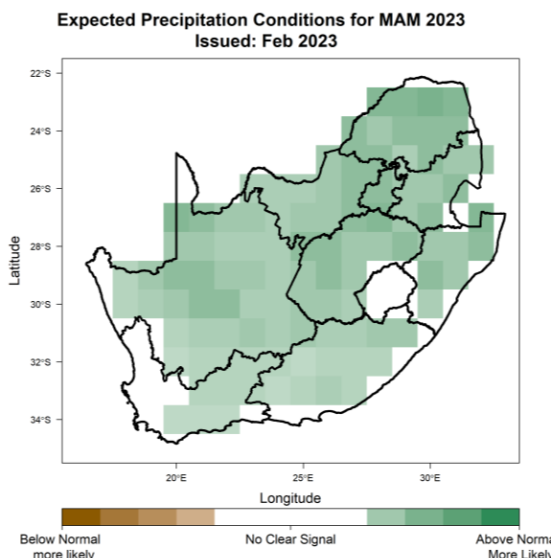
IV. MONTHLY CLIMATE OUTLOOK

Seasonal Climate Watch: March to July 2023

State of Climate Drivers

The El Niño-Southern Oscillation (ENSO) is currently in a La Niña state, and forecasts indicate that it will likely return to a neutral state by autumn (Mar-Apr-May). As ENSO remains in a La Niña state, early autumn rainfall remains likely to receive above-normal rainfall over the summer rainfall areas. However, as summer comes to an end so does the typical impact of ENSO and it is to be monitored for the next summer season.

Figure 1 – Rainfall



The multi-model rainfall forecast indicates above-normal rainfall for most parts of the country except for the south-western parts during late-autumn (Apr-May-Jun) and early-winter (May-Jun-Jul) which is expected to receive below-normal rainfall.

