NDMC

SEASONAL HAZARD PROFILE

Autumn 2024

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1. SUMMARY STATEMENT

The NDMC seasonal hazard profile is intended to guide and inform disaster management stakeholders at all spheres of government in terms of a medium term (3 month) forecast as it pertains to various hazards throughout South Africa.

Each seasonal hazard profile will aim to highlight, at a national level, a spatial pattern related to hazards for the given timeframe. Indicative hazard profiles have been conceived for the most prevalent hazards in South Africa and include fires, floods, drought, windstorms and snow. Recent partnerships with strategic entities with intrinsic hazard and risk knowledge has resulted in NDMC producing a more scientific and relevant national product.

Many hazards in South Africa are weather related and it is important to note that viewing the hazard profiles should be done in conjunction with the included 3 month weather forecasts (Sourced and consulted on with the South African Weather Services (SAWS)) as conditions may directly impact the prevalence of the hazard (the seasonal hazard profile is static and does not include dynamic weather variability).

The envisioned audience for the seasonal profile include all national, provincial, district and municipal disaster management stakeholders involved with medium term planning and disaster operations.

The release dates for this product will be aligned with the South African seasonal calendar with the following time frames:

a) End November for Summer (December, January and February)
b) End February for Autumn (March, April, May)
c) End May for Winter (June, July, August)
d) End August for Spring (September, October, November)

Cautionary Note: *It is important to note that the product primarily illustrates a national view and should not be used to obtain what may be perceived to be "exact" parameter values at very specific localities. Often when spatial detail is presented on a map, values are derived by means of simulation models and often smoothing of local effects and dampening of outlier values occur. Values at a specific point should thus be viewed in relative rather than absolute terms.*

2. SEASONAL HAZARD PROFILE – AUTUMN 2024

The specific goals of the seasonal profiles are to:

(a) Provide insights into the spatial and temporal nature of hazards throughout South Africa
(b) Create awareness around potential and current conditions (situational awareness) in order to augment short –term early warning systems.
(c) Guide medium term operational and tactical planning in order to mitigate identified risk.
(d) Assist in identifying possible areas where disaster risk reduction (DRR) initiatives, to minimize risk, may be targeted.

2.1 Hazard Profiles

2.1.1 Fire

Fires are one of South Africa's most devastating hazards that cause loss of lives and incur billions of rands in damage to agriculture and infrastructure. Fires in South Africa have a strong seasonal nature with the summer fire season in the western parts of the country generally moving towards the eastern provinces in winter and spring.

The indicative hazard profile in South Africa takes into account the historical spatial distribution of fire observations, burn scars, fire danger ratings, the veldfire ecology, and recorded fire related deaths. These outline the characteristics of the hazard as it relates to the hazard components of likelihood, frequency, predictability and magnitude.

The autumn fire hazard profile indicates continuing fire hazard escalation (Orange and Brown) post summer for **south-western** parts of South Africa.

High fire hazard ratings areas include parts of the **Western Cape**, such as the City of Cape Town Metropolitan, West Coast, Cape Winelands and the Overberg district municipalities. Fire hazard intensification is expected over these areas until the first widespread autumn / winter rains occur.

Similarly, elevated fire hazard scores are noted over the Highveld, particularly in **Gauteng**. An above normal amount of biomass over the summer rainfall region, attributed to favourable rainfall conditions during the 2023/24 summer, may contribute to fire susceptibility.

Excessive dry biomass (Figure 6), high maximum temperatures (Figure 10) and elevated wind hazard ratings (Figure 3) may contribute to an enhanced fire hazard during the coming season.

