MINISTRY OF NATURAL RESOURCES

Department of Climate Change & Meteorological Services

STATE OF MALAWI CLIMATE

2025

The State of Malawi Climate in 2025

Department of Climate Change and Meteorological Services (DCCMS)

March, 2026

Foreword

The year 2025 marks a critical point in Malawi's climate trajectory, characterized by heightened variability and an increasing frequency of extreme weather events. From erratic rainfall patterns and prolonged dry spells to destructive floods and emerging heatwave conditions, the country has faced significant challenges that have tested both institutional preparedness and community resilience.

This report, *The State of Malawi Climate in 2025*, provides a comprehensive and evidence-based assessment of the prevailing climate conditions, their drivers, and the resulting socio-economic impacts. It serves as an important national reference, highlighting the growing complexity of climate risks and the urgent need for strengthened climate services and coordinated response mechanisms.

The findings underscore the far-reaching implications of climate variability on key sectors of the economy, particularly agriculture, water resources, energy, infrastructure, and public health. The delayed onset of rains, uneven spatial and temporal distribution of rainfall, and the occurrence of extreme events such as Tropical Cyclone Jude and widespread flooding have had profound consequences on livelihoods and national development. These realities call for a paradigm shift toward proactive, impact-based forecasting and anticipatory action.

As a Government, we remain committed to enhancing climate resilience through strategic investments in early warning systems that effectively support agriculture, resilient infrastructure, and integrated water resource management. Strengthening collaboration among government institutions, development partners, academia, and local communities will be essential in addressing the escalating risks associated with climate change.

I commend the Department of Climate Change and Meteorological Services (DCCMS) for its continued dedication to providing timely and reliable climate information. The insights presented in this report will be instrumental in guiding policy formulation, planning, and decision-making processes at all levels.

It is my expectation that this publication will serve as a vital resource for all stakeholders working towards building a climate-resilient Malawi.

Richard Perekamoyo

Principal Secretary for Natural Resources

Preface

The *State of Malawi Climate in 2025* report has been prepared to provide a detailed and authoritative account of the country's weather and climate conditions during the 2024/2025 rainfall season and the broader 2025 calendar year. This publication reflects the mandate of the Department of Climate Change and Meteorological Services (DCCMS) to monitor climate variability, analyze emerging trends, and support informed decision-making through the provision of accurate and timely climate information.

The report presents an integrated analysis of observed climatic conditions, including rainfall and temperature patterns, extreme weather events, and their socio-economic impacts. It further examines key large-scale and regional climate drivers such as sea surface temperature variability, the El Niño–Southern Oscillation (ENSO), the Indian Ocean Dipole (IOD), and the Madden–Julian Oscillation (MJO), and their influence on Malawi's climate system.

The 2024/2025 season was marked by significant variability, including a delayed onset of rains, mid-season dry spells, and episodes of intense rainfall that triggered flooding in several parts of the country. These conditions had notable implications for agriculture, water resources, infrastructure, and food security. Additionally, emerging hazards such as heatwaves and persistent threats like lightning highlight the evolving nature of climate risks in Malawi.

This report is the result of a collaborative effort by a dedicated team of professionals within DCCMS, supported by contributions from partner institutions. Their expertise in data collection, analysis, and interpretation has ensured the production of a high-quality and credible document.

The Department remains committed to strengthening climate services, enhancing early warning systems, and promoting the use of climate information across all sectors. As climate variability and change continue to intensify, the importance of accessible, reliable, and actionable climate information cannot be overstated.

It is my sincere hope that this report will support policymakers, practitioners, researchers, and the general public in understanding climate risks and in taking informed actions to build resilience and safeguard livelihoods.

Lucy Mtilatila, PhD

Director for Climate Change and Meteorological Services (DCCMS)

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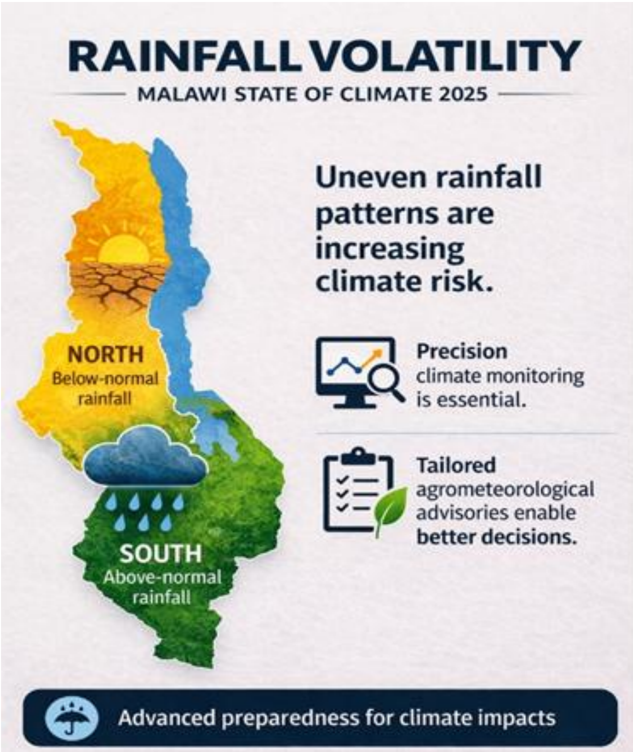
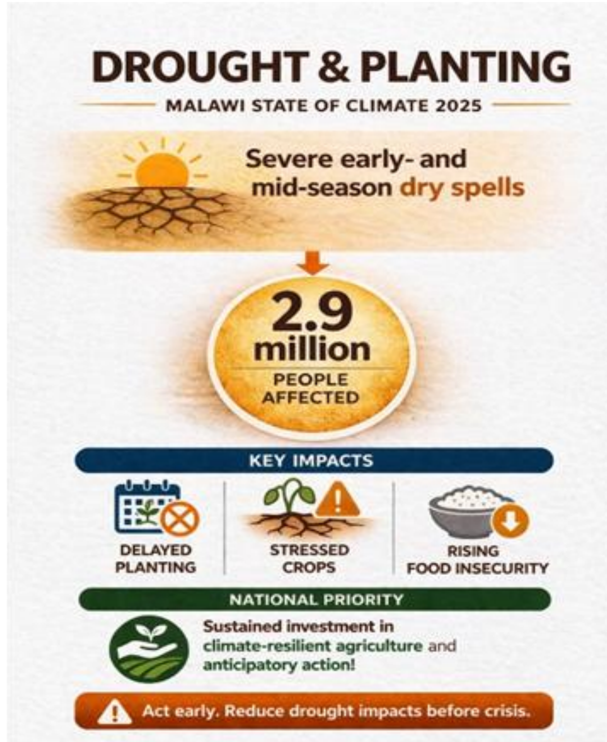
Abbreviations

ADD	Agricultural Development Division
APES	Agricultural Production Estimates Survey
CAB	Congo Air Boundary
CAP	Common Alerting Protocol
COSMO	Consortium for Small-scale Modelling
DCCMS	Department of Climate Change and Meteorological Services
DMI	Dipole Mode Index
DoDMA	Department of Disaster Management Affairs
DJF	December, January, February
EWS	Early Warning System
ENSO	El Niño
FHHs	Farm Households
ICP/IPC	Integrated Food Security Phase Classification
IOD	Indian Ocean Dipole
ITCZ	Intertropical Convergence Zone
JFM	January, February, March
MANA	Malawi News Agency
MJO	Madden–Julian Oscillation
MVAC	Malawi Vulnerability Assessment Committee
NOAA	National Oceanic and Atmospheric Administration

OND	October, November, December
PRISM	Platform for Real-time Impact and Situation Monitoring
SPEI	Standardized Precipitation Evapotranspiration Index
SPI	Standardized Precipitation Index
SSTs	Sea Surface Temperatures
SWIO	South-West Indian Ocean
TA	Traditional Authority
Tmax	Maximum Temperature
Tmean	Mean Temperature
Tmin	Minimum Temperature
UNICEF	United Nations Children's Fund
WFP	World Food Programme

Key Messages






LIGHTNING HAZARDS
MALAWI STATE OF CLIMATE 2025
Lightning remains a major recurrent hazard
26 of 39
RAIN-RELATED DEATHS
KEY IMPACTS
High fatality risk
Unsafe public spaces (schools, homes)
Frequent storm exposure
Urgent action on early warning, public awareness, and risk reduction measures is vital to save lives.


SOCIO-ECONOMIC IMPACT
MALAWI STATE OF CLIMATE 2025
Climate shocks are disrupting livelihoods and essential services
24,643
households affected
KEY IMPACTS
Household vulnerability
Livelihood disruption
Service interruptions
Scale impact-based forecasting and strengthen multi-sectoral recovery support.


ANTICIPATORY ACTION
MALAWI STATE OF CLIMATE 2025
CAP ALERT
EARLY ACTION
NATIONWIDE CAP ALERTS ISSUED
demonstrated the value of proactive preparedness.
PILOT DROUGHT-SPECIFIC ANTICIPATORY ACTION TRIGGERS
5 DISTRICTS
KEY STRATEGIES
Targeted drought-prone districts
Early warnings for early action
Pre-positioned support before crisis
Advance anticipatory action to reduce losses and protect vulnerable communities.


LAKE LEVEL PRESSURES
MALAWI STATE OF CLIMATE 2025
475.86 masl
Lake level peak recorded
KEY IMPACTS
Disrupted agriculture
Impacted tourism
Flooding in lakeshore areas
Addressing these impacts requires integrated water resource management, and strategic relocation from flood-prone zones.

Chapter one

1.0. Background Information

Malawi is a landlocked country located in southern Africa, situated between latitudes 9°S and 17°S and longitudes 32°E and 36°E. It shares international boundaries with Tanzania to the north and northeast, Mozambique to the east, south, and southwest, and Zambia to the west.

The country has a total land area of approximately 118,484 km². A defining geographical feature of Malawi is Lake Malawi, which occupies roughly one-fifth of the national territory. The lake extends longitudinally from north to south within the Great Rift Valley and covers an estimated surface area of 29,600 km². It is the third-largest lake in Africa and ranks as the ninth-largest lake globally (Haghtalab et al., 2019). The Shire River, the only outlet of Lake Malawi, flows southwards before joining the Zambezi River.

The country landscape is highly varied, ranging from the low-lying Shire Valley in the south, where elevations fall to below 100 m above sea level, to upland plateaus and mountainous regions. The Mulanje Massif in the south rises sharply to about 3,000 m above sea level at Sapitwa Peak.

Malawi has an estimated population of approximately 21 million people. The economy largely depends on agriculture, with over 80% of the population engaged in agriculture, making it highly susceptible to external shocks, particularly those related to climate variability and extremes. (World Bank, 2023).

1.1 Climatic Conditions

1.1.1 Temperature and Rainfall Patterns

The country has a subtropical climate with a distinct wet season from October to April and a dry season from May to September. Rainfall is mainly influenced by the Intertropical Convergence Zone (ITCZ), tropical cyclones, the Congo air mass, easterly waves, and the Convergence Ahead of Pressure Surge system (Jury and Mwafulirwa, 2002). These drivers, together with complex topography such as mountain ranges and Lake Malawi, result in significant spatial and temporal variability in precipitation.

Most rainfall (about 95% of the annual total) occurs during the wet season, particularly between November and April, with peaks in January and February (Ngongondo et al., 2011). Annual rainfall ranges from 700 mm in lowland areas to about 2,500 mm in highland regions. Monthly precipitation during the rainy season can exceed 200 mm, while temperatures typically average 26–28°C.The dry season is generally cooler and characterised by low rainfall, often below 20 mm per month (Mtilatila et al., 2022). During this period, a high-pressure system over the Indian Ocean drives cool, dry air inland (Ngongondo et al., 2011). Maximum temperatures range from 17°C to 27°C, while minimum temperatures fall between 4°C and 10°C. Although conditions are mostly dry, occasional light rain or drizzle may occur, particularly in high-altitude areas.

1.1.2 Extreme Weather Events

Malawi is prone to several climate-induced extremes, with the most common being floods, droughts, cyclones, dry spells, and heatwaves. Flooding frequently occurs during the rainy season, particularly in low-lying and flood-prone areas such as the Shire Valley, often following intense or prolonged rainfall and cyclones. Droughts and dry spells are also recurrent, resulting from prolonged periods of below-average precipitation, and they significantly affect agricultural production and water availability. In addition, Malawi is also frequently impacted by tropical cyclones originating from the Indian Ocean which can bring heavy rainfall and strong winds, resulting in widespread damage and loss. Heatwaves result in water stress, and exacerbate dehydration, respiratory and other existing health problems. Together, these hazards pose serious risks to livelihoods, infrastructure, and food security in the country.

Chapter Two

2.0. Major drivers of weather and climate events in Malawi

Malawi’s weather and climate are shaped by a complex interplay of local, regional and global factors, including the country’s diverse topography, the lake effect from Lake Malawi, variations in mean sea level pressure, surface and upper-level wind patterns and sea surface temperature dynamics across the tropical Pacific, Indian and Atlantic Oceans.

2.1 Observed Weather and Climate Drivers in 2025

Sea surface temperature variability across the tropical Pacific, Indian and Atlantic Oceans plays a key role in shaping Malawi’s weather and climate by driving large-scale circulation systems such as the El Niño–Southern Oscillation and the Indian Ocean Dipole. Additionally synoptic features including the Intertropical Convergence Zone and movement of regional air masses also regulate the weather patterns across the country.

2.1.1 The Sea Surface Temperatures (SSTs)

SST variations in the world's oceans are key drivers of global weather and climate, as they influence large-scale atmospheric circulation patterns. These temperature fluctuations play a critical role in shaping phenomena like the ENSO, the IOD and the Madden-Julian Oscillation (MJO). Changes in warming of sea surface temperatures (SST) are closely associated with shifts in rainfall patterns, either enhancing or reducing precipitation over Malawi.

2.1. 1. 1 El Niño and Southern oscillations (ENSO)

The El Niño-Southern Oscillation (ENSO) is a climate phenomenon characterised by three phases: El Niño, Neutral, and La Niña. El Niño is the warming of the ocean surface, leading to above-average Sea Surface

Temperatures (SSTs) in the central and eastern tropical Pacific Ocean. On the other hand, La Niña is the cooling phase, resulting in below-average SSTs in the same region. The Neutral phase signifies conditions that are neither El Niño nor La Niña, and it is mostly linked to SSTs in the Tropical Pacific Ocean that are close to average.

To categorize the ENSO phase, El Niño is declared when the average SST anomalies are greater than 0.5°C, La Niña when they are less than -0.5°C, and Neutral when the anomalies fall between -0.5 and 0.5°C. These thresholds help in identifying and characterizing the prevailing ENSO conditions.

During the 2024/2025 season, the El Niño–Southern Oscillation remained in a neutral phase throughout October and November (OND2024 in Figure 1), indicating limited large-scale atmospheric forcing over Malawi during the onset period. A transition to weak La Niña conditions occurred from late December through February (DJF2025 in Figure 1) before returning to neutral conditions toward the end of the season. While La Niña conditions are generally associated with enhanced rainfall over parts of southern Africa, the spatially inconsistent distribution of rainfall suggests that this signal was not dominant.

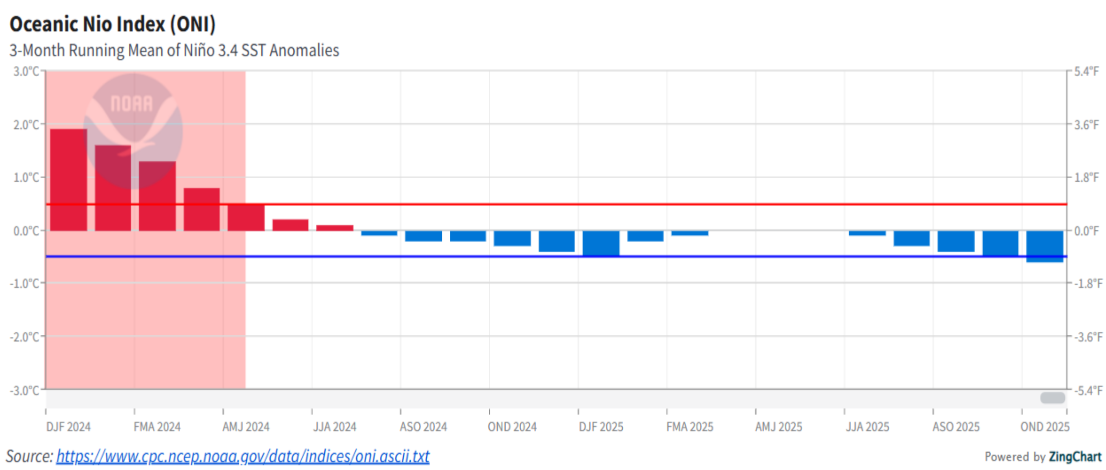


Figure 1: Observed Sea Surface Temperature anomaly for Nino 3.4 from DJF 2024 to OND 2025 (NOAA, 2026)

2.1.1.2 Indian Ocean Dipole (IOD)

The Indian Ocean Dipole (IOD) is a recognized ocean atmosphere coupled mode in the Indian Ocean that exerts a significant influence on the surrounding weather and climate events. This phenomenon is characterised by irregular oscillations of Sea Surface Temperature (SST) anomalies, wherein the western Indian Ocean alternately becomes warmer (positive phase) and then colder (negative phase) than the eastern part of the ocean. The IOD is considered negative when the Dipole Mode Index (DMI) is less than -0.4, and is positive when it is greater than +0.4, and Neutral when it falls between -0.4 and 0.4. These thresholds help in identifying and categorizing the different phases of IOD.

During the 2024/2025 season, Indian Ocean Dipole was in a positive phase from October to November before transitioning toward a negative phase from December onwards.