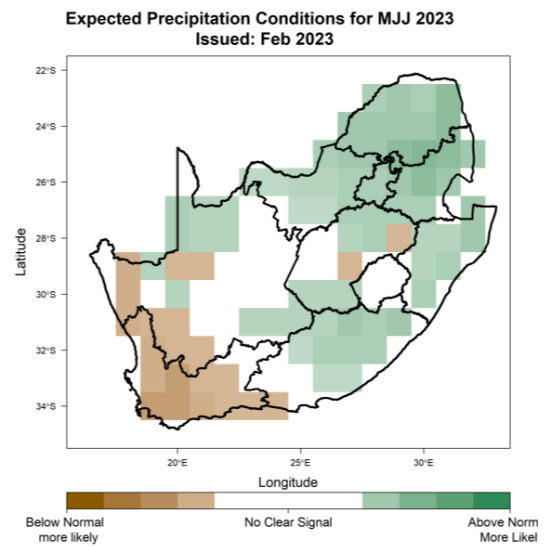
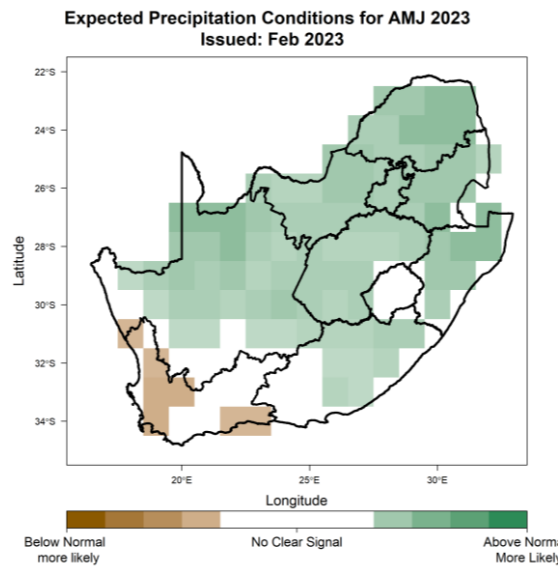
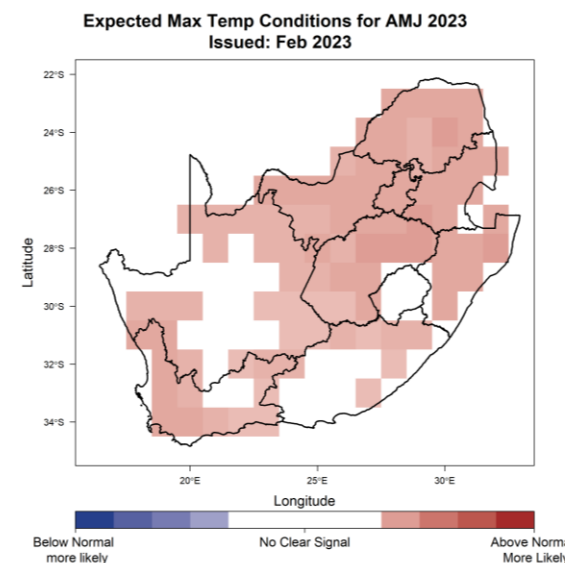
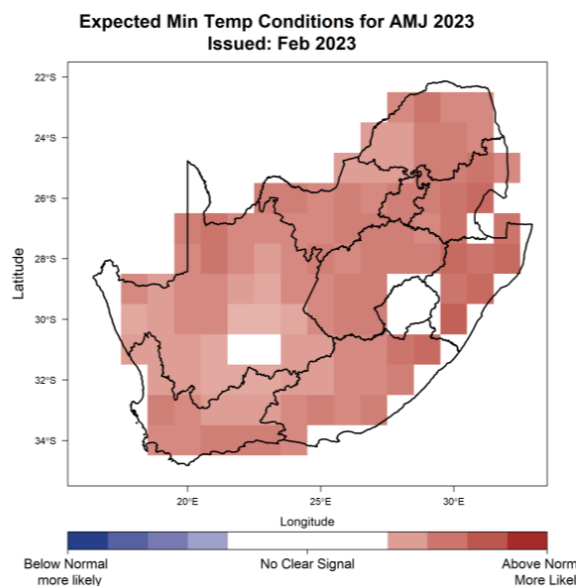
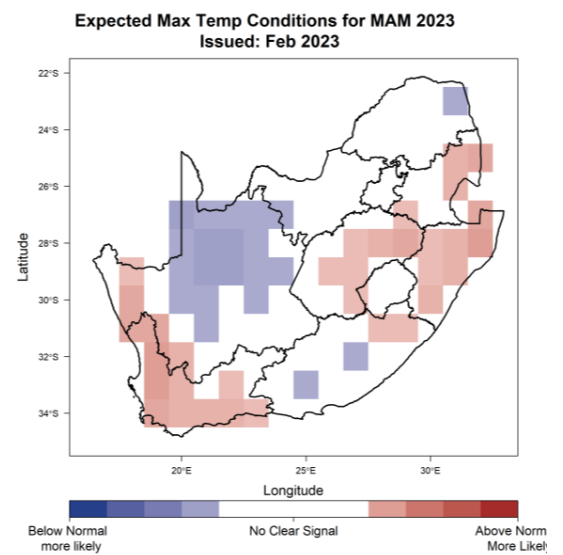
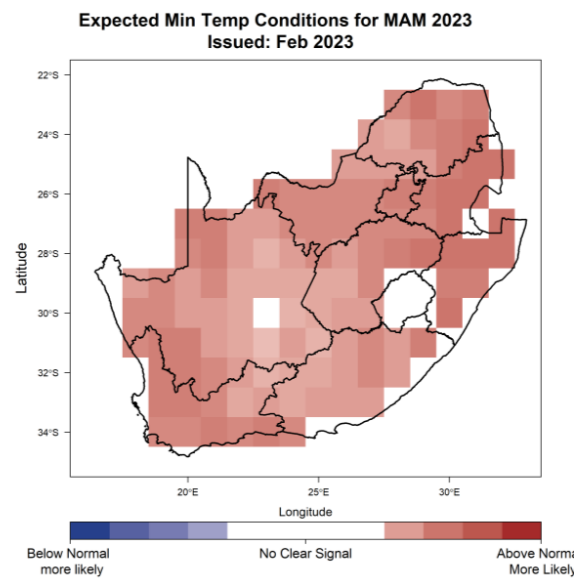
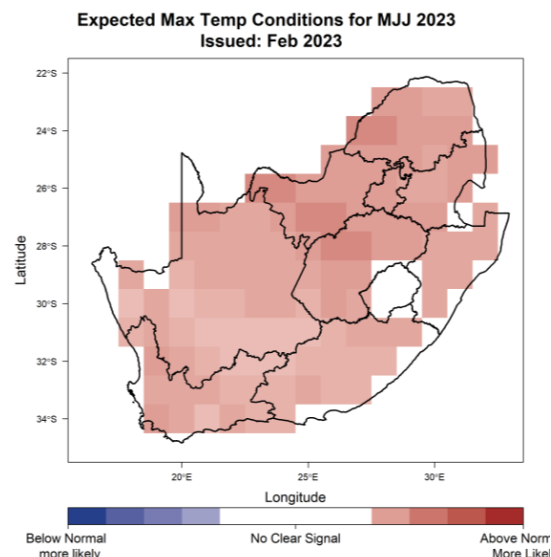
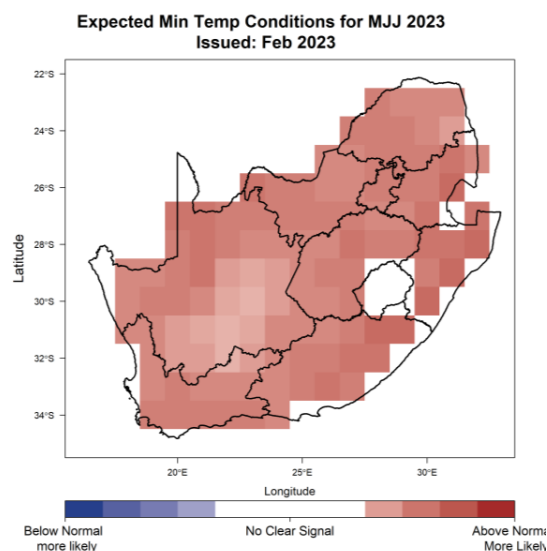


