Africa RiskView

MID-SEASON REPORT | SUDAN (2021)

This ***Africa RiskView* End of Season Report** is a publication by the **African Risk Capacity (ARC)**. The report discusses *Africa RiskView's* estimates of rainfall, drought and population to be affected, comparing them to information from the ground and from external sources. It also provides the basis of a validation exercise of *Africa RiskView*, which is conducted in each country at the end of an insured season. This exercise aims at reviewing the performance of the model and ensuring that the country's drought risk is accurately reproduced by *Africa RiskView* for drought monitoring and insurance coverage. The mid-season-sowing reports are also being continuously refined with a view to providing early warning to ARC member countries.

HIGHLIGHTS:

Rainfall:

- The 2021 season was characterised by an early onset of rainfall.
- The cumulative rainfall received from 11 June to 31 August 2021 (dekad 17-24) was generally above average over most parts of the country.
- Slightly below-normal rainfall was observed during the last two dekads of August over Kassala, North Kordofan, West Kordofan and Darfur.

Drought:

- As per the predefined sowing criteria in *Africa RiskView*, sowing for the 2021 season was successful over most parts of the country except for the northern parts of North Darfur, western half of Khartoum and Gezira and North Kordofan.

Affected Populations:

- As at 31 August 2021, the Africa RiskView projected that 473,728 people would be affected by drought by the end of the cropping season, i.e., 20 November 2021.
- It is important to note that this figure is subjected to change based on rainfall performance for the remainder of the season.

Rainfall

Since the start of the season on the 11th of June 2021 up to 31 August 2021, the rainfall performance was generally above normal over most parts of the country. Very few localised areas mostly over the northern parts of North Darfur and Northern state experienced below normal rainfall (Figure 1 & 2). Since most of these areas with below normal rainfall lie outside the crop mask, no significant impact on the crop production is anticipated.

In terms of the temporal distribution of precipitation, the rainfall started off in the southern parts of Sudan and gradually expanded to cover most parts of the country (Figure 3). Most of the widespread rainfall was received in August and this rainfall was concentrated over the eastern and western half of the country.

The cumulative rainfall received from the start of the season on the 11th of June up to 31st of August was generally above normal with most rainfall mostly concentrated over the central and north-eastern parts of the country (Figure 2). The states which recorded significant above normal rainfall include North Kordofan and Central Darfur.

In terms of the monthly rainfall performance compared to long-term average, most of the above normal rainfall was concentrated over the central and eastern parts of the country during the month of June and July (Figure 4). The most notable areas which received above normal

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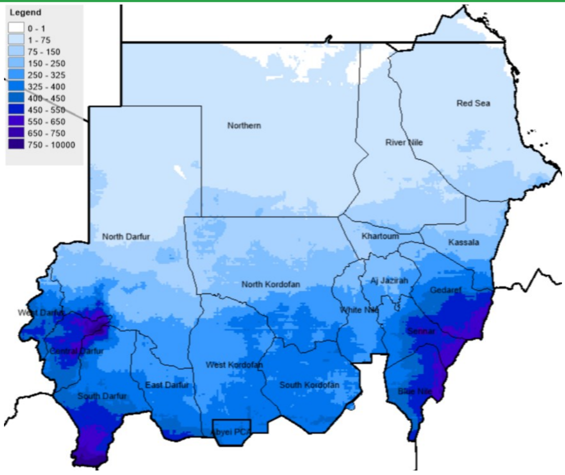

FIG 1: CUMULATIVE RAINFALL (MM) RECEIVED (11 JUNE -31 AUGUST), BASED ON CHIRP SATELLITE ESTIMATES.

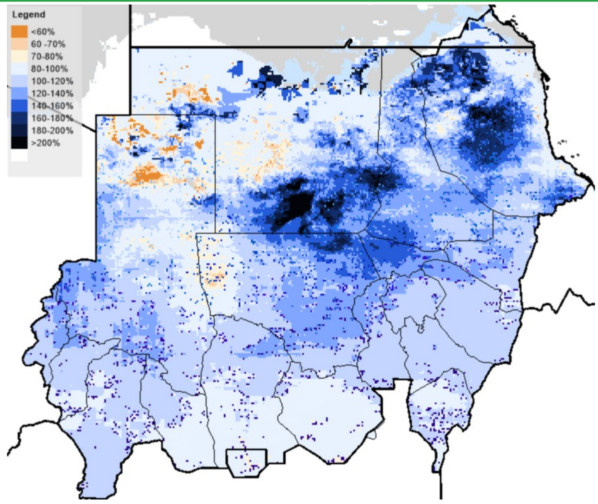

FIG 2: CUMULATIVE RAINFALL ANOMALY (MM) (11 JUNE -31 AUGUST)

rainfall during this period include Northern Kordofan, Khartoum and Gezira. The June rainfall over these areas was more than two times the above average (Figure 4). In contrast, below normal rainfall was mostly recorded in August covering the areas bordering North Darfur, Northern and northern parts of North Kordofan states (Figure 4).