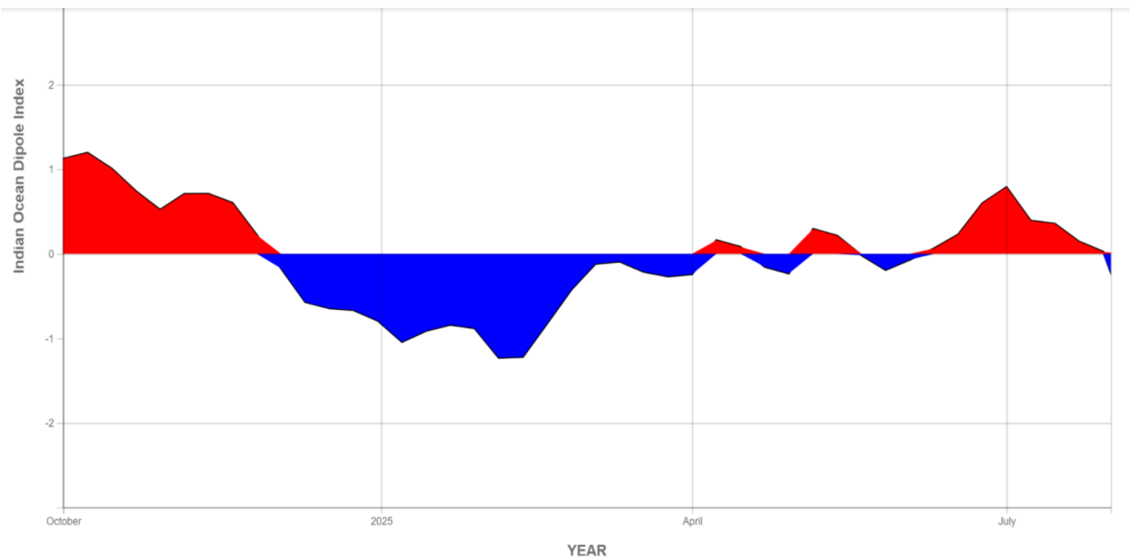


Figure 2: Observed Indian Ocean Dipole Index from October 2024 to August 2025 (NASA, 2026)

2.1.1.3 Madden-Julian Oscillation (MJO)

The Madden-Julian Oscillation (MJO) is a form of intra-seasonal atmospheric variability observed in tropical oceans. It can be characterized as an eastward propagating disturbance that spans approximately 30–90 days. The passage of an active phase of the MJO is associated with an increase in tropical disturbances, while the inactive phase tends to suppress such disturbances over a region. Although the MJO is defined in the tropics, its effects extend beyond, reaching both tropical and mid-latitude regions. In Southern Africa, the impacts of the MJO include alterations in the distribution of clouds, rainfall, and wind patterns. The MJO also plays a role in modulating monsoonal rains and enhancing the development of tropical cyclones in the region. Figure 3 illustrates the Madden–Julian Oscillation phase-space, highlighting phases 1 and 8 over the African region and phases 2 and 3 over the Indian Ocean. During January and March 2025, the MJO was notably active over the African region, while enhanced activity was also observed over the Indian Ocean in January (red) and March (blue), compared to weaker activity in February (green). This pattern indicates periods of enhanced large-scale convection, which can support the development of synoptic systems. In this context, MJO activity likely contributed to favourable conditions for the formation and intensification of Cyclone Jude, which indirectly influenced rainfall over Malawi in March, although its impacts were spatially variable and modulated by regional atmospheric conditions.

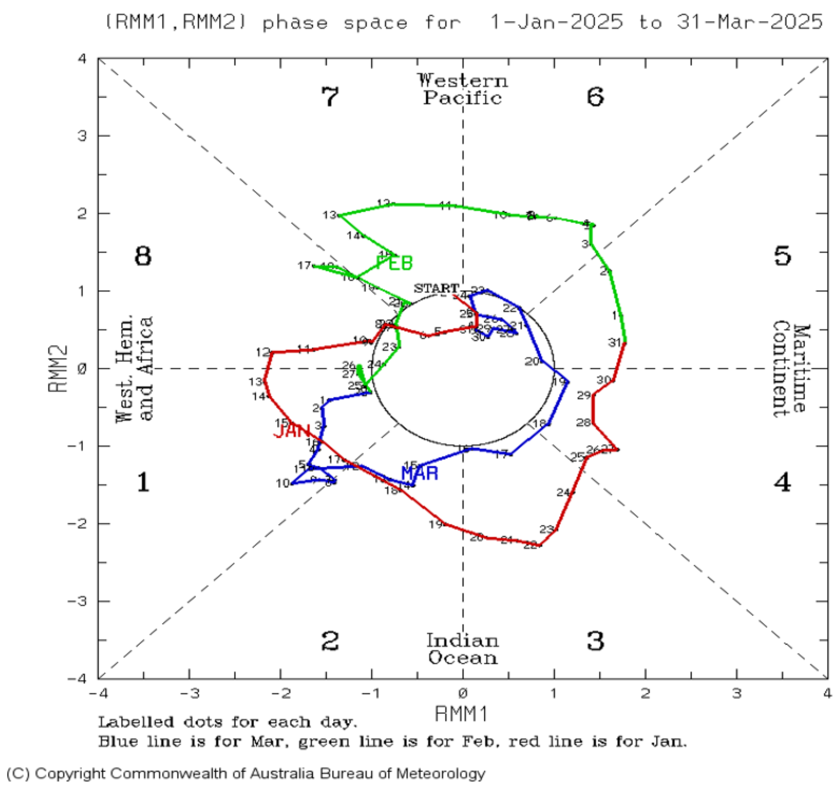


Figure 3: Observed Madden–Julian Oscillation (MJO) between January and March 2025

2.2 Observed Rain Bearing Systems and Wind Regimes

The commonly observed rain-bearing systems in Malawi include convergence ahead of a pressure rise, the Intertropical Convergence Zone (ITCZ), the Congo Air Mass, easterly waves and tropical cyclones.

During the winter season, Malawi experiences distinct weather patterns characterized by Mwera winds over Lake Malawi and widespread Chiperoni conditions, particularly over highland areas. Figure 4 summarizes the occurrence of these rain-bearing systems and wind regimes in terms of the number of days per month during the 2024/2025 season.

Analysis of the season indicates that two tropical cyclones influenced weather conditions over Malawi, contributing to episodic rainfall events. However, the overall frequency and influence of major synoptic systems were variable, with generally weak activity of the Congo air mass and delayed establishment of the ITCZ. The influence of the ITCZ was most pronounced in January compared to other months, as illustrated in the figure, although its overall contribution to seasonal rainfall probably remained limited due to its late onset and reduced persistence.

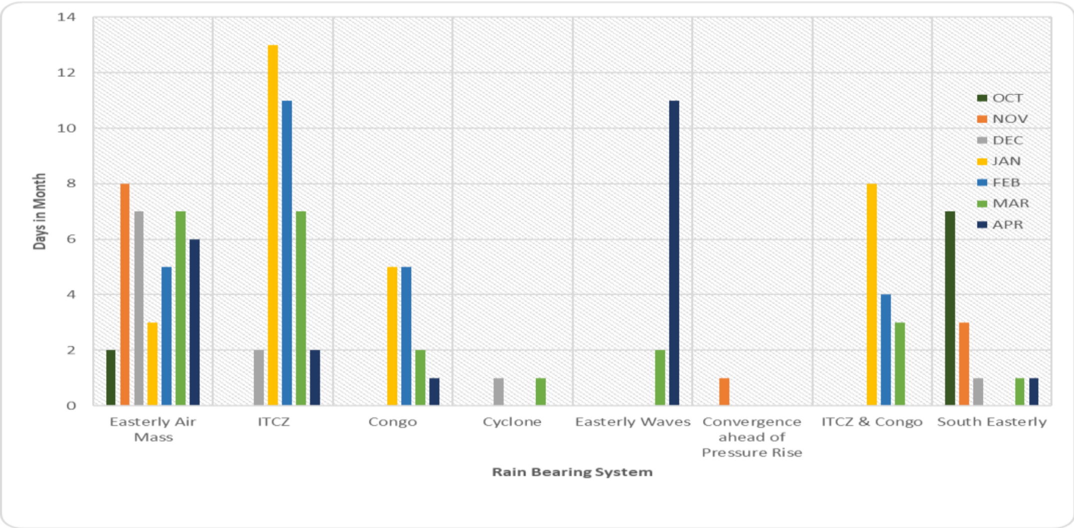


Figure 4: Observed rain bearing systems in the 2024/2025 Rainfall Season

2.2.1 Convergence ahead of pressure rise

The convergence ahead of a pressure surge occurs when a stronger southeasterly air mass converges with an easterly air mass. This phenomenon is most common at the onset of the rainfall season, typically in October and November. Both air masses usually originate from the southern hemisphere. The rainfall resulting from this convergence is often accompanied by lightning, hail and potentially damaging winds and gusts.

During the 2024/2025 season, this system was very rare with one occurrence in November, consistent with its typical role in influencing early season rainfall activity. The strong winds associated with this system caused significant damage, including the blowing off roofs in several areas..

2.2.2 Inter-tropical Convergence Zone (ITCZ)

During the 2024/2025 season, the Intertropical Convergence Zone (ITCZ) was established later than usual, contributing to a delayed onset of rainfall across Malawi. Initially, rainfall was limited, reflecting the weak and slow progression of the ITCZ during late December. In January, the ITCZ expanded, leading to a temporary period of more widespread rainfall across much of the country. By February, however, the ITCZ became confined over the Southern region, resulting in reduced rainfall and spatial variability in the Central and Northern region. During March, the ITCZ shifted northwards, concentrating rainfall in the northern part of the country. This northward displacement, combined with the weakening of other rain-bearing systems, led to a return of spatially inconsistent and variable rainfall patterns in the later months of the season, highlighting the uneven distribution of seasonal precipitation across Malawi.

2.2.3 Congo Air Mass

This refers to air masses originating from the Congo Basin, which are moisture-laden and contribute to rainfall in Malawi when they encounter topographical barriers or interact with other weather systems. The Congo air mass comprises westerly winds that originate from the Atlantic Ocean, traverse the tropical forests of the Congo Basin, and bring precipitation to Southern African countries, including Malawi. This air mass is characterized by intermittent thunderstorms and continuous rainfall covering a wide geographical area and lasting for extended periods. The surface convergence zone, where low-level westerlies from the Congo Basin meet easterlies from the Indian Ocean trade winds, is known as the Congo Air Boundary (CAB).

During the 2024/2025 season, the Congo air mass was notably suppressed. Its influence was confined to January and February, where it occurred in intermittent pulses rather than as a sustained system. This limited persistence likely reduced its contribution to continuous and widespread rainfall, in contrast to its typical role in supporting prolonged wet spells across the country.

2.2.4 Easterly Waves

The end of the rainfall season in Malawi is characterized by rains associated with easterly waves, which originate from the eastern regions of tropical oceans and move westward at speeds of 20 to 40 km/hr. These waves generate rainfall by disrupting the normal isobaric pressure patterns, producing a wave-like effect that enhances precipitation.

During the 2024/2025 season, easterly waves were predominant in the month of April which caused persistent isolated precipitation mainly in central and northern areas including along the lakeshore (as shown in Figure 4).

2.2.5 Tropical Cyclones

During the 2024/2025 season, cyclonic activity over the South-West Indian Ocean (SWIO) was near average, with 14 named storms developing between December and March. Notably, Cyclone Chido and Cyclone Jude influenced weather conditions over Malawi. Although neither system made direct landfall over the country, their impacts differed.

In December 2024, Chido was primarily associated with strong winds that affected several districts, with limited contribution to rainfall. In contrast, Jude, after making landfall in Mozambique in March, had a more pronounced impact, particularly over southern Malawi, where it brought heavy rainfall, strong winds, and localized flooding.

The rainfall impacts were observed during the period of Cyclone Jude, whose circulation enhanced moist easterly inflow and strengthened low-level convergence over the region. Its interaction with the Intertropical Convergence Zone further supported the development of organized convection, resulting in episodes of locally heavy rainfall, particularly over southern parts of the country.

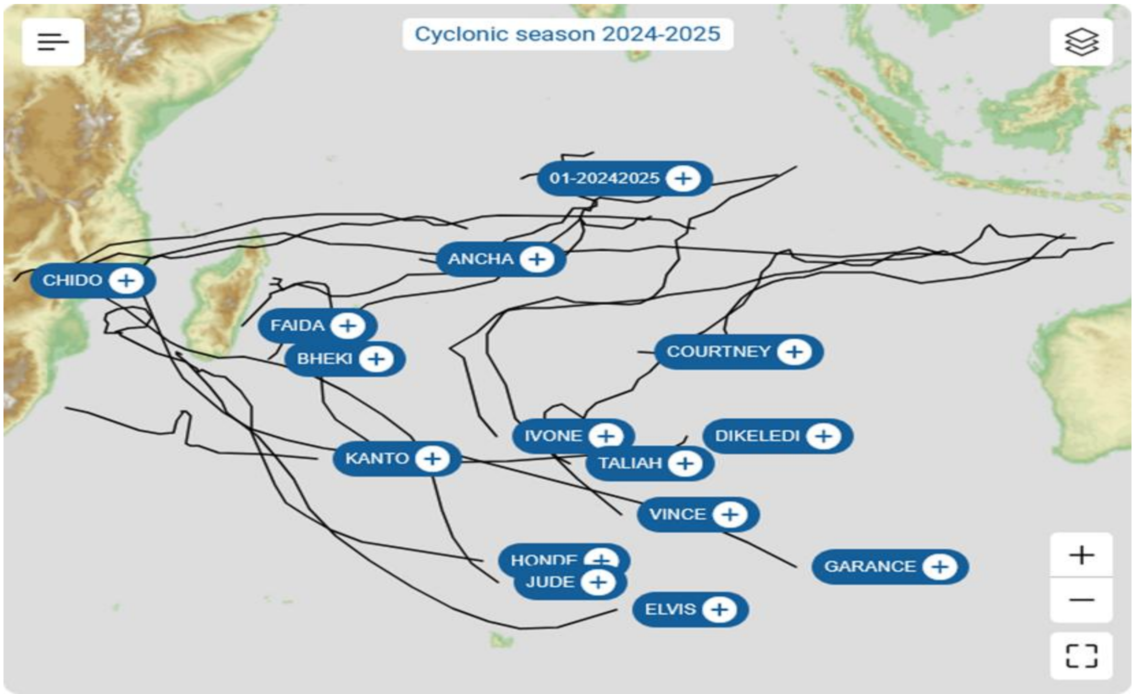


Figure 5: 2024/2025 cyclonic activities over the South-west Indian Ocean (SWIO) region. Source: https://meteofrance.re/fr/cyclone

Tropical Storm Jude that originated from a disturbance south of the Chagos Islands on 6 March 2026, intensified as it tracked westward across the southwest Indian Ocean. The system strengthened into a severe tropical storm, with an estimated central pressure of 990 hPa, and was forecast to intensify further before making landfall along the northern coast of Mozambique, particularly in Nampula Province near Ilha de Moçambique. The storm generated hazardous conditions, including very heavy rainfall, destructive winds, and rough seas, while its outer rainbands affected neighboring provinces such as Cabo Delgado, Niassa, and Zambezia (European Commission, 2026), Figure 6.

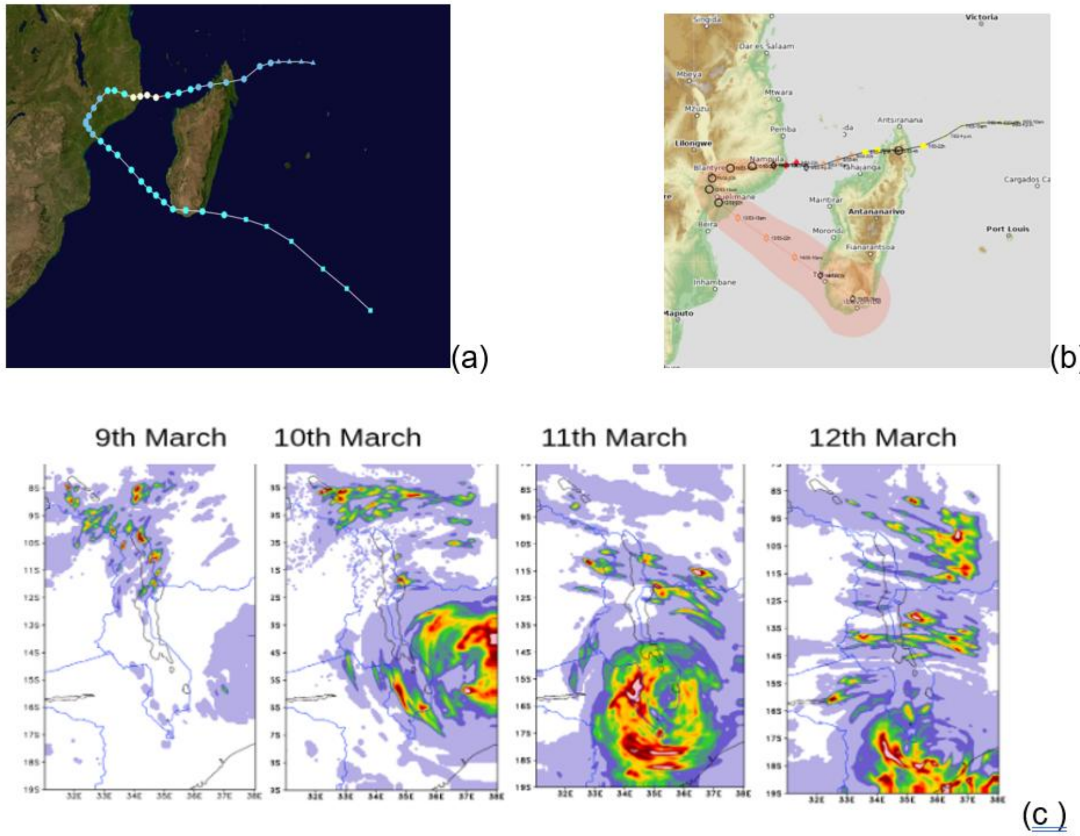


Figure 6: Evolution of Tropical Storm Jude from 9 to 12 March 2025, illustrating the system's track (a), intensity (b) and associated rainfall patterns across the southwest Indian Ocean and Malawi from DCCMS COSMO model (c). Source: DCCMS (2025).

As the system moved inland, its impact extended into southern Malawi, where rainfall exceeding 100 mm in 24 hours was anticipated. Although weakening over land, Jude continued to produce significant impacts, including flooding and flash floods in vulnerable districts such as Nsanje.

2.2.6 Mwera winds and Chiperone Weather Conditions

Winter weather patterns in Malawi are largely influenced by cool, moist air masses originating from the southern Indian Ocean, associated with high-pressure systems that migrate between the Azores and St. Helena regions. When these high-pressure systems intensify along the southeast coast of southern Africa, they drive a cool, moist south-easterly airflow into the country. This results in chilly conditions, overcast skies, and persistent light rain or drizzle locally known as "Chiperoni", especially over highland areas. In addition, Lake Malawi experiences moderate to strong southerly winds, commonly referred to as “Mwera,” which often generate high water waves.

During the 2025 winter season, several episodes were observed, particularly over Lake Malawi and Lake Chirwa from May through July 2025. Wind speeds at times exceeded 50 km/h, generating high and hazardous waves potentially exceeding 2m that posed risks to fishing activities and small watercraft.

During the 2025 winter season, Chiperoni conditions were most pronounced in July, while in the preceding months their occurrence was relatively limited due to reduced influence of high-pressure systems over the southern Indian Ocean.

Chapter Three

3.0. Observed weather and climatic parameters analysis

3.1 Rainfall

Malawi has a unimodal rainfall season running from October to May with a peak in the month of January. The rainfall season typically commences in the south of the country progressing northwards. In recent years, the characteristics of the season have been shifting, including the onset, cessation, rainfall intensity, spatial and temporal distribution, as well as the occurrence of extreme rainfall events. A detailed look at the 2024/2025 rainfall season is given in subsequent sections.