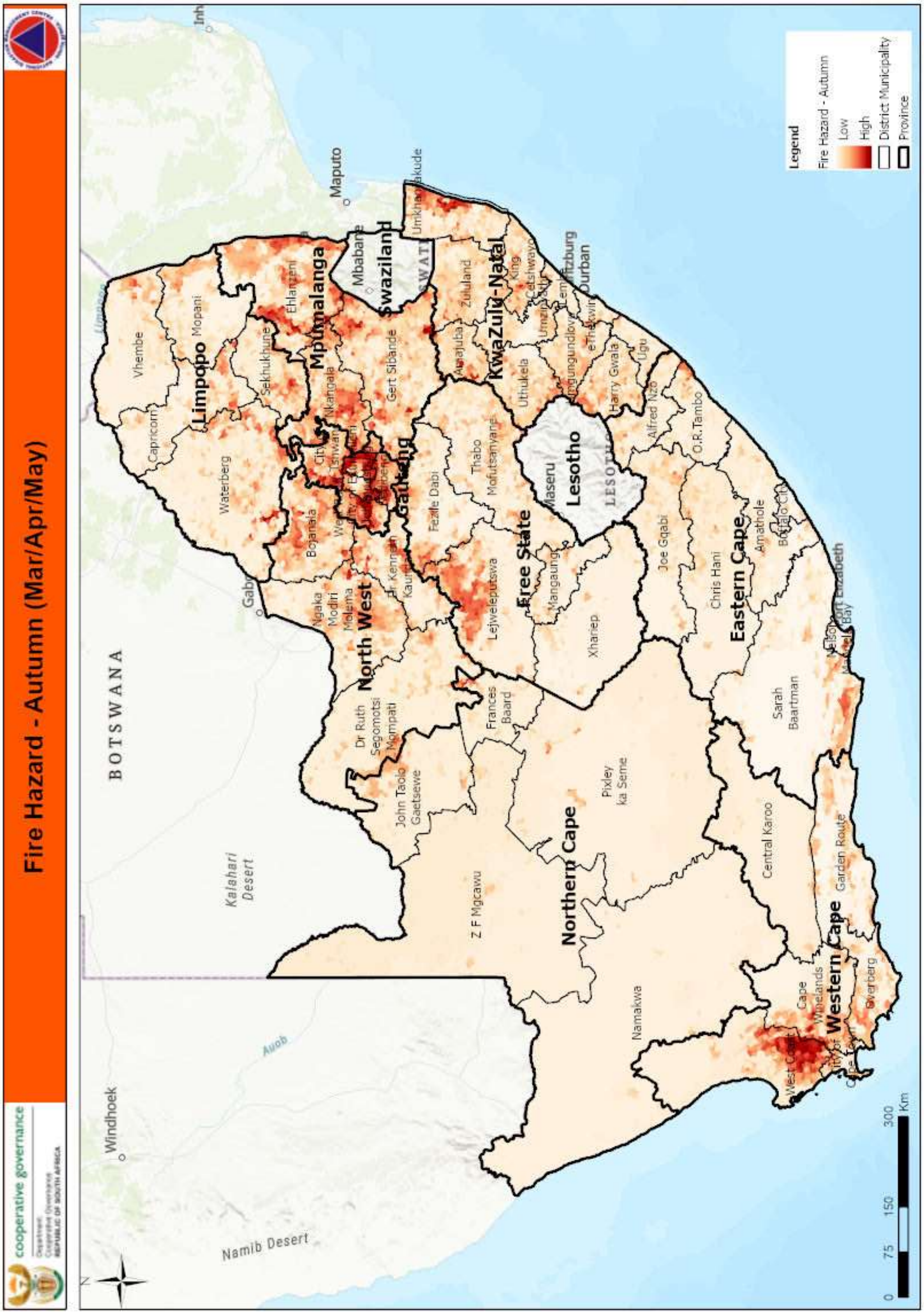


Figure 1: Fire hazard map – autumn

2.1.2 Flood

The historical hazard profile for South Africa derived from the EMDAT, CAELUM (SAWS database) and situation reports submitted to the NDMC, rates flooding events the highest in terms of frequency in South Africa. Flooding in South Africa consists of riverine and flash flooding events. The desktop analysis from the indicative risk profile outlines various hazard parameters related to likelihood, frequency, magnitude and predictability using various studies (Land capability by ARC:2002, South African Atlas of Agro hydrology and Climatology by UKZN: 2001) and data sources (historical events) in a weighted scoring model.

Eastern parts of South Africa illustrate Flood hazard elevations (darker Blue) during the autumn period.

Northern- (UMkhanyakude, UThungulu and UThukela) and coastal (iLembe and EThekwini) areas in **KwaZulu-Natal** are implicated. Similarly, elevated values are observed over parts of the **Eastern Cape** (Buffalo City Metro, Alfred Nzo, Amatole, O.R Tambo and Chris Hani district municipalities). Finally, areas with elevated values in the **Western Cape** (Cape Winelands, Overberg) are also noteworthy.

A higher likelihood of below normal precipitation (Brown) for greater parts of the country is eluded to by SAWS (Figure 8). Contrary to the above are minor eastern parts (**KwaZulu-Natal, Eastern Cape**) that indicate a higher likelihood of above normal precipitation (Green). These areas may experience flood hazard escalation and prospects of localised flooding.