Figure 2 – Minimum and Maximum temperatures





Minimum and maximum temperatures are expected to be mostly above-normal countrywide for the forecast period.

In summary, above normal rainfall is anticipated during autumn and early winter but below normal in winter rainfall areas. Both minimum and maximum temperatures are expected to be above normal. Farmers are encouraged to continually check updates i.e., seasonal forecasts and utilize 7-day weather forecasts for short term planning.

With the above forecast in mind, the following strategies are recommended:

V. SUGGESTED STRATEGIES

A. Rain-fed crop production

Crop management:

- Control weeds regularly.
- Scout for pests and diseases regularly and control where necessary.
- Practice water harvesting techniques e.g., construction of basins, contours, ridges.

B. Irrigation farming

- Remove all weeds containing seeds but keep other vegetative rests on the land because that will reduce evaporation.
- Check and repair all tools and machinery especially where there are water leaks.
- Be aware of the state of regional water resources and whether it will be adequate for irrigation.
- Timing of irrigation - rather late afternoon or early evening to reduce evaporation.
- Manage irrigation so that the plant receives water only when needed.

- Consider using drip irrigation as it saves water by allowing it to drip slowly straight to the roots.
- Avoid over irrigation because that can create problems e.g., water logging and diseases.
- Adhere to water restrictions when issued.