3.1.1 Seasonal rainfall distribution

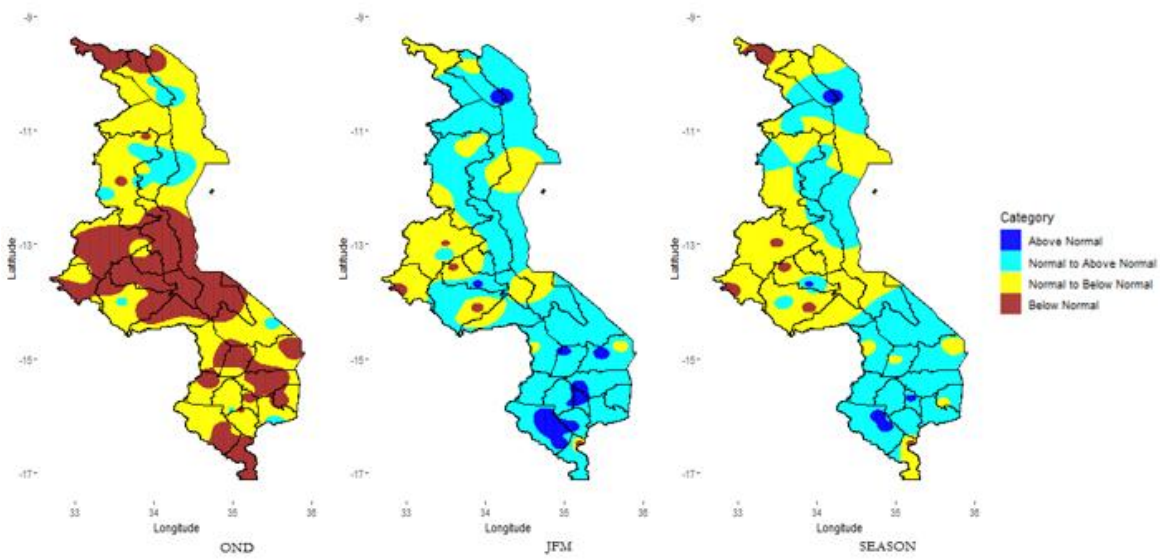


Figure 7: Seasonal and sub-seasonal rainfall distribution as percentage of normal

In terms of seasonal and sub-season analysis, October - November - December (OND), normal to below-normal rainfall amounts were recorded over the majority of central and southern highland areas below normal rainfall amounts over majority of central areas. Pockets of above-normal rainfall amounts were recorded particularly over northern lakeshore areas. This is captured in map OND in Figure 7 (left).

For the sub-season January - February - March (JFM), generally normal to above-normal rainfall amounts were observed over majority of northern, central lakeshore and southern areas of the country. Normal to below normal rainfall amounts were observed over the majority of central plain areas as shown in JFM map in Figure 7 (middle).

Overall, the 2024/2025 rainfall season was generally normal to above-normal over the southern half of the country while normal to below-normal total rainfall amounts with pockets of below normal were observed over the northern half of the country. This is shown in Figure 7 (right).

3.1.2 Monthly rainfall distribution

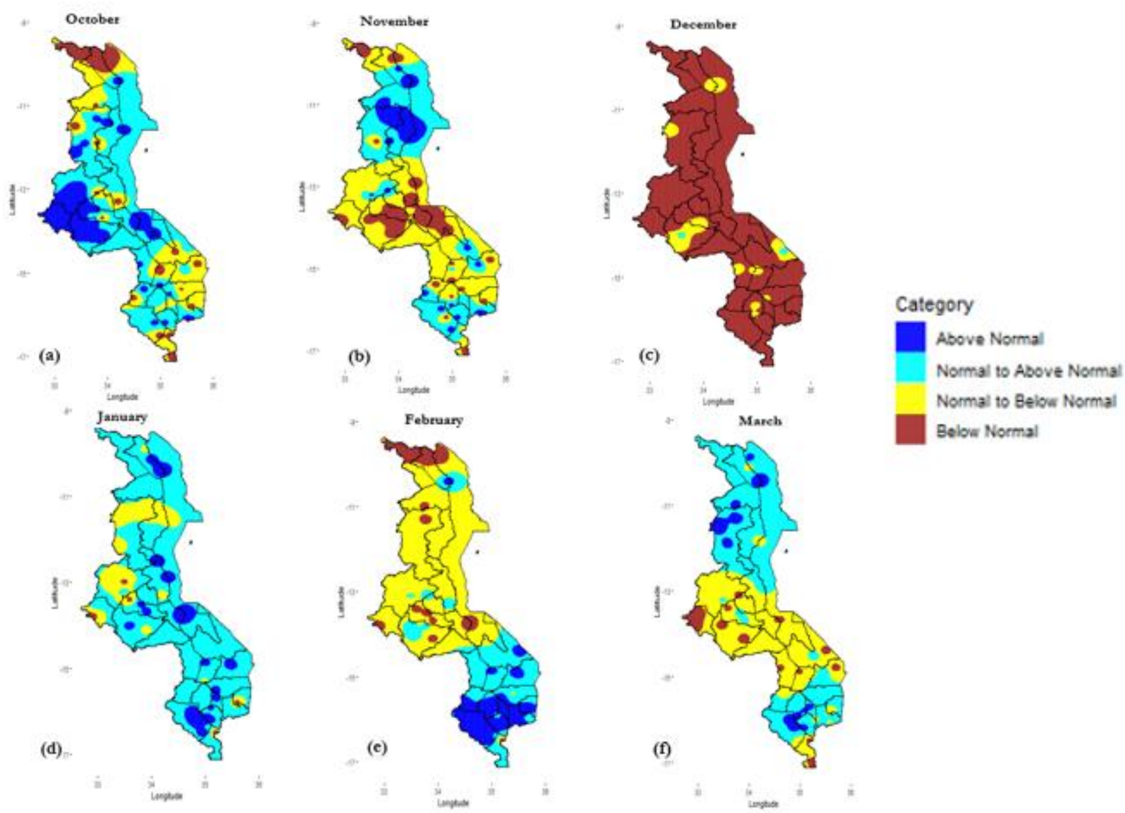


Figure 8: Monthly rainfall distribution as percentage of normal during 2024/2025 rainfall season (a) October, (b) November, (c) December, (d) January, (e) February and (f) March

Figure 8 contains maps of monthly rainfall distribution across Malawi. During the month of October 2024, above normal rainfall amounts were recorded over western areas of central region with normal to above-normal rainfall amounts were experienced over majority of lakeshore areas and some southern areas of the country with normal to below-normal rainfall amounts over southern highland and below normal over northern most areas as shown in Figure 8(a). Mulanje Boma reported the highest monthly rainfall of 269.4mm.

The month of November 2024 was above-normal over parts of Nkhata Bay, Mzimba, Rumphi and Karonga with generally normal to above-normal rainfall amounts recorded elsewhere over northern areas and some southern areas and normal to below normal over majority of central and southern areas as shown in Figure 8 (b). The distribution of the rains in most areas was very erratic during this month, and the highest monthly rainfall of 302.6mm was recorded at Chintheche Agriculture in Nkhata Bay.

December 2024 was worse where extremely below normal rainfall amounts were experienced over the majority of the areas Figure 8 (c). Though the rainfall amounts were below normal, the normal range for December is higher than that of October and November. The total monthly rainfall was highest at Namwera Agriculture in Mangochi, which reported 165.1mm during this month.

The month of January 2025 was the wettest of the season, where normal to above normal rainfall amounts were experienced over the majority of areas of the country with sporadic cases of above normal conditions in all the three regions of the country. Normal to below normal cases over parts of Mchinji, Kasungu and Mzimba districts as shown in Figure 8 (d) below. Lifuwu Agriculture Research station in Salima reported the highest monthly rainfall total for January of 400.6 mm.

For February 2025, normal to above normal rainfall amounts were experienced over southern areas with above normal rainfall amounts mainly over Shire highland areas. Normal to below normal rains were experienced over the majority of northern and central areas as shown in Figure 8 (e). The highest monthly rainfall amount of 497.4mm was reported from Chiradzulu Agriculture.

For March 2025, normal to below normal rainfall amounts were experienced over central and parts of Ntcheu, Balaka, Mangochi, Machinga and Nsanje districts as captured in Figure 8 (f). Vinthukutu Agriculture in Karonga registered a monthly total of 540.7mm during this month.

3.1.3 Cumulative rainfall

Cumulative rainfall analysis is important for tracking and understanding rainfall patterns, including their characteristics and seasonal performance. To assess this, cumulative rainfall data for the 2024/2025 season were analyzed and compared with the long-term average (1991–2020) at selected station points. The cumulative deviation from the long-term average provides an indication of the overall rainfall performance at the end of the season relative to the climatological mean.

During the 2024/2025 rainfall season, Malawi experienced erratic rainfall patterns from the onset. This is evident across all stations selected for this analysis, where predominantly below the average cumulative rainfall conditions were observed, as illustrated in Figures 9 and 10. Furthermore, all stations exhibited a declining trend in cumulative rainfall totals relative to the 1991–2020 climatological average.

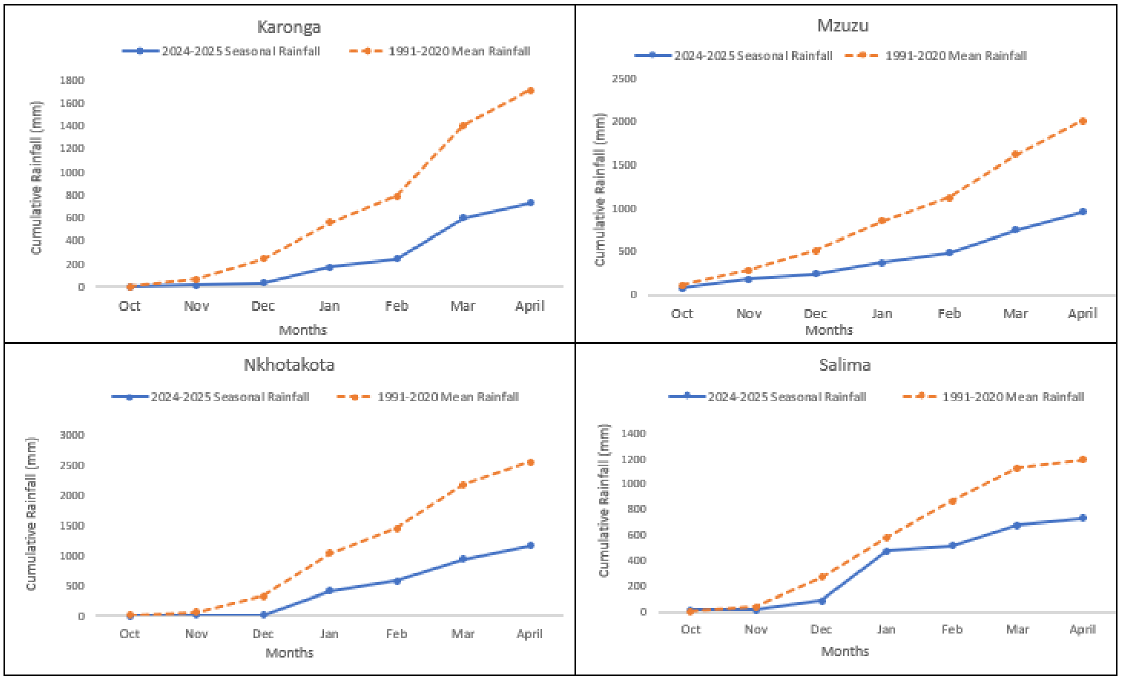


Figure 9: Cumulative rainfall for Kronga, Mzuzu, Nkhotakota, and Salma stations for 2024/2025 season versus 1991- 2020 mean

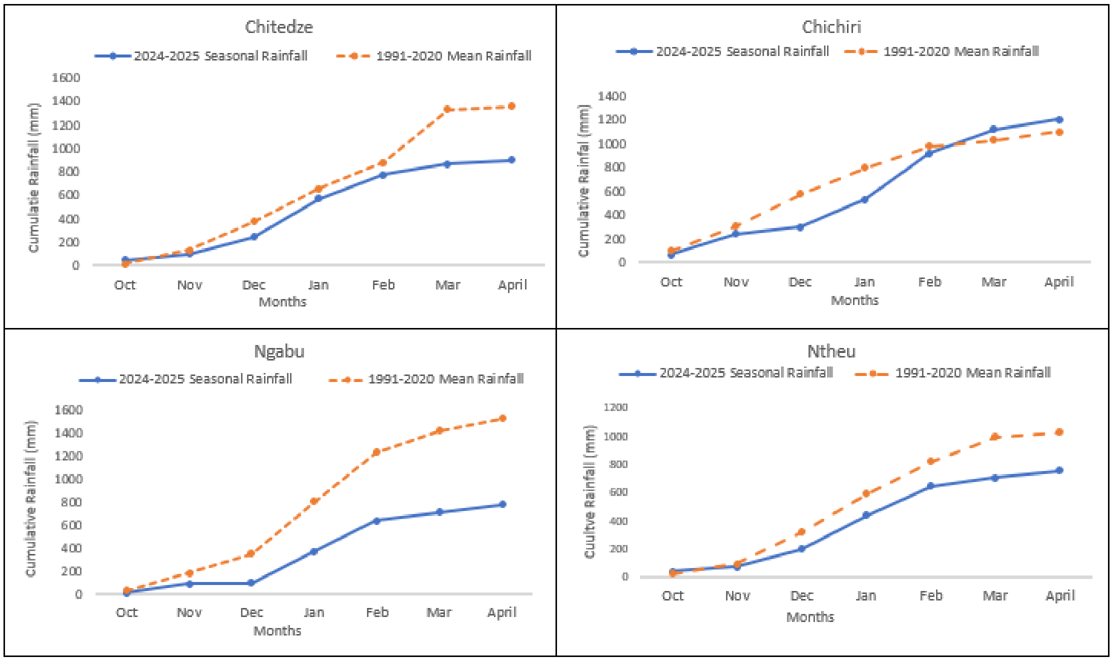


Figure 10: Cumulative rainfall for Chitedze, Chichiri, Ngabu and Ntcheu stations for 2024/2025 season versus 1991- 2020 mean

Specifically, Chichiri Station, located in the Southern Region, recorded below-average cumulative rainfall during December 2024 and January 2025 . In contrast, near-normal to above-average rainfall conditions were observed from October to

November 2024 and from February to April 2025. In the context of increasing rainfall variability, these findings highlight the need to invest in irrigation farming and to promote rainwater harvesting technologies as adaptive strategies for enhancing agricultural resilience.

3.2 Temperature

Temperature is a fundamental driver of weather and climate systems, influencing atmospheric circulation, moisture processes, and the distribution of energy across regions. In Malawi, temperature variability is strongly shaped by geographical contrasts, particularly altitude, with low-lying areas such as the Lower Shire Valley experiencing extreme heat, while highland regions like Dedza remain comparatively cooler with larger diurnal ranges. These variations not only define local climatic conditions but also contribute to the occurrence of extreme temperature events, including heat waves and cold spells, which have significant implications for human health, agriculture, water resources, and ecosystems. Prolonged periods of high temperatures, in particular, can intensify evapotranspiration, reduce soil moisture, and increase stress on both natural and human systems.

3.2.1 Annual Mean Temperature

The map of annual mean temperature anomalies over Malawi in 2025 indicate that much of the country experienced near-normal to slightly above-average temperatures, within the range of 0 to +1°C. A distinct warm anomaly (+2 to +3°C) is however evident over Kasungu in the central-western area , suggesting localized hot conditions. In contrast, the far northern areas of Karonga into Chitipa show moderate cooling (−2 to −3°C), indicating below-average temperatures. The southern areas remain largely near normal, with only minor deviations. Overall, the pattern reflects a generally mild warming signal across Malawi, interrupted by localized cooling in the north and a pronounced warmer spot in the central-west, highlighting spatial variability driven by regional climatic influences, Figure 11.

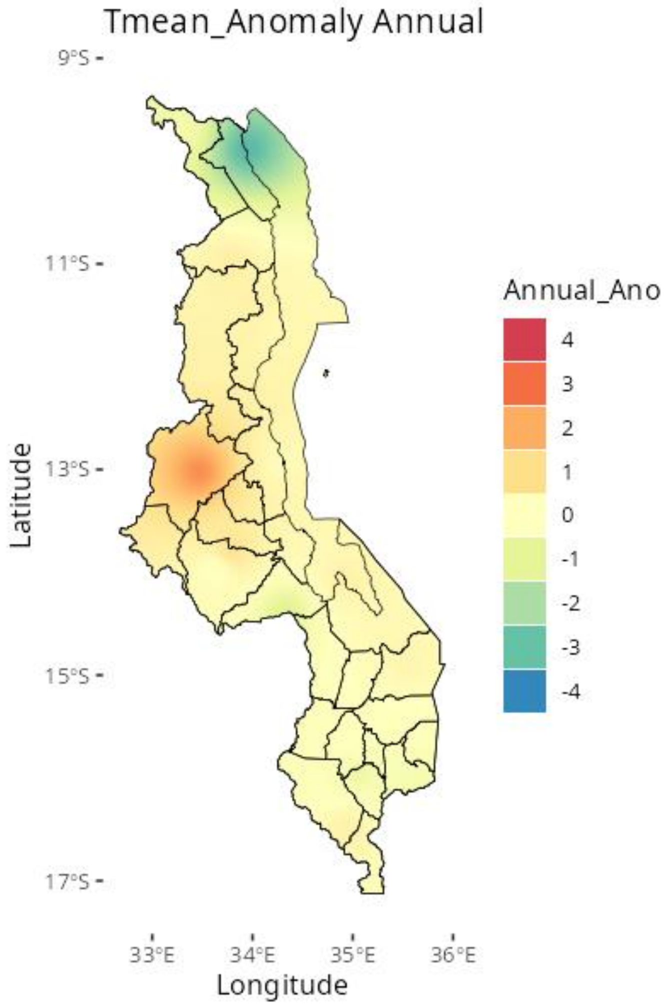


Figure 11: The Map showing annual mean temperature (Tmean) anomaly

3.2.2 Annual Maximum Temperature

Annual maximum temperature anomaly for Malawi in 2025 suggests generally stable conditions (0 to +1°C) for most parts of the country. Besides that, further analysis suggests cooler-than-average conditions in the north and localized warming in the central-western areas, highlighting spatial differences in highest daytime temperature. A distinct cooling deviation (−2 to −3°C) is observed in the far northern areas around Karonga district, suggesting reduced daytime heating while a localized warm anomaly (+1 to +2°C) appears over Kasungu district in the central-western area of Malawi , pointing to relatively hotter daytime conditions. The southern region remains near normal, with minor variations, Figure 12.