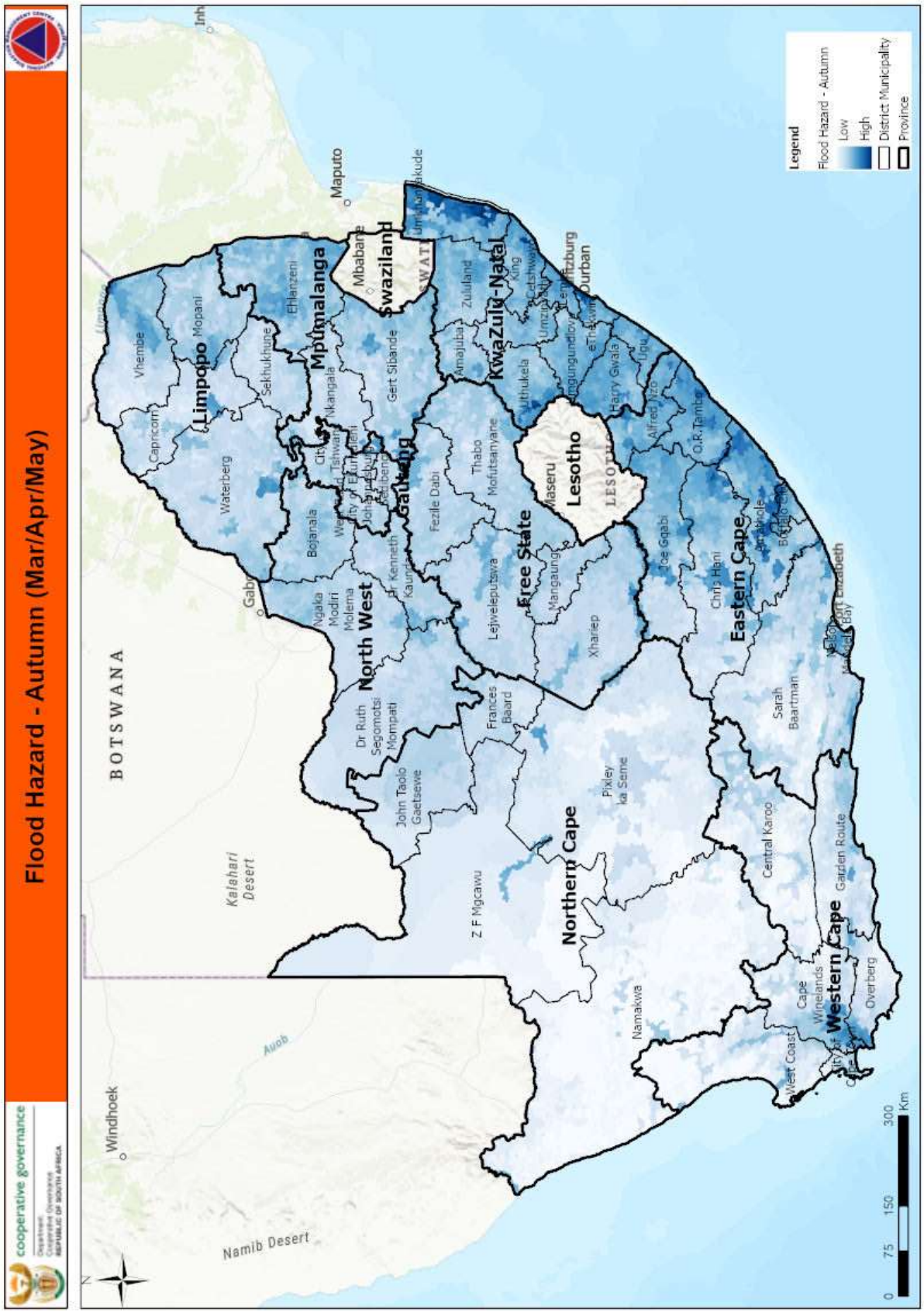


Figure 2: Flood hazard map - autumn

2.1.3.1 Cut-Off Low

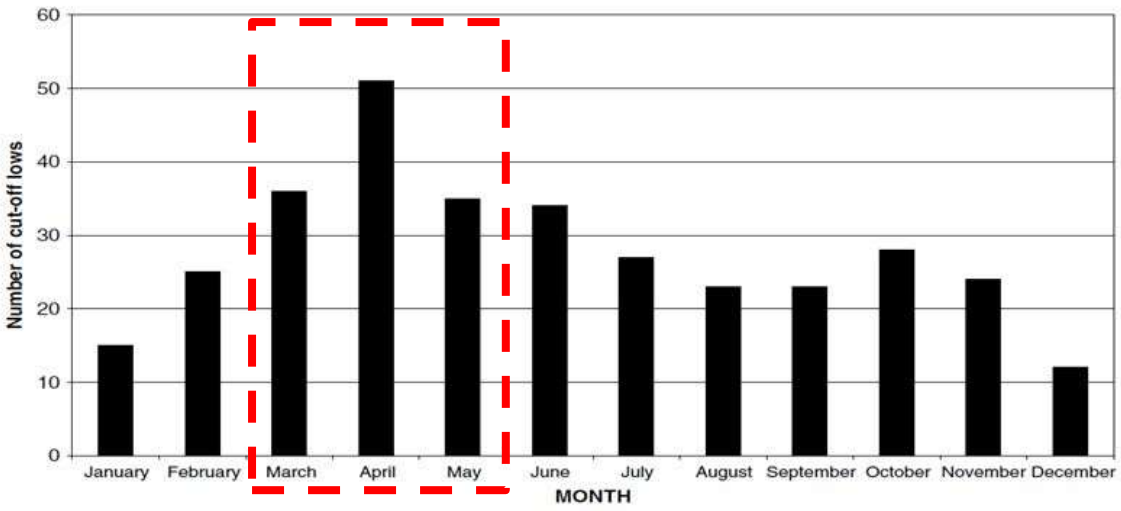
"A Cut-Off Low is a low pressure system that develops south of South Africa, stemming from the main westerly trough systems of cold air. Cut-Off Low's are unstable, baroclinic systems that slope to the west with height and are associated with strong convergence and upward motion, particularly while they are deepening.

A Cut-Off Low's system usually prevails over an area for more than a day, and can last up to 6 days. The Cut-Off Low moves slowly over a confined region leading to heavy rainfall.

Parameter	Description
Precipitation	• Heavy rainfall; exceeding 50mm at a given station over a 24 hour period. • Snowfall
Temperature	• Very cold conditions, maximum temperatures of 10° C or below
Wind (incl. gusts)	• Gale force winds exceeding 17m/s
Other relevant information	• Very rough seas, total sea in excess of 4-6m.

Table 1: Cut Off Low Parameters and Descriptions

The graph below shows the Cut-Off Low's are most frequent during the autumn season in South Africa (March, April and May), with the highest frequency during April. Severe weather conditions are associated with the least frequency of Cut-Off Low systems whereas the low winds in the upper air and dry conditions in the lower troposphere are associated with the highest frequency of the system. But nevertheless, states that one out of ten Cut-Off Low's produces severe conditions and leads to flash flooding." (https://resources.eumetrain.org/satmanu/CM4SH/S_Africa/COL/index.htm)



Graph 1: Cut-Off Low Temporal Distribution

2.1.4 Windstorm

Wind related hazards rates third on the historical data obtained by the NDMC in terms of frequency of weather related events. Wind hazards are defined in terms of the wind speed or the origin of the strong wind, e.g. tornadoes, tropical cyclones and thunderstorms. In terms of wind speed, the definition or threshold of a wind hazard is dependent of the socio-economic sector it relates to (SAWS: 2013).

The windstorm hazard relates to parameters such as likelihood, frequency, magnitude and predictability using similar methodology outlined (weighted scoring GIS modelling) in previous hazard assessments related to fire, flood and snow.

Dark Green and Blue-Green areas on the map (Figure 3) indicate higher windstorm hazard values observed in autumn over the **interior and southern parts** of the country.

Most of the western **Free State** illustrate medium to high values with high values in Lejweleputswa. In the **Eastern Cape** elevated values are observed in Nelson Mandela Metro, large areas in O.R. Tambo, southern Sarah Baartman and western parts of Chris Hani District municipality. Minor areas of western **KwaZulu-Natal** also show elevated values (Uthukela).

Similarly, parts of the **Northern** (Pixley ka Seme, southern Francis Baard) **and Western Cape** (City of Cape Town Metropolitan, Central Karoo, Overberg and Cape Winelands) demonstrate elevated values as well.