C. Domestic and home garden water use

- Conserve existing water supplies.
- Eradicate water weeds.
- Limit water waste and losses.
- Repair leaking pipes.
- Re-use water and retain high quality.
- Harvest water during rainy days.

D. Stock farming

- Keep stocking rates conservative and even lower to protect grazing.
- Never exceed carrying capacity of plant associations.
- Provide lots of drinking points where possible.
- Provide additional fodder and enhance nutritional value of dry grazing/feed with licks:
 - Phosphorous deficiency is a major problem.
 - Licks should (in most cases) provide:
 - Phosphorous.
 - Urea (to help with the break-down of dry vegetation).
 - Salt.
 - Molasses.
- Deficiencies differ according to vegetation composition/soil properties/climate.
- Analysis of vegetation/soil samples can benefit the decision for supplement composition.
- Sell mature, marketable animals (to help prevent overstocking/ overgrazing).
- If grazing is in danger, herd animals into pens where different animals can be segregated and fed separately.

E. Grazing

- Subdivide your grazing area into camps of homogeneous units (in terms of species composition, slope, aspect, rainfall, temperature, soil and other factors) to minimise area selective grazing as well as to provide for the application of animal management and veld management practises such as resting and burning.
- Determine the carrying capacity of different plant associations.
- Calculate the stocking rate of each, and then decide the best ratios of large and small animals, and of grazers or browsers.
- Provide periodic full growing-season rests (in certain grazing areas) to allow veld vigour recovery to maintain veld productivity at a high level as well as to maintain the vigour of the preferred species.
- Do not overstock at any time to avoid overgrazing.
- Eradicate invader plants.
- Periodically reassess the grazing and feed available for the next few months and start planning.

- Spread water points evenly.

F. Pests and diseases

Crops

- Fruit crop farmers should regularly scout for pests and diseases and contact the local agricultural office for advice on best control measures. Farmers should further implement phytosanitary measures.

Livestock

- Follow the vaccine routine and consult with the local veterinarian.

G. Veld fires

Provinces and farmers are advised to maintain firebreaks in all areas. An owner of the land who is obliged to prepare and maintain a firebreak must ensure that, with due regard to the weather, climate, terrain and vegetation of the area, the following is taken care of in terms of installing firebreaks (Chapter 4 of the National Veld and Forest Fire Act No. 101 of 1998):

- It must be wide enough and long enough to have a reasonable chance of preventing a veld fire from spreading to or from neighbouring land.
- It does not cause soil erosion and
- It is reasonably free of flammable material capable of carrying a veld fire across it.
- Firebreaks may be temporary or permanent.
- Firebreaks should consist of fire-resistant vegetation, non-flammable materials, bare ground or a combination of these.
- Firebreaks must be in such a way as to minimize risk to the resources being protected.
- Erosion control measures must be installed at the firebreak.

Firebreaks can be made through the following methods:

- Mineral earth firebreak:
 - Through ploughing, grading, other earth movement.
- Use of herbicides.
- Use animals to overgraze specifically to minimise fuel.
- Strategic placement of burned areas,
 - Not to be done on days with fire hazard (windy and dry/hot).
- Plant fire resistant plants.
- Plant species selected for vegetated firebreaks must be non-invasive and capable of retarding the spread of fire.

Maintaining firebreaks:

- Mow, disk, or graze vegetative firebreaks to avoid a build-up of excess litter and to control weeds.
- Inspect all firebreaks for woody materials.
- Inspect firebreaks at least annually and rework bare ground firebreaks as necessary.
- Repair erosion control measures as necessary.
- Access by vehicles or people must also be controlled.
- Bare ground firebreaks, which are no longer needed must be stabilized i.e.
 - Sow grass.
 - Mulch.

What to do when conditions favorable for veld fire are forecast:

- Prohibit fires in the open-air during periods of high fire hazard and establish a fire control committee.
- To control fires, an alarm system, firefighting teams, and beaters must be organized in advance and plans prepared.
- Livestock should be moved out of grazing land to a safe place.