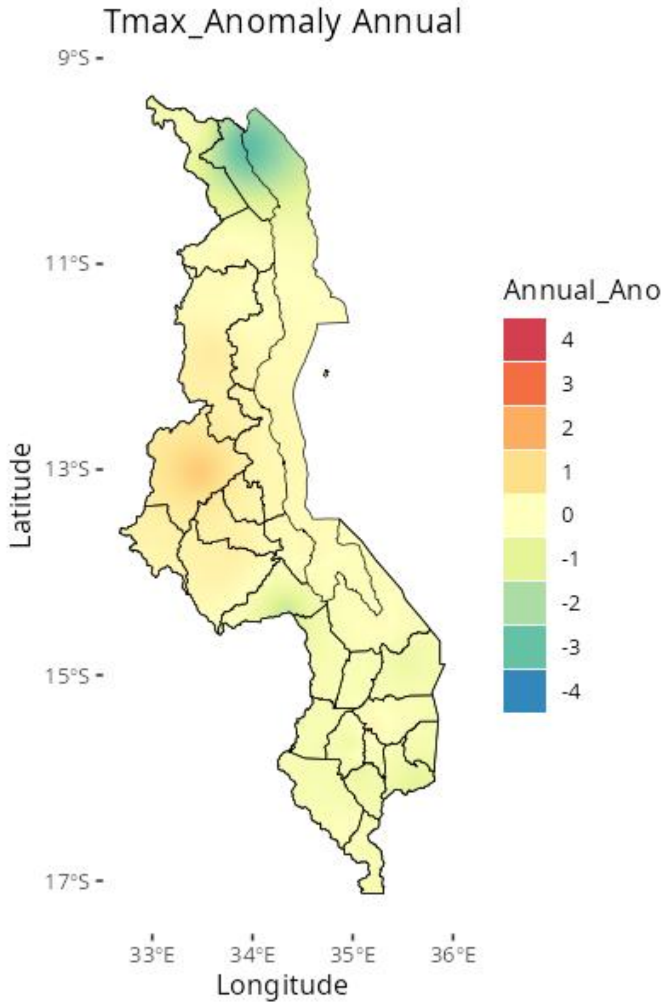


Figure 12: The Map showing annual maximum temperature (Tmax) anomaly

3.2.3 Annual Minimum Temperature

Departures of annual minimum temperature (Tmin) over Malawi in 2025 shows a considerably variable pattern, indicating strong spatial contrasts in nighttime temperatures. Though much of the country displays near-normal to slightly above-average Tmin (0 to +1°C), suggesting generally mild night conditions, the northern region however exhibits a sharp gradient, with intense warming (+3 to +5°C) in the northeast Karonga alongside notable cooling (−3 to −5°C) in the northwest over Chitipa, pointing to localized influences such as cloud cover, elevation, or moisture variability. A cool anomaly (around −2 to −3°C) is also evident in parts of the central areas particularly over Dedza District, indicating cooler nights. In addition, Kasungu in the central-western areas, Nsanje and Chikwawa in the far southern areas show moderate warming (+1 to +2°C). Overall, Tmin in 2025 reflects greater variability than Tmax, with both strong warming and cooling signals, highlighting significant differences in nighttime temperature behavior across Malawi. Though Karonga exhibited cooling in day time temperature (maximum temperature), nighttime remained warmer than average as depicted by minimum temperatures, Figure 13.

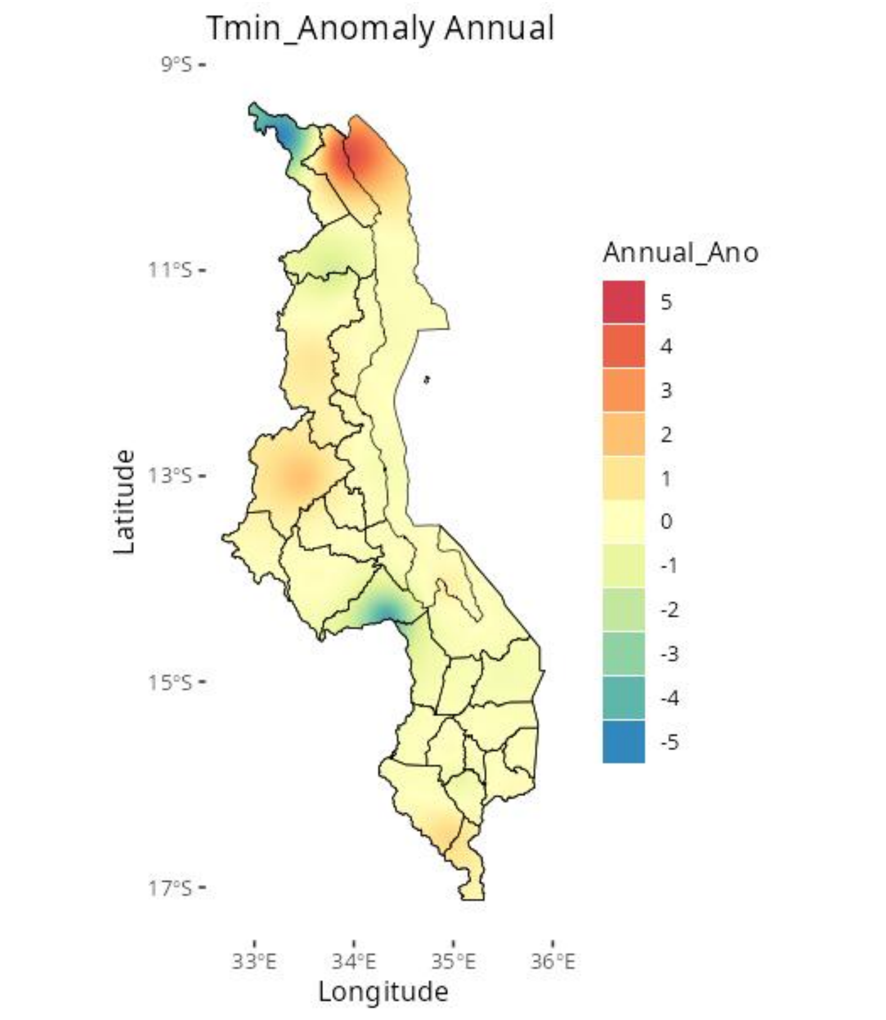


Figure 13: The Map showing annual minimum temperature (Tmin) anomaly

3.2.4 Monthly Mean Temperature

The Figure 14 indicates that Malawi experienced **warmer temperatures throughout the year** with most months characterized by positive anomalies across much of the country. The warming signal is especially pronounced during summer **around September to November** where anomalies intensify particularly over the central and southern regions. The **northern parts of the country occasionally show near-normal to slightly cooler conditions** and this was likely influenced by topography and localized climatic factors, but these are generally short-lived. Spatially, the **central and southern regions consistently recorded highest** anomalies though for some months were localized. Overall, the pattern reflects a **dominantly warm year with widespread positive temperature anomalies** suggesting enhanced heat conditions across Malawi for most of the period.

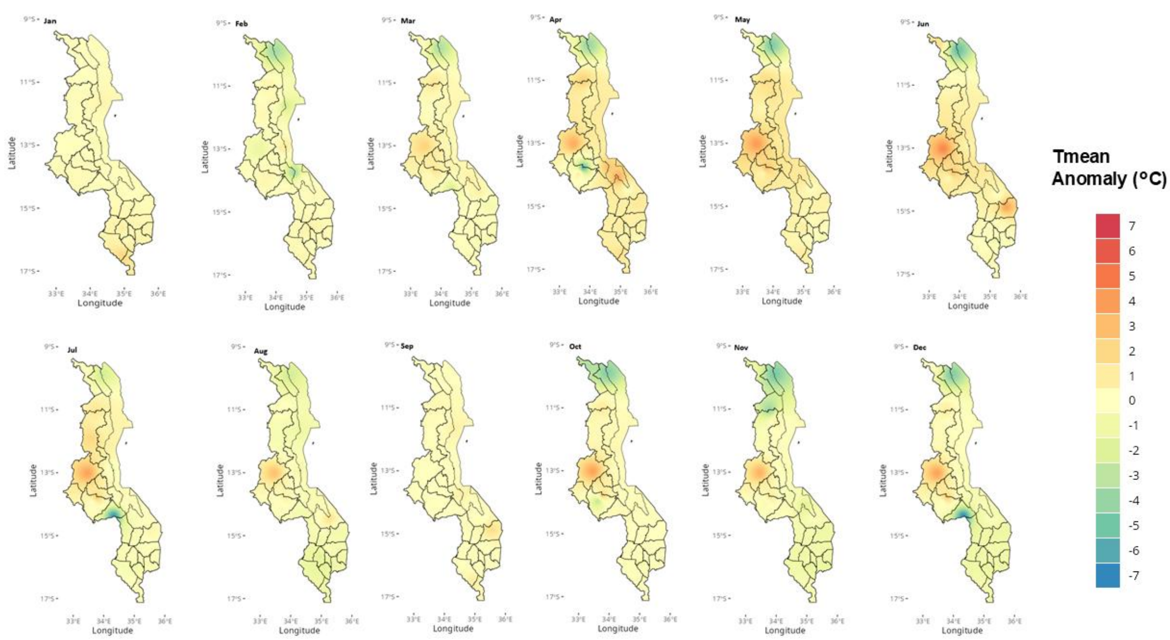


Figure 14: The Map showing monthly mean temperature anomaly

3.2.5 Monthly Maximum Temperature

Figure 15 illustrates the spatial distribution of monthly maximum temperature (Tmax) anomalies across Malawi for the period January to December 2025, relative to the 1991–2020 climatological baseline. At the monthly scale, Tmax anomalies were generally near-normal to above normal across much of the country, although localized areas revealed considerable departures from the long-term mean. The warmest conditions were observed during September and October, with October emerging as the peak month, followed by November, which remained predominantly warm but with slight moderation. These months are characterized by consistent warming signals, with September–October showing the most widespread and intense positive anomalies, indicative of peak pre-rainy season heat. Notably, positive anomalies were observed in Ntaja station in the southeastern region of the country, where maximum temperatures reached up to +3.2 °C above the long-term average. In contrast, the northern tip of Malawi recorded negative anomalies of approximately −3.4 °C, reflecting cooler-than-normal daytime temperatures.

In the Central Region, Dedza station experienced pronounced negative anomalies of −8.9 °C in both July and December. Similarly, in April 2025, Kamuzu International Airport and Kasungu stations experienced cooler than normal maximum temperatures with significant negative anomalies of approximately −7.9 °C and −6.3 °C, respectively. On a monthly mean basis, November was characterized by slightly below-normal conditions, with an average anomaly of −1.1 °C relative to the 1991–2020 climatology. Overall, the spatial and temporal variability of Tmax anomalies highlights pronounced localized climate variability across Malawi, with both warm and cool extremes occurring during the analysis period.

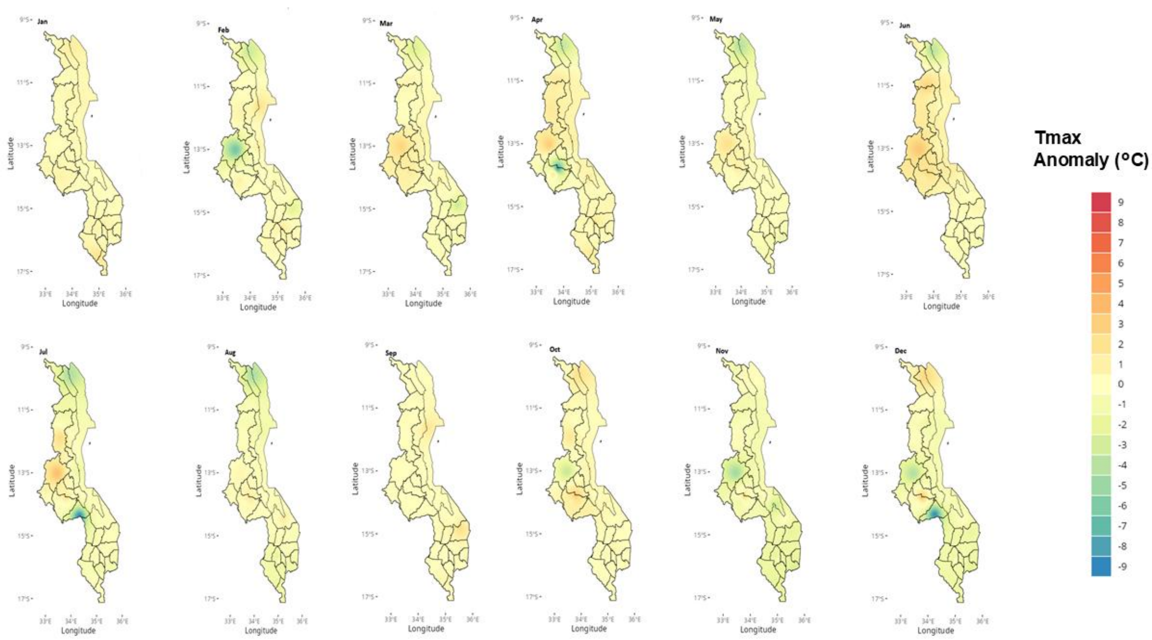


Figure 15: The Map showing monthly mean maximum temperature anomaly

3.2.6 Monthly Minimum Temperature

Overall, minimum temperatures were relatively warmer with predominantly positive anomalies observed throughout the year, except at a few stations. Notably, Nkhotakota recorded several new absolute minimum temperature values. In January, a new record of 16.5°C was set, replacing the previous value of 19.0°C recorded on 21 January 2008. In February, a new minimum of 17.0°C surpassed the earlier record of 18.7°C observed on 25 February 2019, Figure 18. In October, a value of 17.0°C recorded on 4 October exceeded the previous record of 17.6°C set on 3 October 2011. Similarly, in November, a new record of 20.0°C replaced the earlier value of 22.1°C recorded on 30 November 2011.

Additionally, Chichiri registered a new record minimum of 11.0°C on 4 December 2025, surpassing the previous record of 12.2°C observed on 10 December 1999, Figure 16.

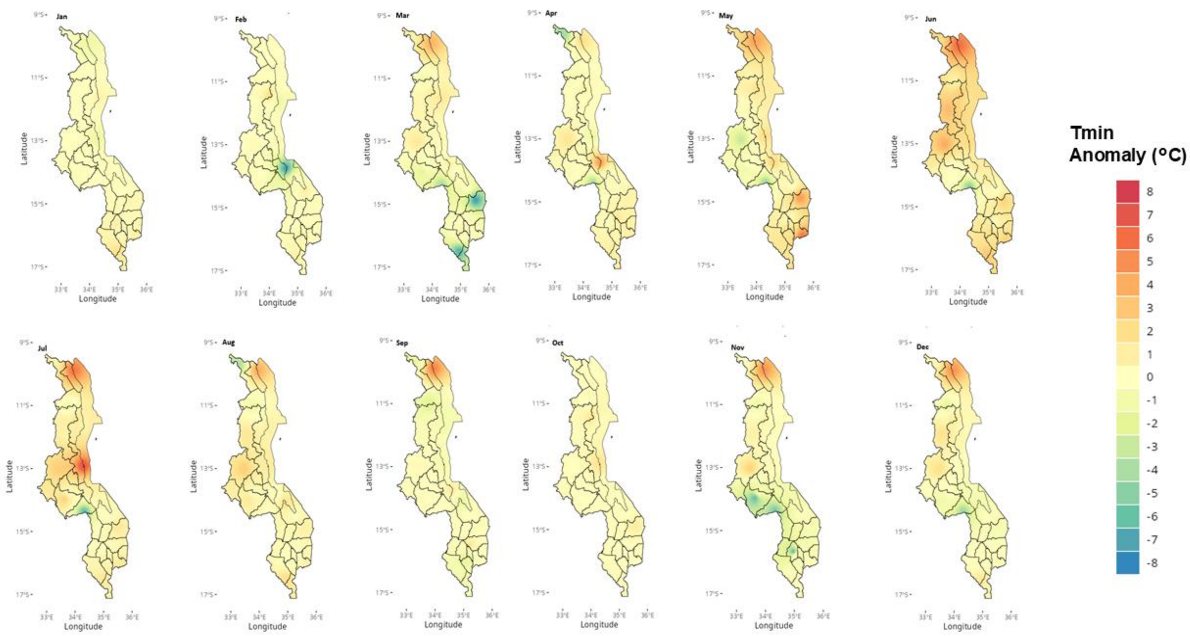


Figure 16: The Map showing monthly mean minimum temperature anomaly

3.3 Wind

During the 2025 winter season (May to September), Malawi experienced predominantly south-easterly winds across most parts of the country as shown in the Windrose analyses from Kawalazi, Dzalanyama, Lifuwu, and Mimosa stations, although some localized directional variability was observed in the northern region. Wind speeds were mostly light to moderate, commonly ranging between 2 and 6 m/s, with relatively stronger winds occasionally observed in the southern region and along the Lake Malawi shoreline. Over Lake Malawi, episodes of strong “Mwera” winds were also experienced, resulting in rough lake conditions and elevated wave activity.

The prevailing south-easterly winds contributed to the generally cool and dry winter conditions experienced during the season. These winds supported the persistence of lower minimum temperatures, particularly during June and July. In some lakeshore and highland areas, the winds occasionally enhanced morning cloudiness, fog, and mist formation during cold mornings, while the stronger Mwera winds over the lake at times affected fishing and marine transport activities.

The windrose diagram for Kawalazi (left) and Dzalanyama station (right)

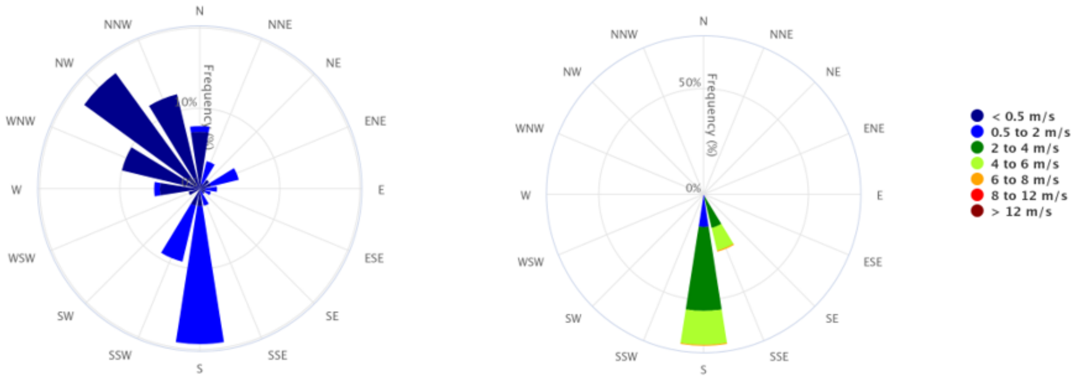


Figure 17: Observed Wind Speed and direction between May and September from Kawalazi Station in the North (left) and Dzalanyama Station in the Central (right). Source: DCCMS (2025) Hint: 1m/s = 3.6km/hr.

The windrose diagram for Lifuwu (left) and Mimosa station (right)

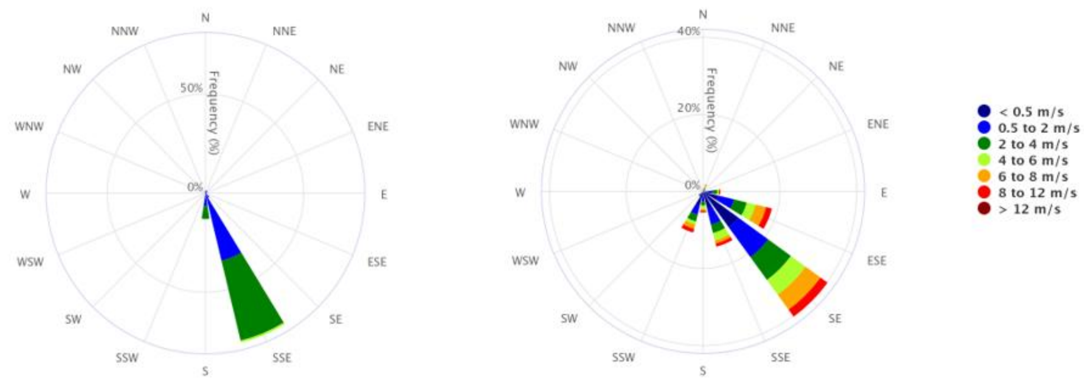


Figure 18: Observed Wind Speed and direction between May and September from Lifuwu Station along the Lake shore in Salima (left) and Mimosa Station in the South (right). Source: DCCMS (2025). Hint: 1m/s = 3.6km/hr.