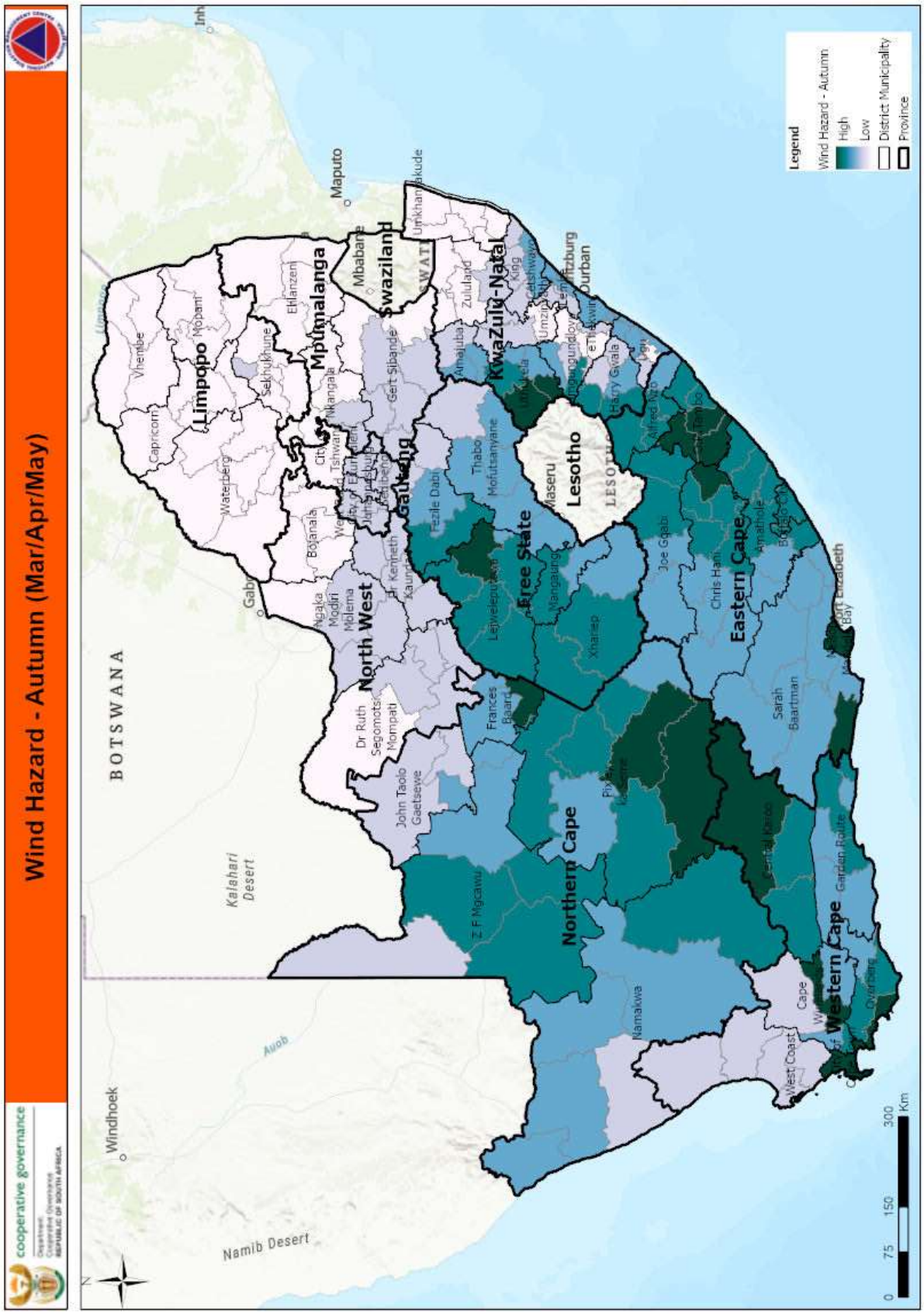


Figure 3: Windstorm hazard map – autumn

2.1.4 Snow

In 2015/16, snow hazard calculations were done as a joint partnership between the NDMC and the Council for Scientific and Industrial Research (CSIR). Parameters quantified for this hazard included: likelihood, frequency, magnitude and predictability using a weighted scoring GIS model with a seasonal component. Historical datasets obtained from SAWS and optical remote sensing techniques were applied in the process.

Figure 4 indicates low (Green) and low to medium (Lime Green) snow hazard values that dominate across South Africa; Joe Gqabi district municipality in the **Eastern Cape** being the only exception, indicating medium (Yellow) snow hazard ratings for the autumn timeframe.

The South African Weather Services (SAWS) has forecasted higher likelihood of above normal minimum temperatures countrywide (Figure 9). This may aid in mitigating snow manifestation in the coming months.