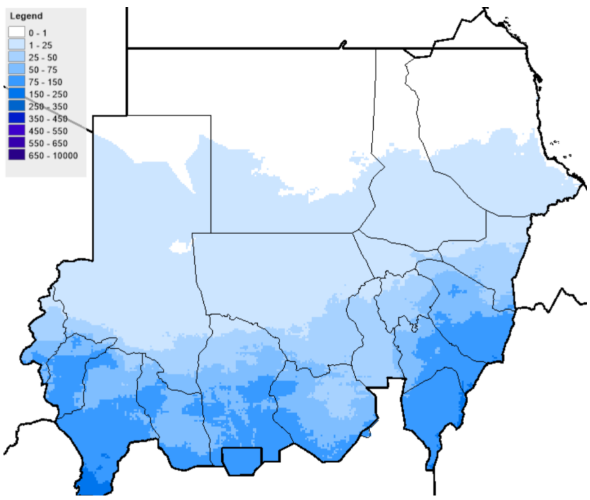

FIG 4: CUMULATIVE RAINFALL (MM) (11-31 JULY 2021)

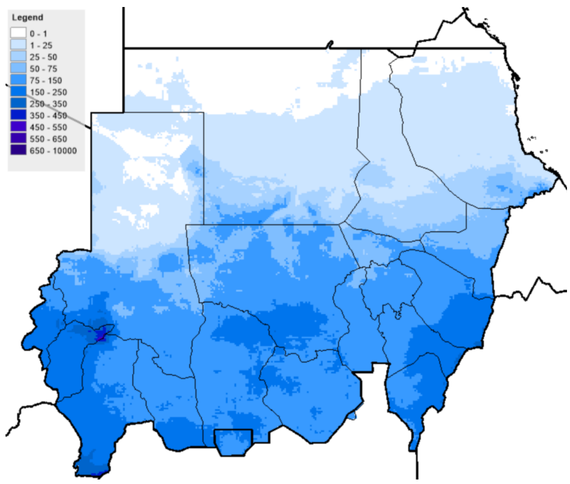

FIG 4: CUMULATIVE RAINFALL (MM) (JULY 2021)

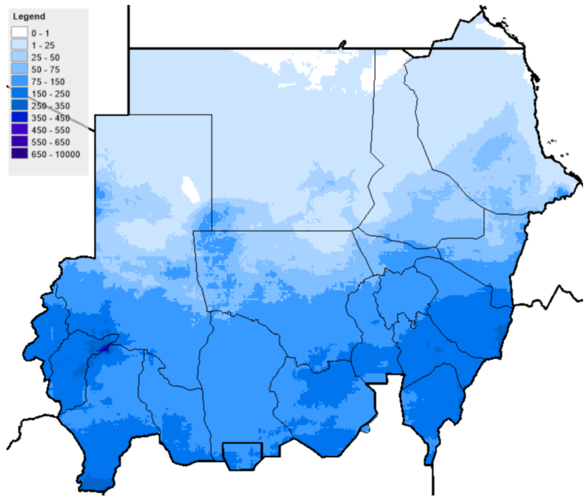

FIG 5: CUMULATIVE RAINFALL ANOMALY (MM) (AUGUST 2021)

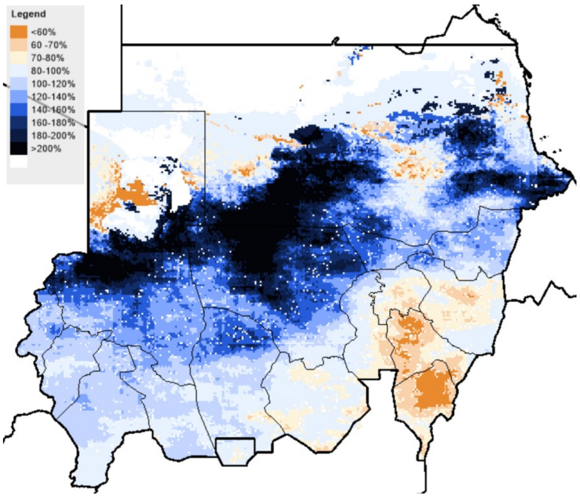

FIG 6: CUMULATIVE RAINFALL ANOMALY (MM) (JUNE 2021)