Chapter Four

4.0. Extreme weather and climatic events

4.1 Standardised Precipitation Evapotranspiration Index (SPEI)

The 2024/2025 rainfall season in Malawi began with predominantly dry conditions, particularly during October and December. The situation was most severe in Salima and Mangochi Districts, which recorded four dry months, followed by Kasungu, Nkhotakota, Dowa, Mchinji, Rumphi, Nkhatabay Districts with three dry months, mainly at the beginning of the season. The wettest months were January and February, and Kasungu and part of Nkhotakota were wetter than normal during these months. These conditions are clearly reflected in the Standardized Precipitation Evapotranspiration Index (SPEI), as illustrated in the maps below, Figure 19.

The SPEI is a widely used drought index that measures the balance between precipitation and potential evapotranspiration to assess the severity of dry and wet conditions (Vicente-Serrano et al. 2010). During this period, most areas exhibited severely dry to extremely dry conditions according to SPEI classifications.

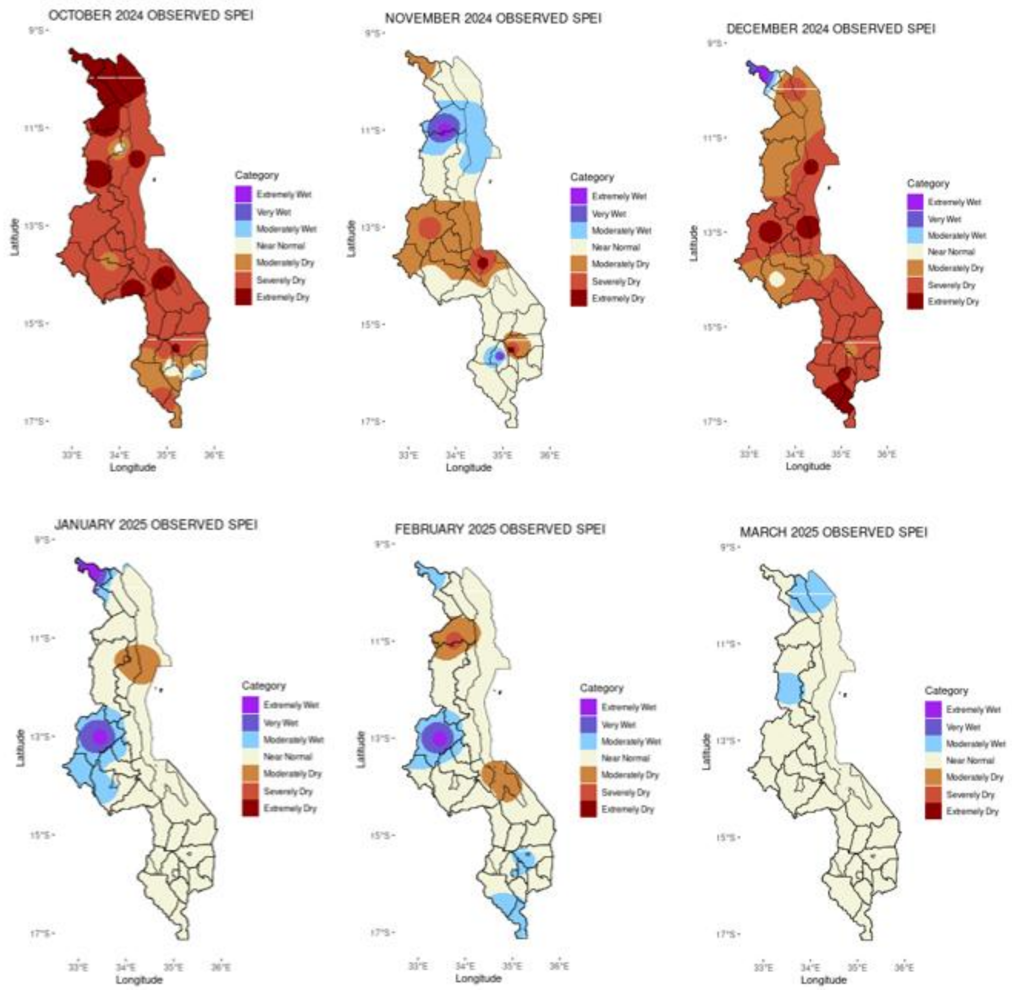


Figure 19: The monthly standardised precipitation and evaporation index (SPEI) from October 2024 to March 2025.

These prolonged dry conditions were largely associated with extended dry spells following the onset of rains, which contributed to germination failure and significant crop water stress. As a result of the worsening food security situation, the Government of Malawi declared a state of disaster in 11 districts in early 2025.

In February, additional dry spells were observed, further exacerbating water stress in several areas, particularly in Salima District, where conditions remained unfavorable for crop development.

4.2 Extreme rainfall and flood events

In 2025, Malawi experienced extreme heavy rainfall from January to April, which triggered flash flooding mainly over southern, and lakeshore areas. Various districts reported significant damage to property and loss oef life due to these floods. The affected districts included Mangochi, Nkhotakota, Karonga, Chikwawa, Nsanje, Ntcheu, Balaka, Salima and Zomba among others. Incidents of hailstorms were also reported in some areas of the country.

For instance, on 31 January 2025, in Traditional Authorities Mapira, Chimwala and Mponda in Mangochi district, heavy rainfall triggered flash floods resulting in at least 3 deaths, 48 injuries, thousands displaced and many casualties. These floods also affected infrastructure such as hospitals, schools, houses and roads, Figure 20 (MANA, 2025).

Figure 20: Affected livelihood in Mangochi, January 2025. Source: MANA 2025.

In February, several areas across the country experienced flash floods due to heavy rain. For example, TA Lundu and Ngabu in Chikwawa district were affected by floods after two days of persistent heavy rainfall with higher levels reported in the Shire Valley (MANA, 2025). Karonga recorded the highest amount of 103.0 mm on 13th February 2025. Figure 21 shows one of the flooded areas in Chikwawa.

Figure 21: Flooding in Chikwawa, February 2025.

From 25th to 30th March 2025, five TAs Mwakaboko, Kilupula, Kyungu, Mwirang'ombe and Wasambo in Karonga district experienced heavy rains which caused rivers such as Kyungu, North Rukuru, Wovwe, Songwe and other small rivers to flood damaging crops and infrastructure as shown in Figure 22. It was reported that 12 people drowned in the Kyungu River, 1 man was struck and killed by lightning while 2 women sustained burns and many people were displaced (Times Malawi online, 2025).

Figure 22: Flooding in Karonga, March 2025. Source: Malawi nation online 2025

A high rainfall of about 141.0mm was recorded on 28th December at Mchilawengo in Mzimba District. Very high rainfall was observed in the southern areas, particularly Chikwawa and Nsanje, where the cumulative rainfall between 26th and 28th December surpassed the average expected for the entire month. Supuni, Chikwawa, recorded 177.0 mm over the three-day period, exceeding monthly norms. Similarly, Kasinthula recorded 150.8 mm, while Lurwe in Nsanje received 150.2 mm.

On 30th December 2025, stormy rains caused Dwangwa River to flood affecting most parts of Nkhotakota district. The highest 24 hour rainfall of 285.3mm was recorded from Nkhunga (29 December 2025) exceeding the historical December average for the area. During the period of 27 to 29 December, Nkhunga received an accumulated 3-day total rainfall of 544.9mm.

This event triggered widespread flooding in Nkhotakota district, overwhelming communities in a similar manner as the Dwangwa floods that took place in March 2024 (Figure 23). About 10,772 households were affected, 11 lost their lives, 37 were injured, 2 went missing and 9594 were displaced and hosted in camps (MANA, 2025)

Figure 23: Damage due to floods in Nkhotakota December 2025.

4.3 Lightning

Lightning emerged as a major weather-related hazard in Malawi in 2025, with its impacts recorded across two consecutive rainfall seasons of 2024/25 and 2025/26. Despite efforts by the Department of Climate Change and Meteorological Services urging residents to avoid open spaces and trees during thunderstorms (Mwale, 2025), Malawi continues to record high lightning fatalities.

Reported incidents resulted in dozens of fatalities and numerous injuries, making lightning one of the leading causes of storm-related deaths during this period (Luka, 2025; Mwale, 2025). The 2024/2025 rainfall season alone recorded at least 22 deaths by January, rising to 26 by early March, while the onset of the 2025/2026 season saw continued casualties, including at least 12 deaths and over 50 injuries between November and mid-December (Kasanda, 2025; Naitha, 2025). These incidents affected multiple districts, often occurring during routine livelihood activities such as fishing, farming, construction, and schooling, highlighting widespread exposure and vulnerability. In addition to human casualties, lightning-associated storms contributed to infrastructure damage, power outages, and displacement of thousands of people, reinforcing lightning as a significant and recurrent hazard requiring strengthened early warning, public awareness, and risk reduction measures.

Several major incidents recorded during 2024/2025 rainfall season were:

- Phalombe District - Two women were killed and 12 others injured when lightning struck a village savings meeting (Face of Malawi, 2025a).
- Mangochi District - Two fishermen died after lightning struck their canoe on Lake Malawi (Nzangaya, 2025).
- Mzimba District and Balaka District - Fatalities occurred indoors during nighttime storms (Kapito, 2025).
- Karonga and Ntchisi Districts - Reported occupational deaths (Face of Malawi, 2025b).

The onset of the 2025/2026 rainfall season was characterized by unusually high lightning activity. The Department of Disaster Management Affairs reported 12 deaths and 51 injuries between 1 November and mid-December 2025, although media reports suggested at least 14 deaths (Kasanda, 2025; Naitha, 2025a).

Notable incidents include[2]:

- Dowa District - Three construction workers were killed (Kasanda, 2025).
- Kasungu District - Three fatalities in separate incidents (Naitha, 2025a).
- Chikwawa District - Two teenage girls were killed while guarding crops (Naitha, 2025b).
- Neno District - Fatalities during fieldwork and storms (Naitha, 2025c).

4.4 Extreme temperature events

Heat waves are among the extreme weather events affecting Malawi and are becoming an increasing concern under changing climate conditions. A heat wave occurs when temperatures remain unusually high for several consecutive days, often leading to heat stress for people, crops, and ecosystems.

Many southern areas of Malawi experienced very hot conditions with few rainy days in February 2025. The highest maximum temperature anomalies recorded were 7.9 °C at Ngabu in Chikwawa and 6.1 °C at Chileka

[2] One reported incident in Mzimba District involving two young men playing football. This claim could not be independently verified by the authorities.

International Airport on 17 February 2024. Additionally, the highest absolute maximum temperature of 36.4 °C was recorded at Ngabu on 12 February 2026.

Observed maximum temperatures for the January to April period indicate generally warmer-than-normal conditions across most areas of the country, as illustrated in Figure 24. In the figure, red shading represents areas that are warmer than normal, while blue shading indicates areas that are cooler than normal.

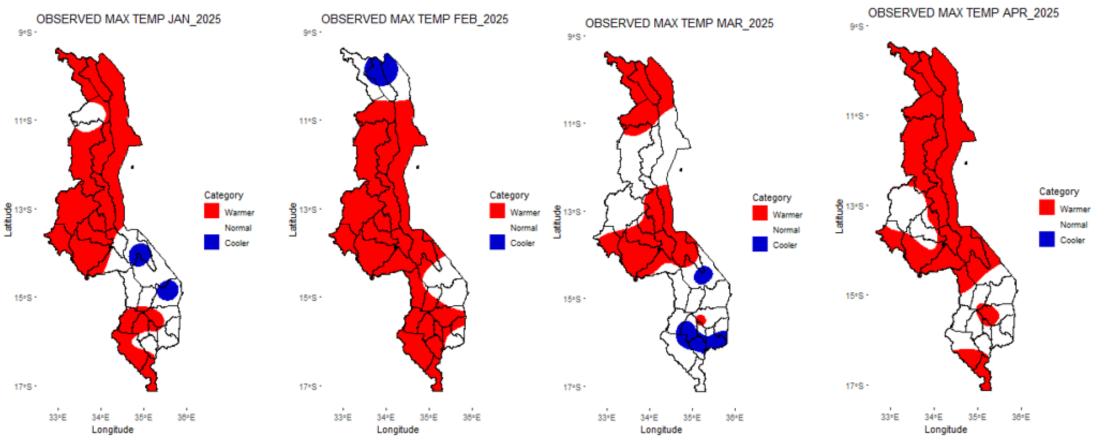


Figure 24: Maximum temperature anomalies over Malawi (January–April), with red indicating warmer-than-normal conditions and blue indicating cooler-than-normal conditions.

These conditions contributed to the occurrence of minor heatwave events during the period. Observations also indicate similar conditions in October 2025, characterized by widespread high temperatures across Malawi. Although the severity of these events was relatively low, they highlight an increasing tendency toward temperature extremes, consistent with growing climate variability.

Heat waves represent an emerging climate risk in Malawi that requires improved climate monitoring, early warning systems, and adaptation strategies to protect public health, agriculture, and livelihoods.

Chapter Five

5.0 Social-economic impacts of extreme Weather and climate events

Climate change has led to an increase in the frequency and intensity of extreme weather events, which are now being observed over many areas. These events are contributing to significant social and economic impacts in Malawi. During the 2024/2025 season, it is important to highlight that a total of 24,643 households were affected by various hazards whereas 9143 households were affected by stormy rains in Nsanje, Chikwawa and Karonga districts. 10912 households were affected by floods in Nkhotakota district. While 4588 households were affected by floods and strong winds induced by Tropical Cyclone Jude where Phalombe District recorded the highest number of affected people (9,968). Other significantly impacted areas included Balaka, Lilongwe, Kasungu, Machinga, Zomba District, Blantyre District, Chiradzulu, Mangochi, Neno, Mulanje, Zomba City, Salima, Mchinji, and Mwanza as shown in Figure 25 below. Meanwhile, according to the MVAC report, approximately 2.9 million people experienced food insecurity due to dry spells during the 2024/2025 rainfall season, representing about 650,000 households in several districts across the country (MVAC report, 2025). Various sectors of the economy that were severely impacted by severe weather events include agriculture, transport, energy, health, education, water resources, and disaster risk reduction.

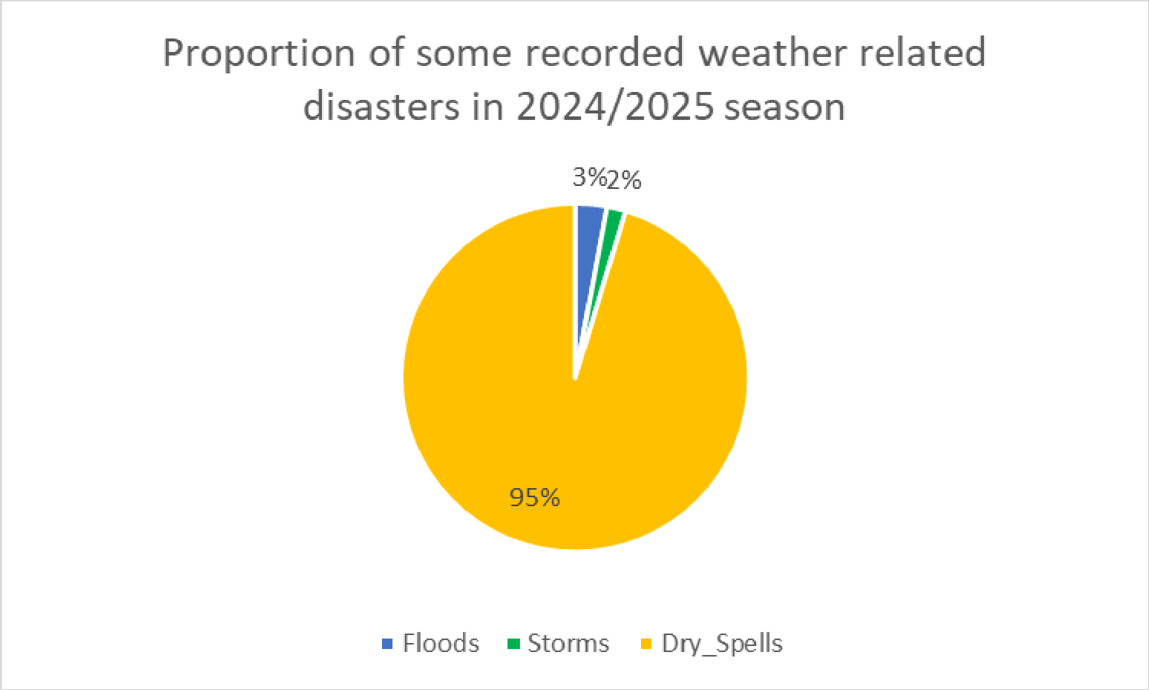


Figure 25: Number of households affected during the 2024/2025 rainfall season (source; DODMA, MVAC report 2025)

5.1 Disaster Risk Management

The Department of Climate Change and Meteorological Services (DCCMS) provides climate information services, weather forecasts, and issues warnings for a range of hazardous weather conditions. During the winter season, the most common hazards include strong southeasterly winds (locally known as Mwera), which predominantly affect Lake Malawi users, as well as cold conditions (locally known as Chiperone) which result in significant cold spells. During the summer season, the country is exposed to a variety of hazards, which include but not limited to strong winds, heat waves, flash floods, thunderstorms and prolonged dry spells, among others.

DCCMS plays a central role in Malawi's Early Warning System (EWS) through the continuous monitoring and analysis of atmospheric systems that influence prevailing weather conditions, thereby enabling the prediction of future weather patterns. Once weather information including warnings and alerts are generated, they are systematically processed and packaged into user-friendly formats for dissemination, ensuring that the public is equipped to make informed decisions aimed at avoiding and minimizing potential loss and damage. Furthermore, the Department produces impact-based weather forecasts on both daily and weekly timescales. Examples of such warnings are presented in Figure 26.

The 2025 rainfall season was characterized by one of the most severe and prolonged dry spells in February and March 2025. In February, most areas in the central and northern region received normal to below-normal rainfall amounts. While in March the areas affected with normal to below-normal rainfall amounts were central and parts of the southern region (Figure 10e and f).

Earlier in the season, the country had already experienced a significant prolonged dry spell in December, which resulted in delayed planting for the majority of smallholder farming communities. Throughout this period, the Department of Climate Change and Meteorological Services (DCCMS) consistently provided updates and advisories to the public.

The cumulative impacts of these dry spells led the Government of Malawi to declare a state of disaster due to acute food insecurity, particularly in the southern region. More than four million people were affected by severe food shortages (OCHA, Malawi Humanitarian Snapshot, October 2025).

To enhance accessibility and comprehension, these forecasts are frequently translated into local languages, including Chichewa, Yao and Tumbuka, thereby facilitating timely and appropriate responses to severe weather warnings.

Dissemination of these products is conducted through multiple channels, including television, email, radio, and various social media platforms such as WhatsApp, Facebook, X, and YouTube.

The reach of these platforms has expanded significantly in recent years; for example, the Department has amassed over 84,000 followers on Facebook, more than 101,000 followers on WhatsApp, ~4,700 followers on X and more than 2,400 on YouTube as of May 2026 (DCCMS, 2026).