What to do during a veld fire:

- Water is generally not available in sufficient quantities or at adequate pressure for the control of major fires; however, sand, or other loose mineral soil material can be an effective method of control.
- Tree branches can be used to beat fire.

H. Flooding

Heavy rainfall raises the water level. When the water level is higher than the riverbanks or the dams, water flows out from the river and flooding occurs.

Preventive measures:

- Construction of proper drainage systems. Drains must be cleaned constantly as they ensure proper water irrigation.
- Mechanical land treatment of slopes such as contour ploughing or terracing to reduce the runoff coefficient.
- Construction of small water and sediment holding areas.
- Construction of floodways (man-made channels to divert floodwater).
- Terracing hillsides to slow flow downhill.
- Water pumps in rivers likely to be affected should be lifted from the riverbanks when a warning for heavy rain has been issued.

What to do when flooding is forecasted:**Avoid:**

- Cutting grass in the rainy season as this can result in nutrient depletion.
- Applying fungicides and pesticide (plants and animals).
- Applying Nitrogen fertilizer as this can burn plants. Dumping fertilizer in one spot can cause the roots below the fertilizer to be burnt and die.
- Irrigation, this can result in waterlogging leading to nutrient depletion.

Other measures to implement:

- Cover Urea licks to prevent them from becoming toxic.
- Provide shelter for animals (young ones can die easily).
- Leave cultivated areas coarse.
- Relocate/ move animals to a safe place.
- Be extra cautious for pest and diseases after rain has fallen, as high moisture content and high temperatures may trigger these.

- Assume that flood water contains sewage and might be harmful for human and livestock consumption.
- Before leading livestock across a river, check whether the water level is rising. This is especially necessary if it is already raining.

Erosion

Erosion is the wearing away of soil and rocks by the action of natural forces, for example, water and wind. The loose and dissolved materials move from one location to another. Erosion therefore may reduce agricultural production potential.

Preventative measures for erosion:

- Do not burn vegetation.
- Keep vegetation cover – e.g., shrubs, grass, small trees; a cover crop may be used to increase organic material and increase soil structure.
- Plant permanent vegetation e.g., perennial grasses where possible.
- Maintain any remaining vegetative cover, e.g. maize stubble during winter wheat sowing, as it acts as a blanket, traps eroded particles and reduces the wind speed at ground level.
- Plant evergreen trees growing densely and perpendicular to the typical wind direction during winter and spring as wind breaks.
- Increase water infiltration by correct management of soil e.g. reduce frequency of plough and use minimum tillage.
- Mulch: to increase infiltration, reduce evaporation, and reduce raindrop impact as well as wind erosion.
- Construct retaining walls around gardens.
- Avoid soil compaction by roughening the soil surface,
 - Furrows and tillage ridges can trap loose soil.
- Farm along contours as this reduces slope lengths.
- Prevent overgrazing.
- Practice conservation farming
 - Maximize retention of crop residues.

I. Heat stress – bad for productivity

- Signs of heat stress:
Bunching in shade, high respiratory rates, open mouth breathing.
- What to do:
 - Offer shade.
 - Offer water- keep good quality water in front of animals.
 - Wet with sprinklers/fire hose.
 - Water ground.
 - Avoid overworking animals.
 - Control insects. Biting insects, such as flies can further stress livestock and interrupt their cooling. If pastures or buildings draw insects to livestock during times of extreme heat, provide proper insecticides or considering relocating your livestock.

Poultry

- Provide cool, clean, quality drinking water to your poultry. Water will help keep your birds cool.

- Always make sure your poultry is in a well-ventilated area in which there is nothing to obstruct the airflow.
- Provide feed during the coolest part of the day.
- Supplement drinking water with electrolytes.
- Reduce the number of birds kept in a house or in an area.
- Avoid excessive activity during the hottest part of the day.