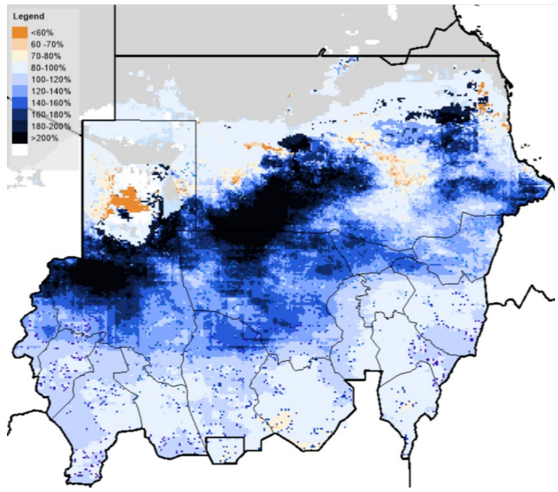

FIG 7: CUMULATIVE RAINFALL ANOMALY (MM) (JULY 2021)

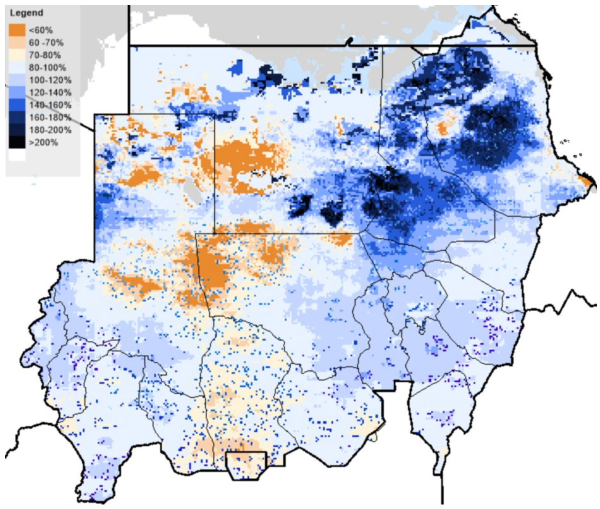

FIG 8: CUMULATIVE RAINFALL ANOMALY (MM) (AUGUST 2021)

DROUGHT INDEX: SOWING DATES

The computation of the drought index (WRSI) starts when the sowing conditions have been met. Sowing in Africa RiskView triggers with the fulfilment of dekadal rainfall criteria. This criterion for the agricultural drought model for Sudan requires 25mm of rain in any one dekad within the sowing window followed by at least 15mm of rain in the second dekad and 5mm in the third dekad. If this condition is not met, it is assumed that sowing was unsuccessful. Additionally, the "First" sowing opportunity aggregation method was assumed to model farmers response to sowing chances. According to this assumption, farmers are expected to take advantage of the first sowing opportunity when and if realized.

As per the sowing criteria described above, most parts of Sudan except for western half of Khartoum, northern parts of Kassala and parts of North Darfur and North Kordofan had successful sowing (Figure 5). The first sowing opportunity for most parts of the country was between dekad 18 and dekad 19 (21 June and 10 July). The earliest sowing was recorded in dekad 17 (11 June) and was mostly over the eastern parts of the country covering Gedarif and parts of Sinnar state (Figure 6).