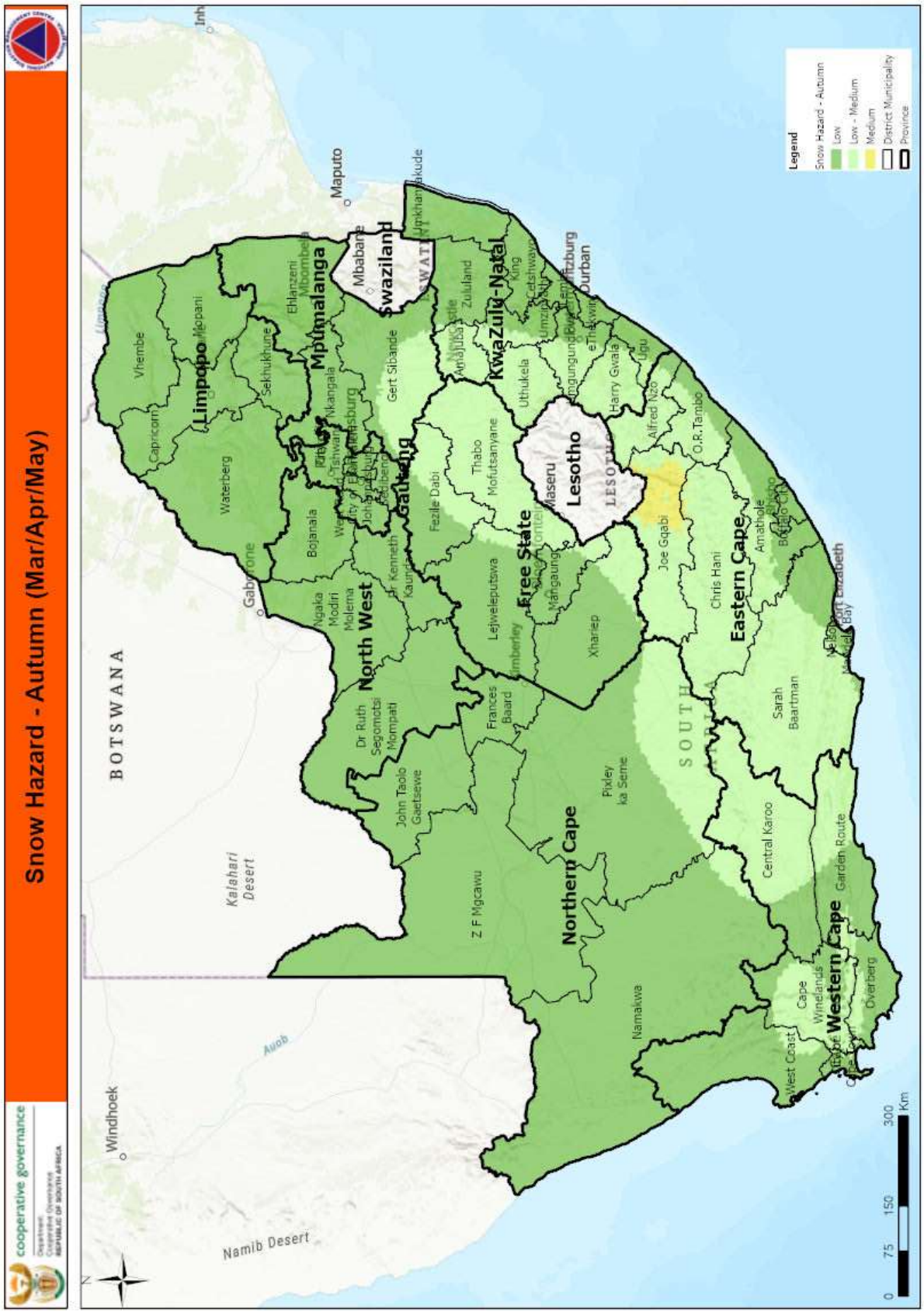


Figure 4: Snow hazard map – autumn

2.1.5 Current Drought Status

A drought is usually identified when a shortage of water (surface/underground) over a long period (in excess of 24 months) results in a negative impact. Drought can be detected and characterized using the Standard Precipitation Index (SPI – McKee et al., 1993). The SPI was developed to monitor the occurrence of drought from rainfall data. The index quantifies precipitation deficits on different time scales and therefore also drought severity. The ARC-ISCW calculates the SPI at various time scales per quaternary catchment. (Malherbe et al. 2016).

Drought extent until the end of January 2024 (Figure 5) remains fairly limited over the **interior** following three wet summers and above-normal rainfall during December 2023 and early January 2024.

There are isolated areas of moderate drought developing over the northeastern parts of the country. The **southwestern** to **southern** parts of the country are **still wet** in the medium term, but relatively **dry** over large parts in the short term (since August 2023).

Large parts of the **central to south-eastern interior** still experience **extremely wet conditions** at the longer term according to the SPI.

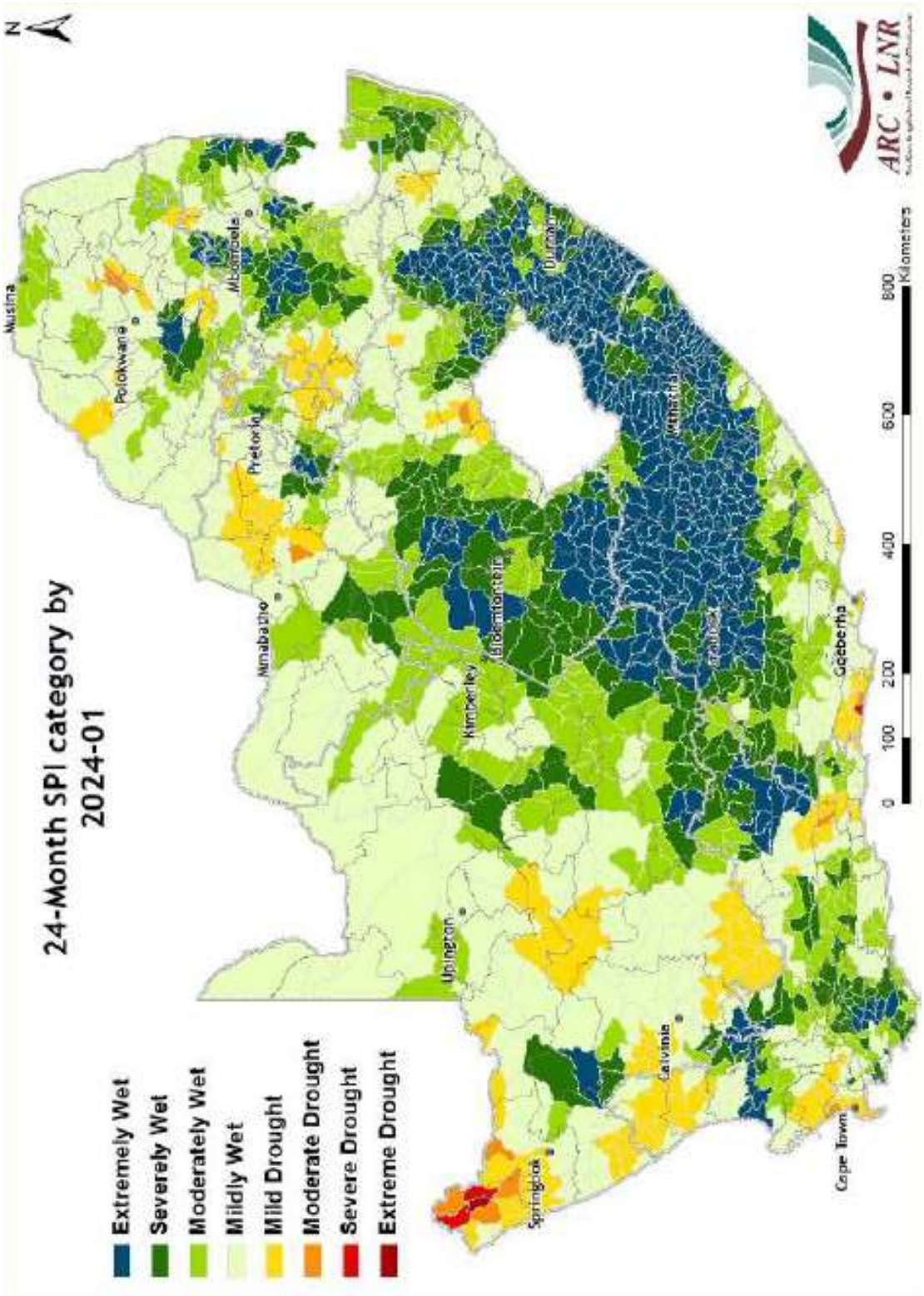


Figure 5: Drought Status Map – January 2024

The Percentage of Average Seasonal Greenness (PASG) (Figure 6) demonstrates deviations from the long-term average vegetation activity over a given timeframe. From the legend provided vegetation activity is categorized from presenting well above average (in green) to areas showing potential drought (orange) and drought conditions (red).