J. Severe thunderstorms/flash floods

Building resilience:

- Identify resources/facilities within 50 km that can be utilized and can be of help during emergencies.
- Be sure to have legal and adequate markings to identify your livestock.
- Stay well informed about livestock in your possession and conduct an inventory after the event.
- Monitor television and local radio stations for information regarding severe storms/flash floods in your region.
- Identify natural or built areas/shelters where animals can be kept during such conditions
 - Sufficient height to be above water level,
 - Sheltered from strong winds and wetness,
- Restrict access to high-risk areas such as low-lying fields close to streams.
- Store food in safe areas sheltered from wetness to be used after storms/flash floods.
- Keep pesticides and other chemicals in areas where water will not be contaminated during extreme rainfall/storm events.
- Inspect/repair farm dams before rainy season, and after each event.

Crops are in reasonable to good condition; however, the heatwaves in January and flooding in February damaged some crops in many summer rainfall areas. The veld and livestock are in reasonable to good condition in most areas. Pests and diseases associated with wet conditions have been reported. Above normal rainfall is anticipated during autumn and early winter but below normal in winter rainfall areas. Temperatures are expected to be above normal.

With the seasonal forecast in mind, farmers are advised to put measures in place for pests and diseases associated with wet and hot conditions. Moreover, it is important for farmers to follow the weather forecasts regularly to make informed decisions. Farmers using irrigation should comply with water restrictions in their areas. Farmers must continually conserve resources in accordance with the Conservation of Agricultural Resources Act 1983, (Act No. 43 of 1983).


Farmers are advised to keep livestock in balance with carrying capacity of the veld and provide additional feed such as relevant licks. Livestock should be provided with enough water points on the farm as well as shelter during bad weather conditions. Veld fires have been reported in some winter rainfall areas, and conditions remain favourable for veld fires. Therefore, the maintenance of fire belts should be prioritized as well as adherence to veld fire warnings. Episodes of flooding resulting from rain bearing weather systems have occurred and may continue; precautionary measures should be in place. Heat waves may occur during the end of summer and therefore measures to combat these should be in place. Farmers are encouraged to implement strategies provided in the early warning information issued.

The users are urged to continuously monitor, evaluate, report, and attend to current Disaster Risk Reduction issues. It is very important and mandatory for farming communities to always implement disaster risk measures and maintain good farming practices.

The climate advisory should be disseminated widely. Users are advised to be on the look-out and act on the daily extreme weather warnings as well as the monthly advisory. Information sharing groups are encouraged especially among farming communities for sustainable development. In general, effective communication among all stakeholders in the sector will enhance effective implementation of risk reduction measures/early warning services. It is the responsibility of farmers to implement disaster risk measures.

The Disaster Management Act 2002, (Act No. 57 of 2002) urges Provinces, individuals, and farmers, to assess and prevent or reduce the risk of disasters using early warning information. The current advisory can be accessed from the following websites: <https://www.dalrrd.gov.za/>.

For more information contact:-

<p>DALRRD, Directorate: Climate Change and Disaster Risk Reduction Private Bag X250 Pretoria 0001 Tel: 012 319 6775/ 6794 Email: MittaA@Dalrrd.gov.za</p>  <p>agriculture, land reform & rural development Department: Agriculture, Land Reform and Rural Development REPUBLIC OF SOUTH AFRICA</p>	<p>SAWS: Private Bag X097 Pretoria 0001 Tel: 012 367 6000 Fax: 012 367 6200 http://www.weathersa.co.za</p>  <p>South African Weather Service ISO 9001 Certified Organisation</p>	<p>ARC: Institute for Soil, Climate and Water Private Bag X79 Pretoria 0001 Tel: 012 310 2500 Fax: 012 323 1157 Email: iscwinfo@arc.agric.za, http://www.arc.agric.za</p>  <p>ARC • LNR Excellence in Research and Development</p>
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