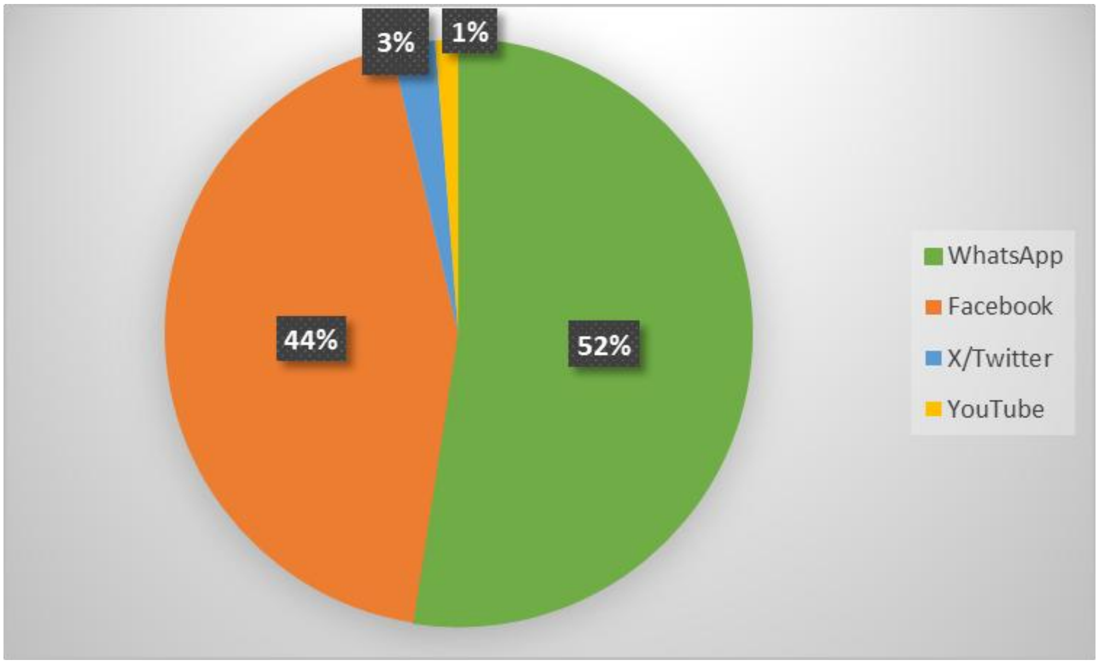


Figure 26: DCCMS Social Media Followership Composition

The huge followership of DCCMS in recent years, as depicted in Figure 26, has been due to the public's right perceptions and trust built by the more accurate forecasts DCCMS has been releasing.

The Platform for Real-time Impact and Situation Monitoring (PRISM) tool, implemented in partnership with the World Food Programme (WFP), represents a major step forward in strengthening national systems for drought preparedness and early action. Through real-time climate monitoring and data analysis, PRISM enhances the country's ability to anticipate drought conditions and respond proactively.

The initiative focuses on monthly monitoring of drought triggers using seasonal climate forecasts, piloted in the districts of Mangochi, Machinga, Nsanje, Zomba, and Phalombe. The Standard Precipitation Index (SPI) serves as the primary indicator for assessing drought conditions. The seasonal forecasts, valid for up to seven months, inform drought prediction across two key monitoring periods—Window 1 (November, December, and January) and Window 2 (January, February, and March)—which align with critical stages of the rainy season.

PRISM systematically tracks drought anticipatory action triggers and issues two categories of alerts to guide timely response: a "Ready" alert, signaling preparedness and early coordination measures, and a "Set" alert, prompting the mobilization of anticipatory actions when rainfall falls below normal levels (lowest tercile). This early warning and action approach enables government and partners to act before the full impact of drought is felt, thereby reducing humanitarian needs, protecting livelihoods, and building resilience in vulnerable communities. The initiative underscores government commitment to proactive disaster risk management and evidence-based decision-making in addressing the growing challenges posed by climate change.

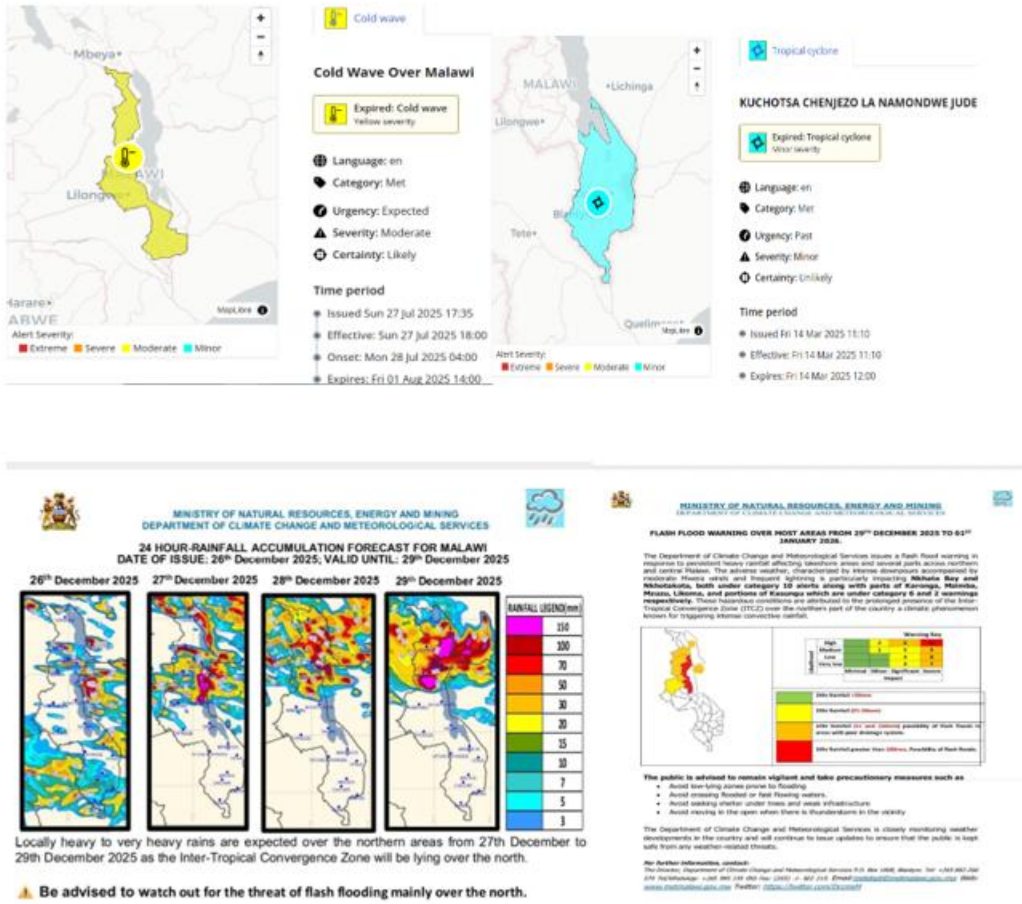


Figure 27: Examples of warnings that were issued in 2025. The figures include a Cold Wave CAP alert issued on 27 July 2025 (top-left), a Tropical Cyclone Jude CAP alert issued on 14 March 2025 (top-right), a 24-hour maximum rainfall warning issued on 26 December

5.1.1 Some climate related impacts

5.1.1.1 Tropical Cyclone Jude (Malawi Scenario)

In 2025, significant hazards included Tropical Cyclone Jude, which was projected to have minor impacts over the Southern region of Malawi. Tropical Cyclone Jude affected approximately 20650 people in 11 districts. 48% of the affected population were in Phalombe districts as shown in Figure 28. Though no death was reported, there were 15 injuries, 4883 people displaced and 3 people went missing, of which 2 were confirmed dead (DoDMA, March 2025), Figure 29.

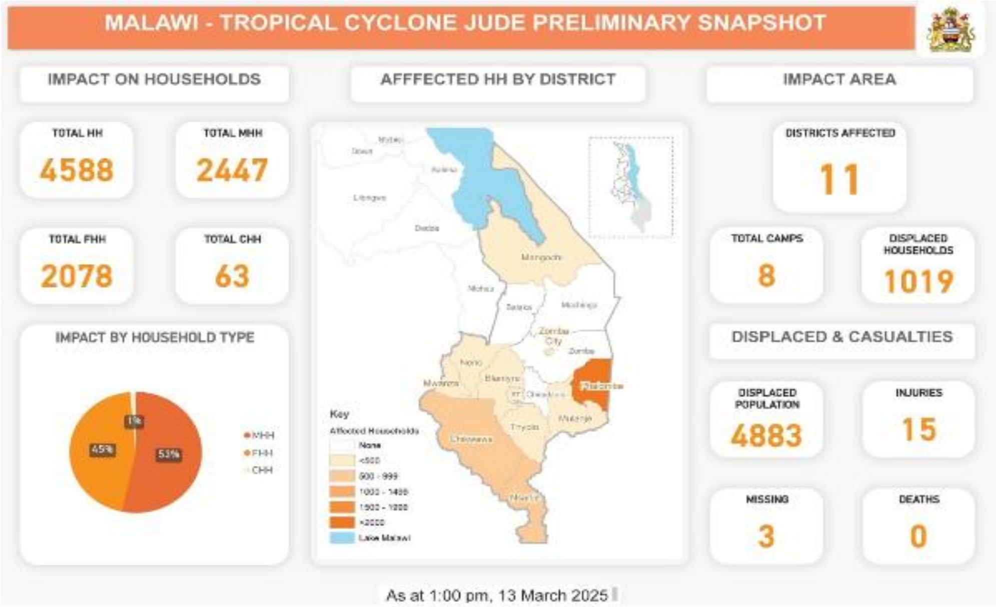


Figure 28:Impact of Tropical cyclone Jude in March 2025. Source: DoDMA, March 2025

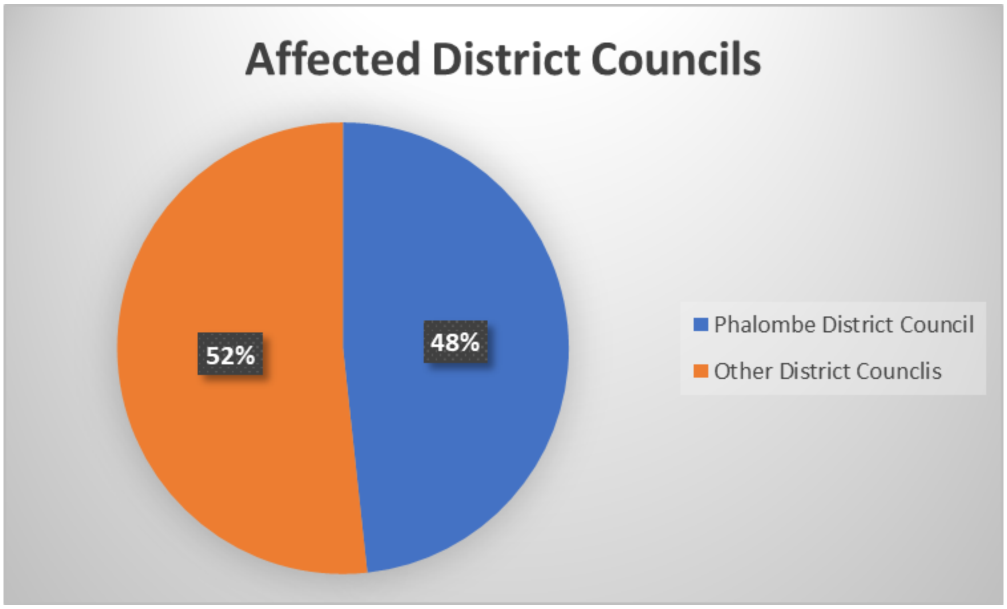


Figure 29: Proportion of population affected by Tropical Cyclone Jude in Phalombe compared to the total population affected: DoDMA, March 2025

It is widely acknowledged that the anticipated severe or minor impacts of various weather and climate related hazards did not fully materialize, largely due to the effective activation of the Early Warning System by the Department of Climate Change and Meteorological Services (DCCMS) in collaboration with key stakeholders, including local communities.

It is considered that, in the absence of these early warning interventions, the impacts could have been substantially greater.

5.1.1.2 Tropical Cyclone Jude (Regional Scenario)

Regionally, Tropical Cyclone Jude also caused widespread humanitarian impacts across Madagascar and Mozambique. Joint assessments by the European Civil Protection and Humanitarian Aid Operations and the United Nations Office for the Coordination of Humanitarian Affairs indicate that approximately 420,000 people were affected across the three countries (Malawi, Mozambique and Madagascar). In Mozambique, 16 fatalities, 135 injuries, nearly 385,000 affected individuals, and over 88,000 damaged houses were reported. Madagascar recorded one fatality, more than 15,000 affected people, and nearly 4,000 damaged houses, while in Malawi approximately 20,650 people were affected and about 4,900 displaced from the 4588 damaged households as shown in Figure 30 (European Commission, 2026; UN OCHA, 2026).

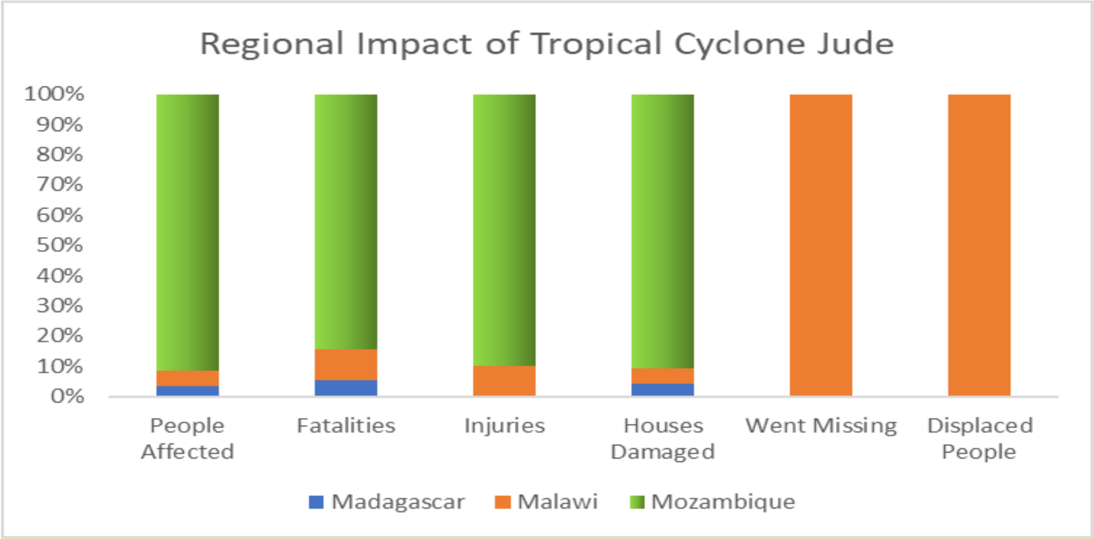


Figure 30: Regional impact of Tropical Cyclone Jude

5.1.1.3 Lightning

Notably, the season recorded a significant increase in lightning-related fatalities, which accounted for 26 out of the 39 rain-related deaths reported by early March 2025 (DoDMA, DCCMS 2025), Figure 31.

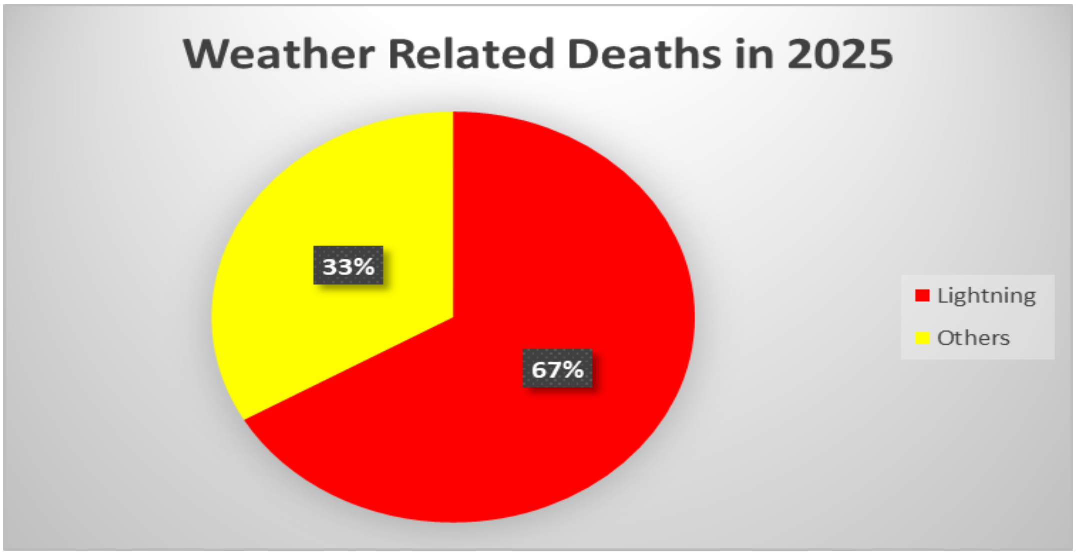


Figure 31: Proportion of deaths due to lightning compared to other climate related disasters

5.1.1.4 Nkhotakota Flood Episodes

Dwangwa in Nkhotakota District emerged as the most severely affected area during the season, primarily due to intense rainfall associated with the Inter-

Tropical Convergence Zone (ITCZ) between 26 and 31 December 2025. During this period, Nkhunga, located within the Dwangwa area, recorded over 750 mm of rainfall during the last 5 days of December 2025.

In Nkhotakota District alone, more than 10,772 households were affected, with a significant proportion displaced and accommodated in temporary shelters, Figure 32. The affected populations required sustained humanitarian assistance, including the provision of food and non-food items, restoration of essential services, and rehabilitation of public infrastructure. The flooding events also resulted in fatalities and injuries, as well as extensive damage to housing, household property, and critical infrastructure, including roads (e.g., the M05 road), bridges, water supply systems, and educational facilities (DoDMA, 2025) as shown in Figures 33

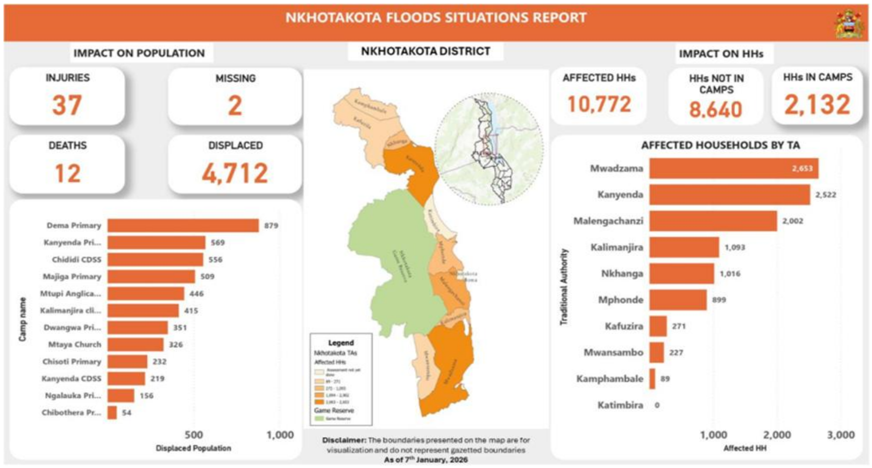


Figure 32: Effects of Nkhotakota floods in December 2025; Source DODMA 2025

Figure 33: Extent of Nkhotakota floods in December 2025.Source: The Guardian Malawi, December 2025

5.2 Agriculture and food security

Malawi's economy is predominantly agricultural based. Agriculture accounts for 30% of Gross Domestic Product and generates over 80% of national export earnings. Furthermore, the agriculture sector employs 64% of Malawi's workforce. (National Agriculture Policy, 2016). Malawi is extremely vulnerable to weather and climate shocks. Malawi's agricultural production is mainly rain fed. With evident changes in seasonal rainfall characteristics such as onset, cessation, seasonal length among others, agricultural production and indeed food security is greatly affected at all levels. A summary of 2024/2025 season agricultural performance is given in the sections below.