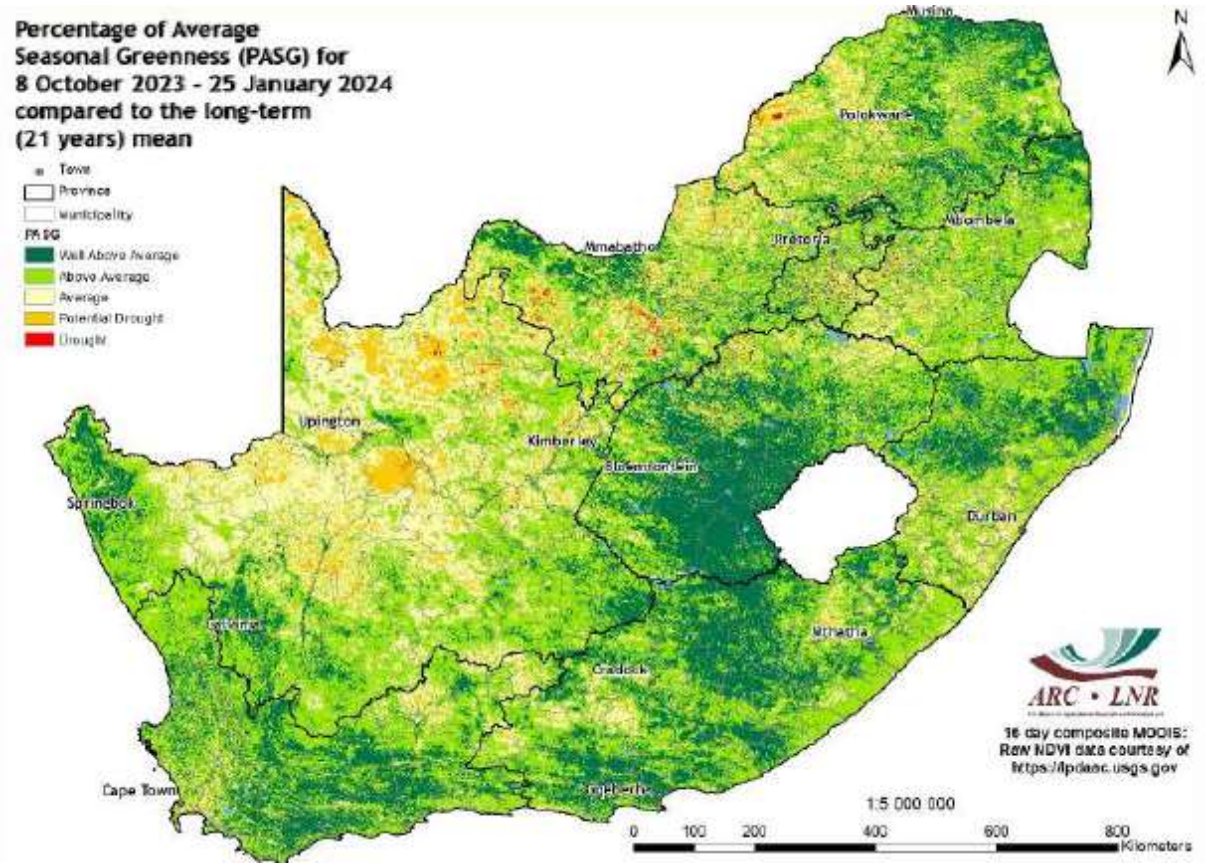


Figure 6: Percentage of Average Greenness (PASG) – 8 October - 25 January 2024

Most parts of the country experience above-normal cumulative vegetation activity. Areas in the Northern parts of the country including the **Northwestern parts of Limpopo**, **central to western parts of North West** and the **northern parts of the Northern Cape** experience potential drought according to cumulative vegetation activity ending late January.

2.1.6 Tropical Cyclones

“The 2023-2024 cyclone season is expected to be characterized by below-normal activity across the cyclone basin of the South-West Indian Ocean. It is estimated that between 5 and 8 systems (storms and cyclones) (normal at 10), with 2 to 4 (normal at 5) of them reaching tropical cyclone stage could develop. “(MeteoFrance: November 2023)

Figure 7 indicates that it is estimated that there is a 70% probability of experiencing activity below normal, a probability of 20% for cyclone activity to be close to normal and a probability of only 10% for activity is higher than normal.

The second part of the Tropical Cyclone season, which is measured between January and April 2024, indicates reduced activity in the Mozambique Channel, near normal or above normal west of Madagaskar and near normal to below normal activity further east.