5.2.1 Agricultural production

5.2.1.1 Crop production

There were several factors which affected agricultural production in the 2024/2025 season. Of the weather and climatic factors, prolonged dry spells during December across the country and the sub-season January-February-March (JFM) particularly over some areas of the country provided suitable conditions for pests and diseases as captured in Figure 34, 35 and 36. Extreme rainfall experienced in some parts of the country that led to flooding which resulted in crop washaways. These had a negative impact on agricultural production both at local and national scale. In total, about 1.119.793 households were affected due to floods, dry spells and hailstorms, Table 1. The most affected ADD was Blantyre followed by Salima due to dry spells.

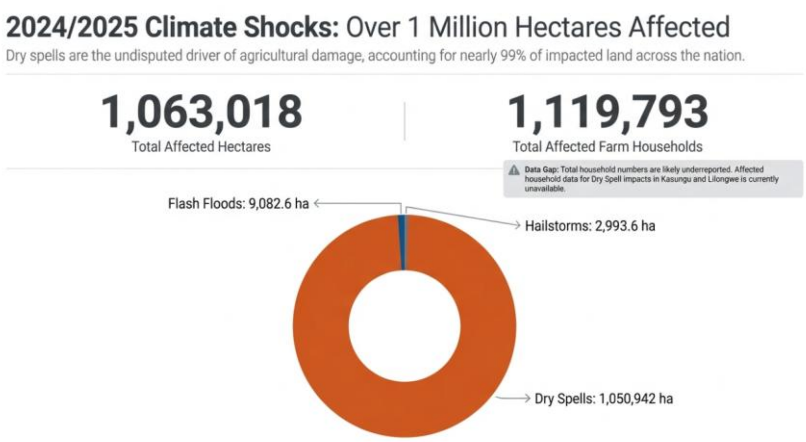


Figure 34: 2024/2025 Impacts of climate shocks on agriculture production (APES, 2025)

1,218,184 households were affected by Fall Armyworms in all the eight ADDs. The worst hit were Kasungu, Lilongwe and Machinga ADDs, Figure 35. African armyworm infestation was in all of the ADDs except northern ADDs including Karonga, Mzuzu and Kasungu ADDs. The worst hit ADD was Salima, Table

MACRO INSIGHT: 16% of the total area affected by Fall Armyworm in 2024/2025 has been controlled so far, affecting 1.22M farm households.

ADD	Degree	Area Affected (Ha)	Area Controlled (Ha)	Level of Infestation (%)	Affected FHHs
Karonga	Mild to Severe	26,027.0	13,067.0	32	52,854
Mzuzu	Moderate	30,514.0	24,411.0	17	81,370
Kasungu	Mild	158,953.0	93,269.0	3	265,056
Lilongwe	Mild	156,179.0	60,535.0	2	267,577
Salima	Mild to Moderate	10,191.0	3,329.0	10	37,596
Machinga	Mild to Severe	100,145.0	32,298.0	29	257,442
Blantyre	Mild to Severe	101,034.2	39,037.3	22	187,570
Shire Valley	Moderate to Severe	16,696.0	12,553.0	13	68,719
Total		**599,739.2**	**278,499.3**	**16**	**1,218,184**

Ha = Hectares; FHHs = Farm Households

Figure 35: 2024/2025 Fall Armyworm infestation as per Farm Household as per Farm Household (APES, 2025)

MACRO INSIGHT: Climate shocks affected over 1.06M hectares of farmland and more than 1.12M farm households in 2024/2025, with dry spells causing the largest share of damage.

ADD	Disaster	Degree of Damage	Affected Hectarage (Ha)	Affected Farm Households (FHHs)
Karonga	Dry Spells	Moderate to severe	39,618.5	47,258
	Flash Floods	Severe	6,319.5	27,119
Mzuzu	Dry Spells	Mild to severe	9,058.7	24,674
	Hailstorm	Mild to severe	1,887.9	1,620
	Flash Floods	Mild to severe	1,077.0	3,746
Kasungu	Flash Floods	Severe	85.7	287
	Hailstorm	Mild to severe	301.7	598
	Dry Spells	Moderate to severe	281,328.0	–
Salima	Dry Spells	Mild to severe	27,336.2	64,667
	Flash Floods	Mild to severe	222.0	673
Machinga	Dry Spells	Mild to severe	97,940.0	165,013
	Flash Floods	Mild to severe	1,218.0	3,775
Shire Valley	Dry Spells	Moderate to severe	24,479.6	69,651
	Flash Floods	Mild	160.4	539
Blantyre	Dry Spells	Moderate to severe	384,890.0	705,898
	Hailstorm	Moderate to severe	804.0	4,275
Lilongwe	Dry Spells	Mild to severe	186,291.0	–
Total			**1,063,018.2**	**1,119,793**

Ha = Hectares; FHHs = Farm Households

Figure 36: Climate related impacts on crop production in 2024/2025 growing season (APES 2025).

Despite the climate disasters and disease manifestation (Figure 36), the crop production was higher than that of the 2023/2024 season for all the crops, Figure 37. Cotton registered the highest production at 166%. Wheat production was at 43.4% higher, sorghum 39.8%, cowpeas 35.1% while maize was at 5.4%.

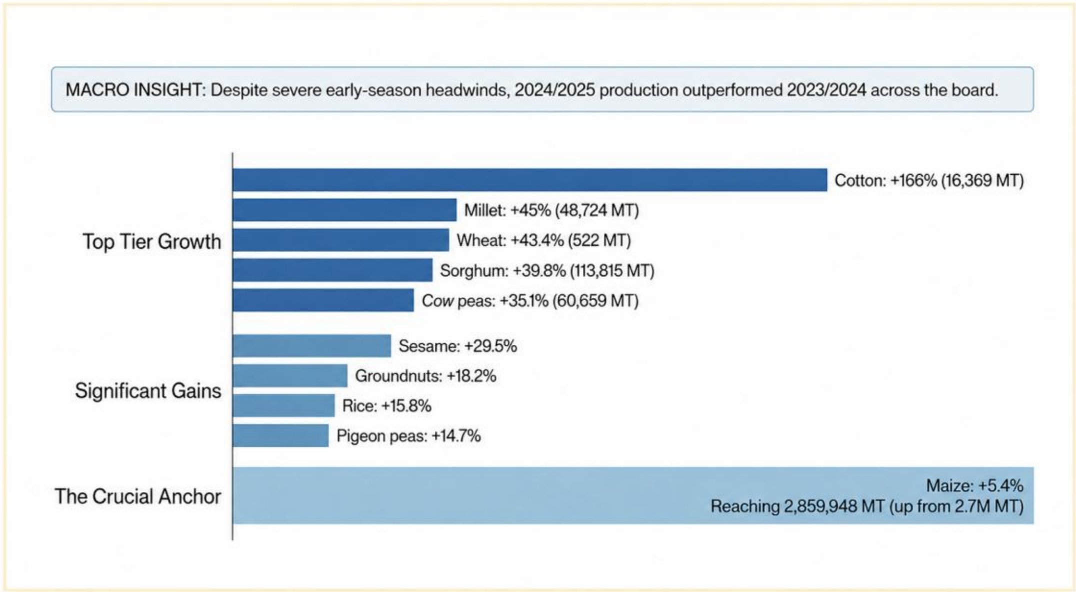


Figure 37: 2024/2025 National crop production compared to 2023/2024 season (APES, 2025)

Though at national level, maize production had increased by 5.4%, there were some ADDs which suffered severe reduction. These include Blantyre and Karonga ADDs which had a reduction of 27.9% and 20.7% respectively. These ADDs were compensated by Shire Valley, Machinga and Lilongwe ADDs that registered the increase by 44.9%, 32.9% and 13.8% respectively, Figure 38.

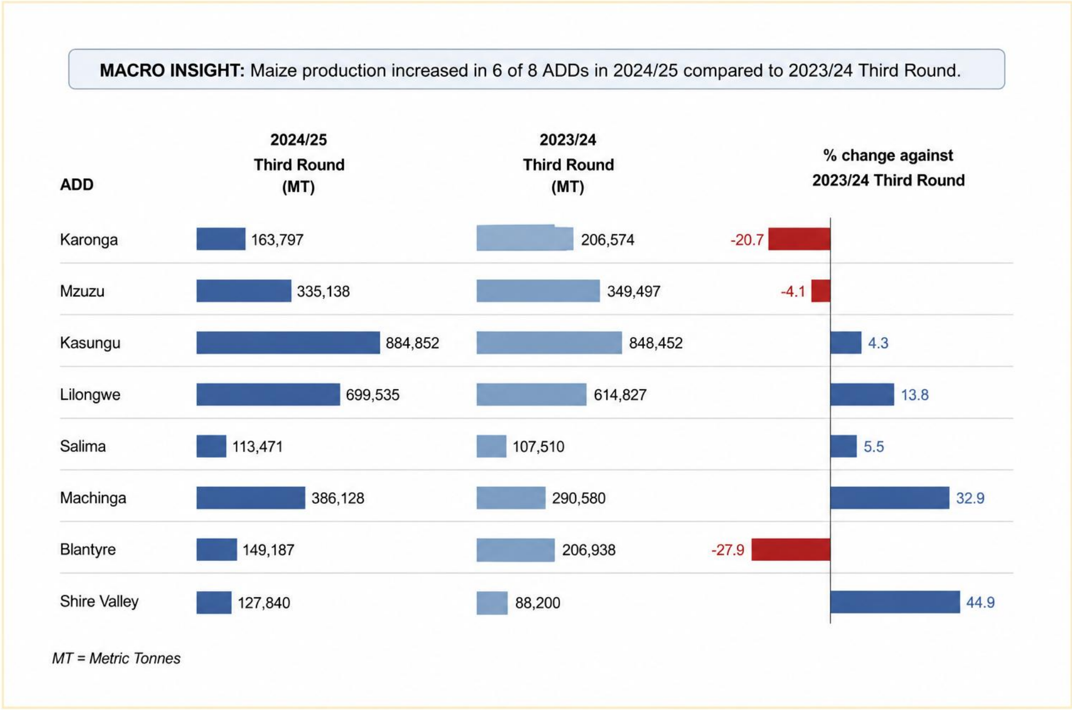


Figure 38: 2024/2025 maize production by ADD compared to 2023/2024 season (APES, 2025)

5.2.1.2 Animal husbandry

Livestock management records varied when compared to the previous season. While some animals such as pigeons, pigs, sheep, turkey, goats, rabbits, cattle, and ducks increased from 2023/2024 season to 2024/2025 season, guinea fowls and chickens reduced, Figure 39.

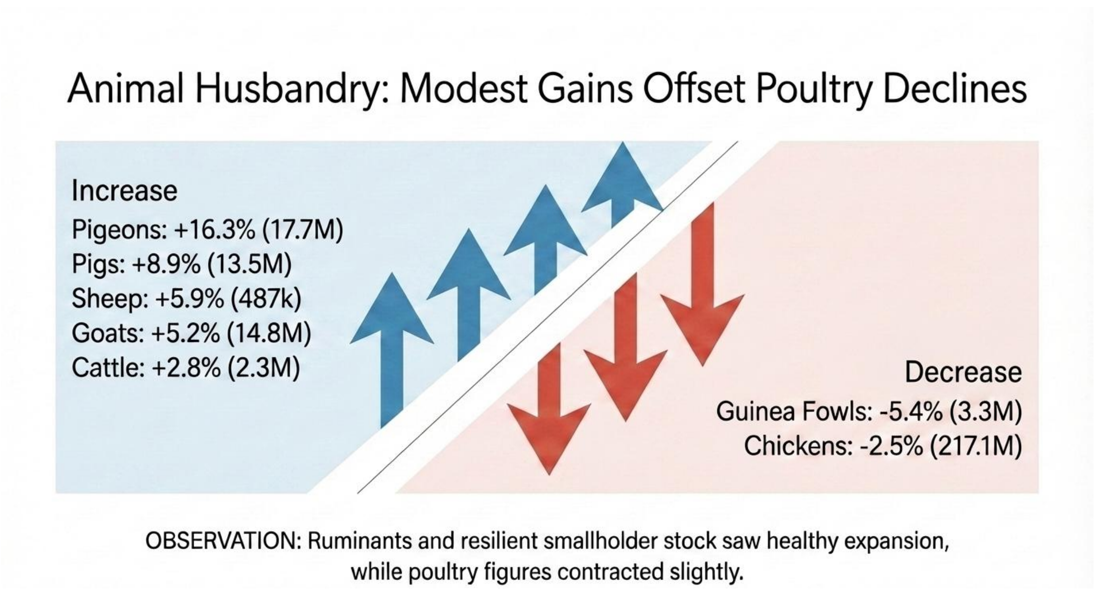


Figure 39: 2024/2025 livestock production compared to 2023/2024 season (APES, 2025)

5.2.2 Food security

The increased crop production indicated in 5.2.1, resulted in improved food security in 2025 compared with 2024. 9.7% of farm households (FHs) did not have food from their own production in May 2025 as compared to 13.8% in May 2024. Blantyre ADD had the highest rate of food insecure households (23.1%), with the lowest being Kasungu (2.4%) as displayed in Figure 40 below.

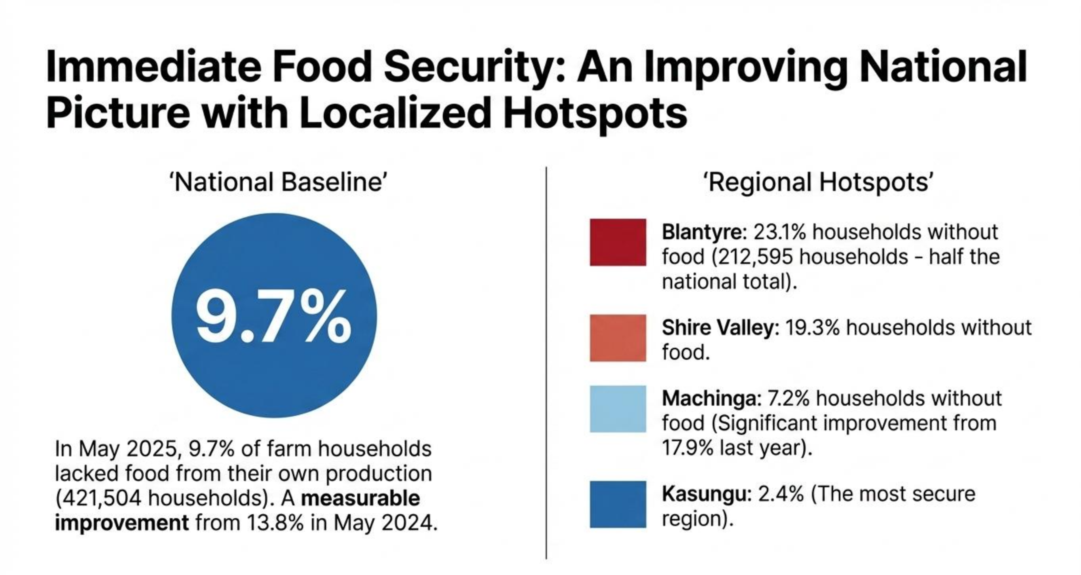


Figure 40: 2024_2025 Farm Households without food from own production as of June 2025 (APES, 2025)

According to the Malawi Vulnerability Assessment Committee (MVAC) October 2025 report, 4 million people (22 percent of the analysed population) were expected to experience high levels of acute food insecurity, classified as IPC Phase 3 or above (Crisis or worse) between October 2025 and March 2026. Of that total, 8,000 people were expected to face critical levels of acute food insecurity, IPC Phase 4 (Emergency), driven by high food prices, economic decline and below average agricultural production. Phase 4 is characterised by large food gaps and high levels of acute malnutrition. These people urgently required immediate, life-saving assistance to prevent a catastrophe. More as captured in Figure 41.

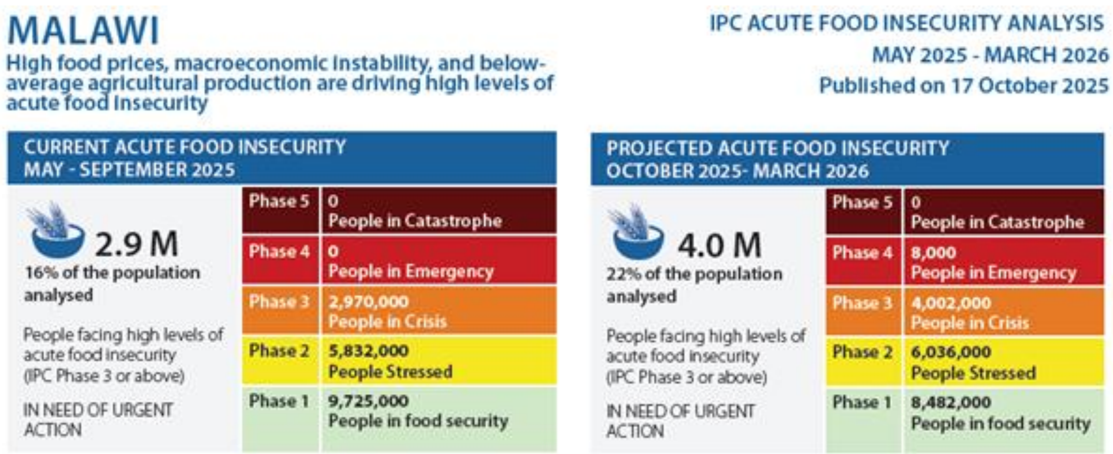


Figure 41: Acute food insecurity situation (IPC Malawi, Malawi: IPC Acute Food Insecurity Analysis, October 2025 - March 2026)

5.3 Water Resources

Water resources constitute a fundamental pillar of Malawi's socio-economic development, underpinning agricultural production, energy generation, environmental sustainability, domestic water supply, and ecosystem integrity. In 2025, the **quality, quantity, and accessibility** of these resources were significantly influenced by evolving weather patterns, largely exacerbated by the impacts of climate change. Weather conditions play a critical role in determining water availability, access, and quality within a given area.

Climatic factors—particularly rainfall, which serves as the primary source of surface and groundwater recharge in Malawi—directly affect the volume, distribution, and quality of water stored in lakes, rivers, and aquifers. Variability in weather and climate, including droughts and episodes of excessive rainfall, can therefore have profound implications for water resource availability and reliability.

During 2025, Malawi experienced **significant spatial and temporal variation in the distribution of rainfall**, characterized by prolonged dry spells in some parts of the country. These conditions resulted in reduced river flows and declining reservoir levels, thereby adversely affecting irrigation schemes and domestic water supply, especially in rural communities. Conversely, periods of intense rainfall led to localized flooding, which overwhelmed drainage systems within catchments. This did not only result in water losses, but also posed challenges to effective water resource management, undermining efforts toward sustainable development.

Heavy rains, while critical for recharge, also led to increased sedimentation and pollutant runoff into rivers and lakes. Poor drainage systems in urban areas and soil erosion during storms exacerbated contamination, affecting water for drinking and irrigation. Additionally, elevated temperatures possibly heightened the risk of algal blooms in stagnant water bodies, further degrading water quality.

5.3.1 Lake Malawi Water Levels

Lake Malawi has a surface area of approximately 28,760 square kilometres and an estimated total volume of 7,725 × 10^9 cubic metres at a mean lake level of 474.93 metres above sea level (Mtilatila, et al 2020)

In 2025, the lake experienced a notable increase in water levels, exceeding those recorded over the past decade as depicted in Figure 42. This sustained rise suggests a corresponding expansion in the lake's surface area over time, as higher water levels lead to the inundation of adjacent low-lying areas.

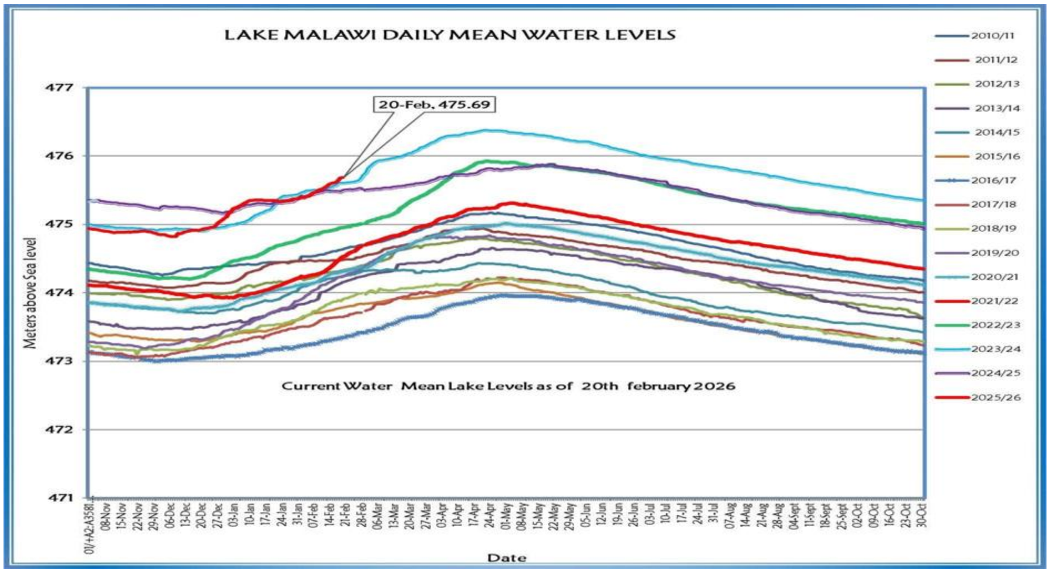


Figure 42: Lake level for Lake Malawi from 2010 to February 2026. The purple graph shows the 2025 trajectory. Source – National Water Resources Authority

Water levels exceeded historical averages, **peaking at approximately 475.86 metres above sea level (masl) in April 2025**. This peak is the third highest level in recent years, where the highest was in 2023/2024 season. This significant rise resulted in the displacement of some lakeshore communities, loss of crops and agricultural land. Furthermore, rising water levels in Lake Malawi negatively impacted lakeside hotels, affecting overall tourism industry performance.

5.4 Transport

5.4.1 Road Transport

Extreme weather, characterised by intense rainfall and flash floods, severely impacted road transport in Malawi. Key infrastructure, including major roads and bridges in the northern, central, and lakeshore regions, were destroyed or submerged, disrupting trade routes and economic activities

In December, 2025, more than 13 districts were affected by floods. Nkhotakota was hit by two waves of devastating floods, with rainfall exceeding 285 mm in a single day, causing damage to transport networks. Floods in December disconnected the Northern Region from the rest of the country, with significant disruptions along the M1 road between Kasungu and Mzimba and the M5 Lakeshore Road between Nkhotakota and Nkhata Bay. Figure 43 shows the impact of flooding. In addition, A section of the Chizimbi Bridge on the Thabwa-Fatima road was partially damaged on 26th March 2025 due to Cyclone Jude, worsening the transportation on the Eastern Bank of Shire River.

Figure 43: Floods swept away Mpasadzi Bridge: National Online (31 December 2025)

5.4.2 Air Transport

Adverse weather conditions disrupted air transport operations in Malawi. In January 2025, heavy rains delayed Malawi Airlines from landing at Chileka International Airport in Blantyre before proceeding to Johannesburg. In November 2025, thick fog forced aircrafts to perform flyovers, fly-arounds and diversions, resulting in delayed landings and rerouted flights. These disruptions caused significant socio-economic consequences.

Pilots also reported experiencing light to moderate turbulence and episodes of wind shear during these weather events, further complicating flight operations and increasing safety risks.

5.4.3 Rail Transport

The rail network is also vulnerable to weather extremes such as floods. The southern rail corridors, including sections along the Shire River, the inclinations around Chiromo, Bangula, and the Ruo River alignments, as well as lakeshore corridors in riverine and low-lying areas, are particularly susceptible.

In 2025, no major public incidents were reported. Heavy rains and floods did not cause severe damage, washouts, embankment failures, track submersion, ballast displacement, debris coverage, or long suspensions of operations on the network. Despite this, the system remains exposed to climate risks, and it is still vulnerable to future weather extremes; this calls for the need of investmenting in climate-resilient rail infrastructure.

5.4.4 Marine Transport

During the winter months of May to August, extreme northerly, southerly and south-easterly winds are experienced across Malawi. They stir up Lake Malawi and other water bodies such as the Shire River and Lake Chirwa. These winds, though seasonal and expected, bring with them powerful waves and unstable conditions that make water transport risky.

On 27th December 2025, At least 35 residents from Likoma Island spent the night on Chizumulu Island after their boat developed engine problems due to strong Northeasterly winds also known as *Mpoto winds*.

5.5 Energy

The energy sector in Malawi is highly vulnerable to the impacts of climate variability and extreme weather events. The country's current installed electricity generation capacity is approximately 550 MW, comprising 398 MW (73%) from hydropower, 101 MW (18%) from solar energy, and 52 MW (9%) from thermal (diesel) sources. In addition, a 10 MW biomass plant has recently been commissioned (MERA, 1.2 Malawi Energy Context). Despite this diversification, hydropower remains the dominant energy source, thereby exposing the sector to hydrological variability and climate-related risks.

Renewable energy technologies, while essential for diversification, are inherently dependent on weather conditions. Extreme weather events—such as intense solar radiation, storms, and flooding—can negatively affect energy infrastructure, including solar panels, wind turbines, and hydropower systems. This underscores the sensitivity of the energy sector to climatic extremes.

In response to these challenges, Malawi's solar energy sector experienced significant expansion in 2025. This growth was driven by utility-scale projects and increased rural electrification initiatives aimed at addressing persistent energy supply challenges. However, global evidence highlights the magnitude of climate-related risks; according to S. Shen et al. (2025), extreme climate events contribute approximately 74.51% of statistically significant impacts at the global scale.

Figure 44: Electricity pole that fell due to heavy rains and strong winds in Lilongwe on 10 December 2025. Zodiak Online. (2025, 12 10. https://www.zodiakmalawi.com/)

At the national level, the effects of extreme weather were evident on 10 December 2025, when Lilongwe experienced heavy rainfall accompanied by strong winds. This event caused extensive damage to infrastructure, including fallen trees and electricity poles, leading to power supply disruptions across several areas, Figure 44.

5.6 Health

Similar to 2024, the year 2025 also had significant weather- and climate-related health implications. On 8th January 2026, the Department of Disaster Management Affairs (DoDMA) issued a press statement noting that since the onset of the 2025 rainy season, disasters—mainly stormy rains, strong winds, flash floods, and lightning—had affected 29 councils. A section of the Chizimbi Bridge on the Thabwa-Fatima road was partially damaged on 26th March 2025 due to Cyclone Jude, worsening the transportation of patients on the East Bank, Figure 45. The Administrator of Trinity Hospital lamented the challenges of ferrying patients to Queen Elizabeth Central Hospital in Blantyre for tertiary care and urged the government to take action (Zodiak Online, 26th March 2025). DoDMA recorded 36 deaths, 168 injuries, and 2 missing persons since the onset of the 2025 rainy season (DoDMA, 8th January 2026).

Figure 45: Chizimbi bridge Thabwa-Fatima road partly damaged disrupted ferrying of patients to Queen Elizabeth Central Hospital in Blantyre for tertiary care (Zodiak Online 26 March 2025)

The 2024/2025 rainfall season characterized by erratic rainfall, dry spells, and tropical cyclones, including Cyclone Jude, negatively impacted agriculture and led to food insecurity and rising malnutrition. The year began with 5.7 million people facing acute food insecurity between January and March (UNICEF, 2025). From January to September 2025, severe acute malnutrition admissions rose by 20 percent, while moderate acute malnutrition admissions surged by 69 percent (UNICEF, 2025). Additionally, disease outbreaks were reported, including cholera (from 8th September 2025), measles (April), and Mpox.

5.7 Education

Impacts of extreme weather and climate events manifested clearly in the education sector in Malawi during 2025. The profound impacts include damage to education infrastructure, administrative challenges, gender disparities, psychological and emotional strain and loss of lives. In 2025, extreme weather events such as heat waves, flash floods, strong winds, thunderstorms and tropical cyclones disrupted the education system in Malawi profoundly.

In March 2015, Tropical Storm Jude swept across southern Malawi, prompting the government to close all schools in 16 districts from March 10 to March 13 (SABC News, 2025). For many communities, the arrival of Jude triggered painful memories of Cyclone Freddy just two years prior, with residents expressing deep anxiety about facing another disaster while still rebuilding their lives (World Vision International, 2025).

One of the most visible impacts of extreme weather in 2025 was the destruction of education infrastructure. In January, authorities in Kasungu District reported that Cyclone Chido had blown off roofs from hundreds of structures across 51 primary schools—including classroom blocks, kitchens, toilets, and teachers' houses (Malawi News Agency, 2025). At Kadamsana Primary School alone, seven teachers' houses were destroyed, creating an accommodation crisis that threatened to undermine teaching quality as schools reopened (Malawi News Agency, 2025).

The problem was not unique to Kasungu. Across the country, schools repeatedly found themselves repurposed as shelters for displaced populations. As noted by Edwin Kanyoma, Deputy Director of Planning at Malawi's Ministry of Basic and Secondary Education, classrooms have increasingly become places of refuge for families fleeing floods and storms—a practice that, while humanitarian, further disrupts teaching and learning (IIEP-UNESCO, 2025).

Prior to Tropical Storm Jude, severe hailstorms accompanied by strong winds struck Ntchisi District in February 2025, causing extensive damage to school infrastructure. According to a 247Malawi news report from February 8, 2025, fourteen primary schools in the district had their classroom blocks severely damaged by the storms (247Malawi News, 2025). The damaged infrastructure forced learners into inadequate learning environments. District Senior Primary Education Advisor Annie Chazema reported that affected students were forced to study in "overcrowded spaces, makeshift shelters, or even under trees" (247Malawi News, 2025). Among the affected schools were Sopani, Chinthungwa, Makanda, Chibweya, and Mpherere (247Malawi News, 2025) as depicted in Figure 46.

Figure 46: Destroyed Mpotola Primary School in Ntcheu district (Times360 19 November 2025)

Beyond physical infrastructure, a more serious threat emerged in 2025: hunger-driven absenteeism. The El Niño drought that began in late 2024 continued to tighten its grip, with the Malawi Vulnerability Assessment Committee reporting that 5.7 million people required urgent food aid (World

Food Programme, 2025b). The lean season—typically from October to April 2025—stretched longer than usual, pushing families to make impossible choices.

The impacts of climate shocks in 2025 were not distributed equally. As families faced food shortages, girls were disproportionately affected. Reports from the field indicated that adolescent girls were often forced to travel longer distances to collect water or engage in manual labour to supplement household income, increasing their exposure to gender-based violence and sexual exploitation (World Vision International, 2025). This pattern—already documented during the 2024 El Niño crisis—persisted into 2025, highlighting how climate change compounds existing gender inequalities in education.

Another weather hazard that affected the education sector in 2025 was heatwave. Edwin Kanyoma, Deputy Director of Planning at the Ministry highlighted that during heatwaves, many learners would be absent from class because of the extreme temperatures (IIEP-UNESCO, 2025a). The heatwave forced families to make difficult choices about whether to send their children to school at all. In most rural areas, children walk long distances to reach their schools. The journey became hazardous under the scorching sun. In urban centers, overcrowded classrooms with inadequate ventilation trap heat. That created environments that were both physically uncomfortable and psychologically draining. Parents, concerned about their children's wellbeing, often chose to keep them home. For students who did attend class during heatwaves, the quality of their learning experience was severely compromised.

Chapter Six

6.0 Conclusion

The 2024/2025 rainfall season in Malawi was characterized by a delayed onset and marked spatial and temporal variability. The Intertropical Convergence Zone (ITCZ) established later than usual, while the Congo air mass was notably suppressed, contributing to erratic rainfall distribution across the country. Seasonal rainfall was generally normal to above normal over the southern half of the country and normal to below normal over much of the north, while cumulative rainfall at selected stations remained predominantly below the 1991–2020 average. The season began with predominantly dry conditions, especially in October and December, and additional dry spells were observed in February. Salima District recorded four consecutive dry months and Kasungu District three, with these conditions contributing to germination failure, delayed planting, crop water stress, and worsening food insecurity. As the situation deteriorated, the Government of Malawi declared a state of disaster in 11 districts in early 2025.

Temperature conditions in 2025 were generally near-normal to slightly above average across much of the country, although strong local contrasts were observed. Localized warming was evident over Kasungu, while cooler-than-average conditions were recorded in parts of the far north. At the monthly scale, maximum temperatures were highest during September and October, with October emerging as the peak month, while minor heatwave events were reported during the January to April period and again in October. On the lower side, minimum temperatures set new records at stations such as Nkhotakota and Chichiri, reflecting continued temperature variability across the country.

Malawi also experienced several extreme weather events during the year. Heavy rainfall from January to April triggered flash floods mainly over southern and lakeshore areas, resulting in deaths, injuries, displacement, and widespread damage to homes, schools, roads, bridges, water systems, and other infrastructure in districts such as Mangochi, Chikwawa, Karonga, and Nkhotakota. Later in the year, intense rainfall associated with the ITCZ caused major flooding in Dwangwa, where Nkhunga recorded approximately 750 mm of rainfall over a six-day period and more than 15,000 people in Nkhotakota District were affected. Lightning also emerged as a major recurrent hazard, accounting for 26 of the 39 rain-related deaths reported by early March 2025.

The socio-economic impacts of these climate shocks were widespread. During the 2024/2025 season, 24,643 households were affected by various hazards, while approximately 2.9 million people experienced food insecurity linked to dry spells. Key sectors affected included agriculture, transport, energy, health, education, water resources, and disaster risk reduction. Rising Lake Malawi water levels, which peaked at approximately 475.86 metres above sea level in April 2025, displaced some lakeshore communities, caused loss of crops and agricultural land, and negatively affected lakeside hotels and tourism performance.

Throughout the year, the Department of Climate Change and Meteorological Services (DCCMS) played a central role in providing forecasts, warnings, and Common Alerting Protocol (CAP) alerts, which were critical for preparedness and timely decision-making. The PRISM initiative was highlighted as an important step in strengthening drought preparedness and anticipatory action. Overall, the findings underscore the need for sustained investment in climate services, early warning systems, anticipatory action, and climate-resilient adaptation measures to support timely decision-making and reduce future loss and damage.

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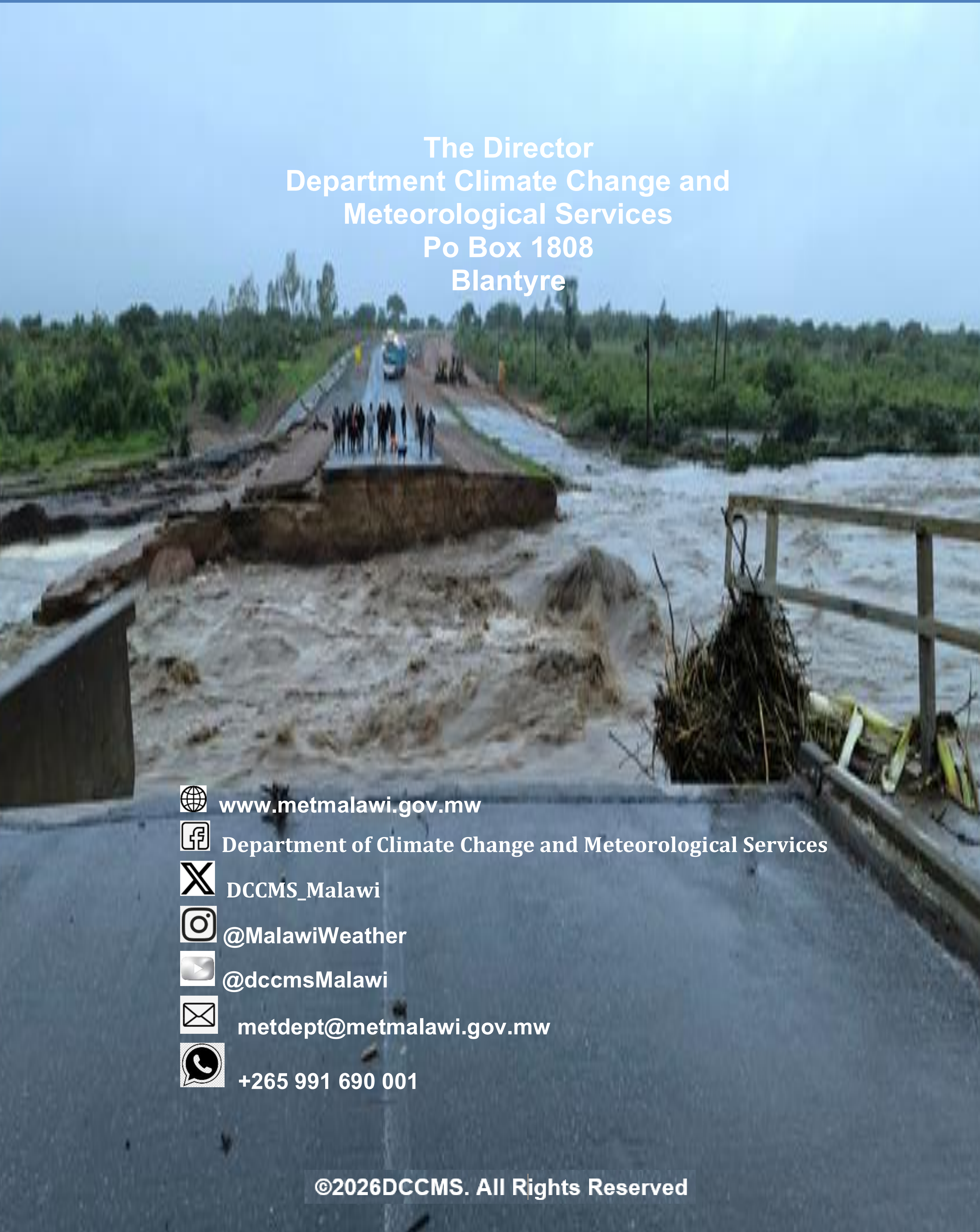

The Director
Department Climate Change and Meteorological Services
Po Box 1808
Blantyre

www.metmalawi.gov.mw
Department of Climate Change and Meteorological Services
DCCMS_Malawi
@MalawiWeather
@dccmsMalawi
metdept@metmalawi.gov.mw
+265 991 690 001