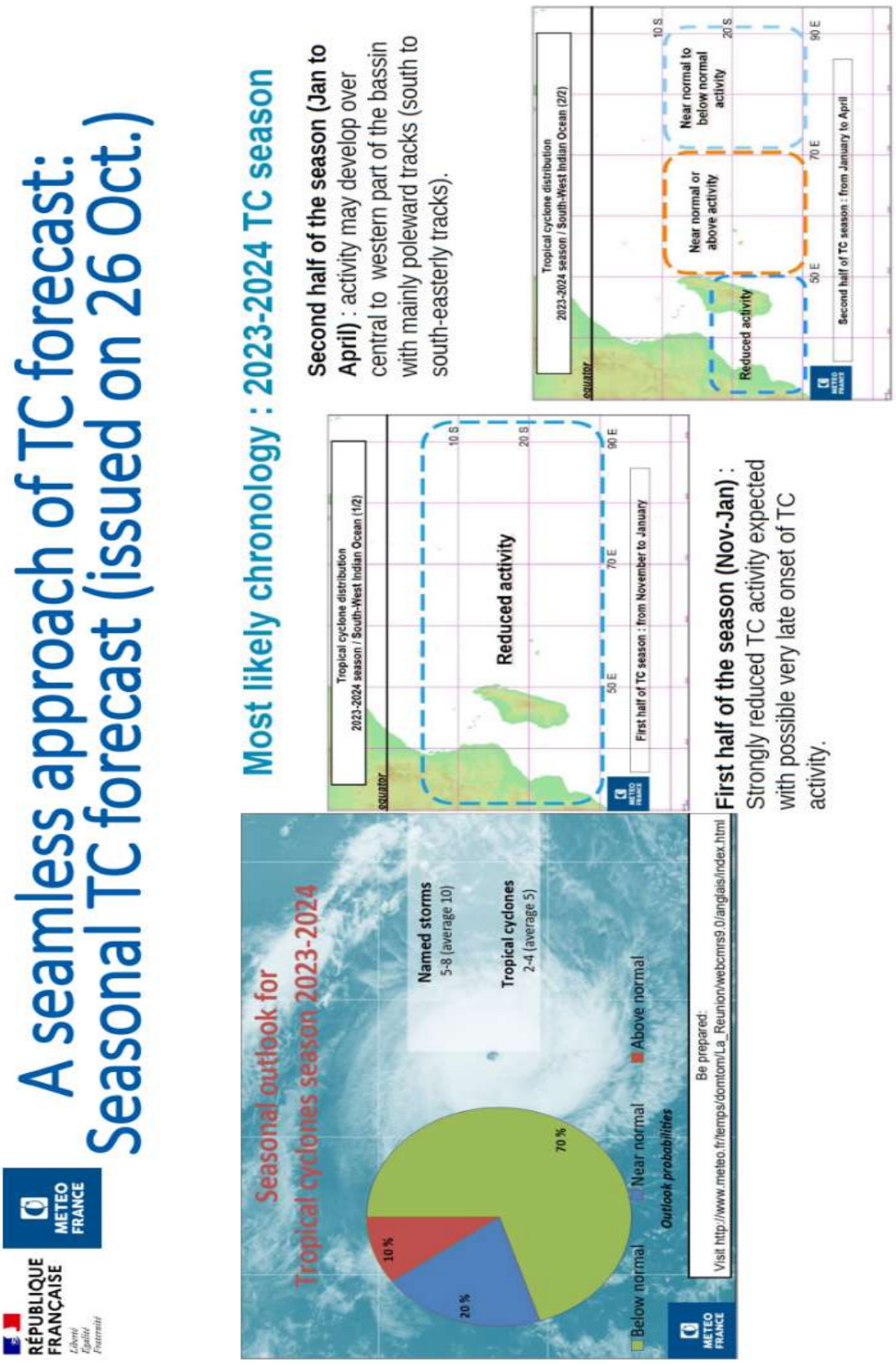


Figure 7: Seasonal Outlook for Tropical Cyclones 2023/24 (MeteoFrance: Oct'23)

2.2 Seasonal Weather Forecasts

The seasonal forecasts are sourced from the South African Weather Services (SAWS) and aim to add greater context to the hazard profiles already discussed. For more information around the Seasonal Climate Watch product and services please contact:

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Website: www.weathersa.co.za

2.2.1 Overview

“The El Niño-Southern Oscillation (ENSO) is currently in a strong El Niño state. This El Niño event is expected to persist through the 2024 autumn, whereafter it is predicted to weaken with ENSO neutral conditions by the coming winter. ENSO’s typical impact on Southern Africa is in favour for generally drier and warmer conditions during the summer seasons. However, as the summer nears its end, so does the typical impact of ENSO on South Africa, thus its effect is only expected to last for the remaining summer months.

We are now nearing the transition from summer to autumn. This is also the time of the year when the occurrence of cut-off low weather systems (from Marth to May) climatologically have the highest frequency of occurrence. These systems typical have the largest impact along the southern to southeastern coastal areas. It is therefore strongly recommended that the short-term weather forecasts of SAWS are routinely consulted in addition to the seasonal forecast.

The SAWS will continue to monitor the weather and climate conditions and provide updates on any future assessments that may provide more clarity on the current expectations for the coming season.” (Seasonal Climate Watch, SAWS: March 2024)

2.2.3 Rainfall

“The South African Weather Service (SAWS) multi-model rainfall forecast indicates mostly below-normal rainfall over most of the country during Mar-Apr-May (MAM), Apr-May-Jun (AMJ) and May-Jun-Jul (MJJ), with the exception of some parts over KwaZulu-Natal and the Eastern Cape for MAM where abovenormal rainfall is expected.” (Seasonal Climate Watch, SAWS: March 2024)

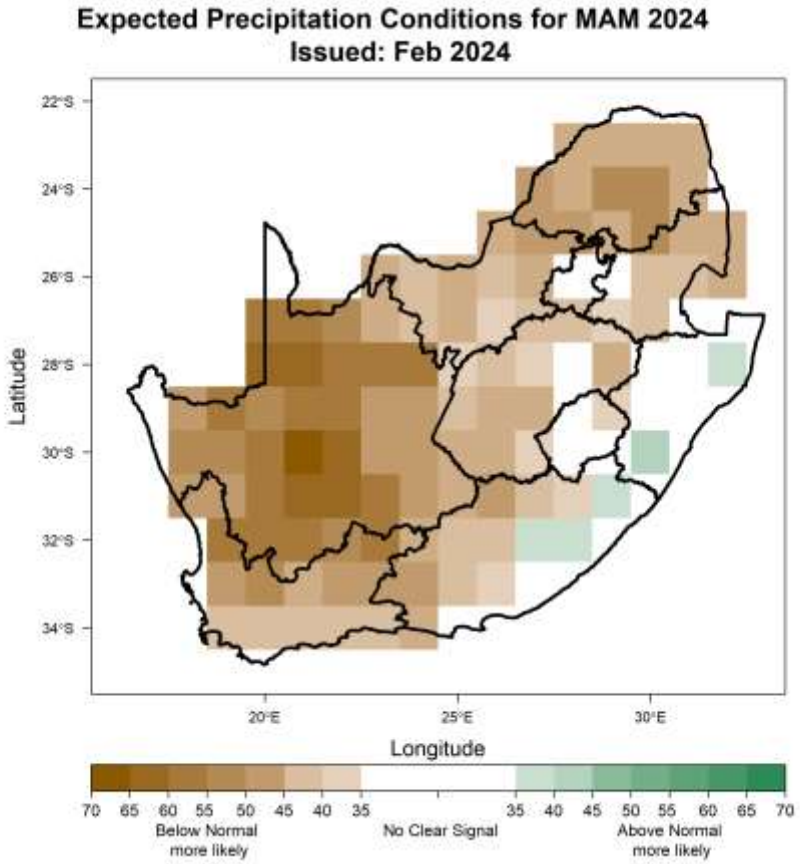

Figure 7: Rainfall - autumn 2024 (March / April / May (MAM)).

2.2.4 Minimum and Maximum Temperatures

“Minimum and maximum temperatures are expected to be mostly above-normal countrywide for the forecast period.” (Seasonal Climate Watch, SAWS: March 2024)

2.2.4.1 Minimum Temperatures

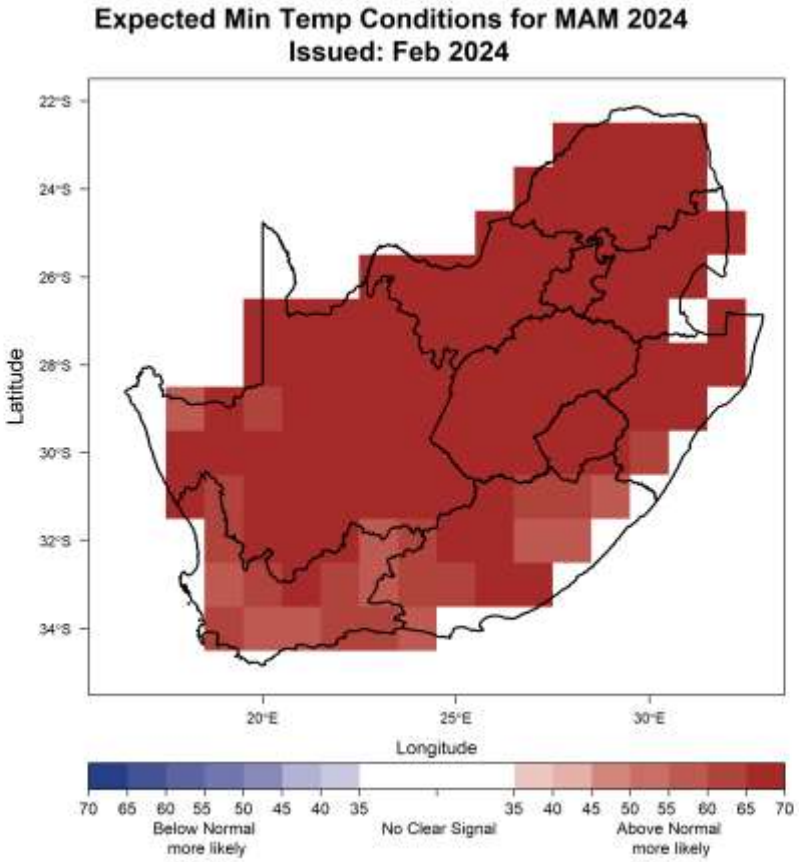

Figure 8: Minimum Temperatures - autumn 2024 (March / April / May (MAM)).

2.2.4.2 Maximum Temperatures

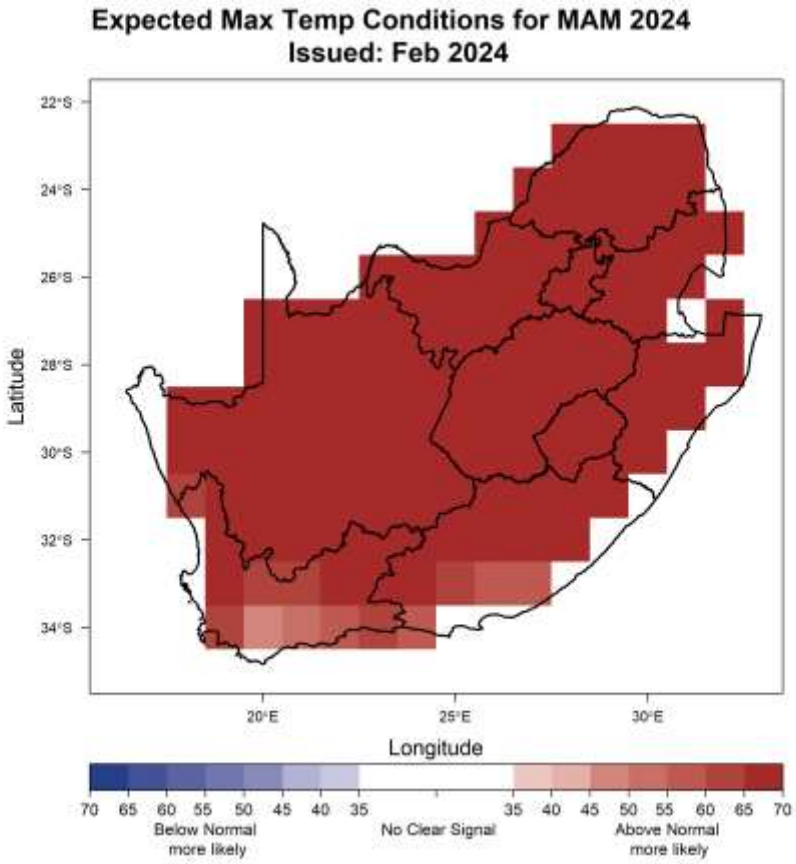

Figure 9: Maximum Temperatures - autumn 2024 (March / April / May (MAM)).

3. RECOMMENDATIONS

It is recommended that Disaster Management entities and stakeholders note the content of the seasonal hazard profile for autumn 2024 and note the commentary made by the SA Weather Services and contributing stakeholders.

4. APPENDICES

None

5. References

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