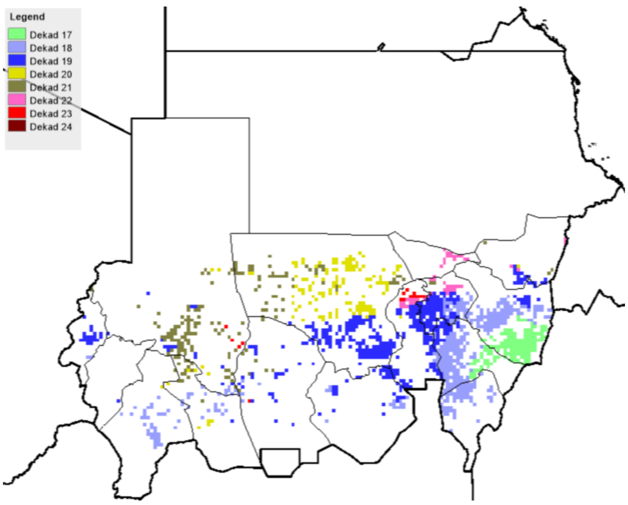

FIG 10: FIRST SOWING OPPORTUNITY IN SUDAN

DROUGHT INDEX :WRSI

Africa RiskView uses the Water Requirements Satisfaction Index (WRSI) as a proxy indicator for drought. The WRSI is an index originally developed by the Food and Agriculture Organisation of the United Nations (FAO) which, based on satellite rainfall estimates, calculates whether a particular crop is getting the amount of water it needs at different stages of its development. In Sudan, Sorghum was used as a reference crop to model the performance of the agricultural season.

As shown in Figure 7, the southern half of the country generally had good WRSI values with the remaining half

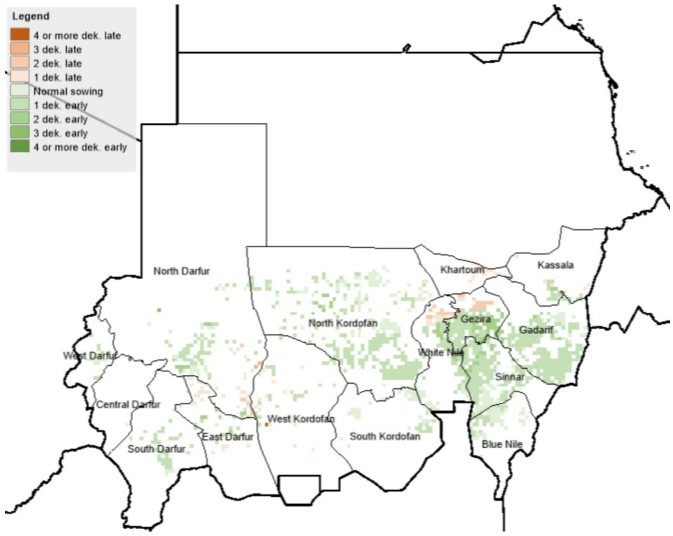

FIG 10: FIRST SOWING OPPORTUNITY ANOMALY IN SUDAN

of the country having poor WRSI values. Despite the low WRSI values over the northern half of the country, the comparison of the *Africa RiskView* projected WRSI with the benchmark (mean WRSI of the past 10 years) showed that, the end of season projected WRSI value for most parts of Sudan is normal to above normal over this area (Figure 8). This suggests that the WRSI in the northern half of the country is typically lower. WRSI values below the benchmark were observed over the south eastern

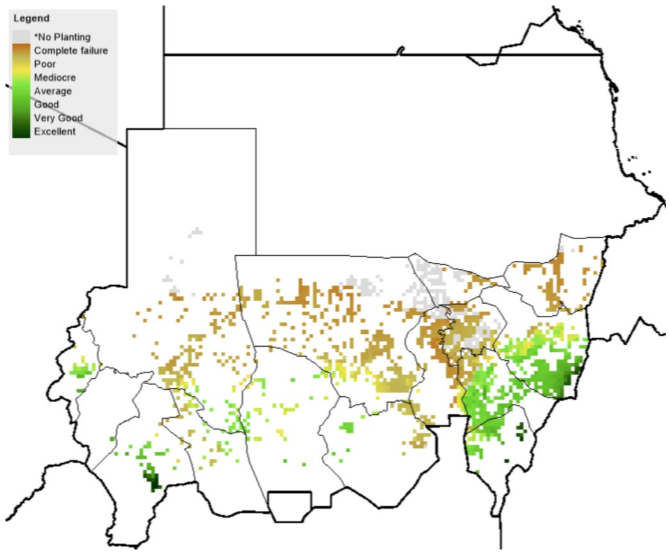

FIG 11: PROJECTED END-OF-SEASON WRSI AS AT 31 AUGUST 2021 (DEKAD24).

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parts of the country, especially over Blue Nile and southern parts of Sennar and Gadarif.

The WRSI model output is in line with the GEOGLAM crop monitor report (No. 64: Published September 2nd, 2021) which mapped the south eastern part of the country under the 'watch' category. The watch category indicates that the conditions are not far from average but there is a potential risk to final yields. These areas which were put under the "watch" category are also the ones with negative WRSI anomaly values (Figure 8)

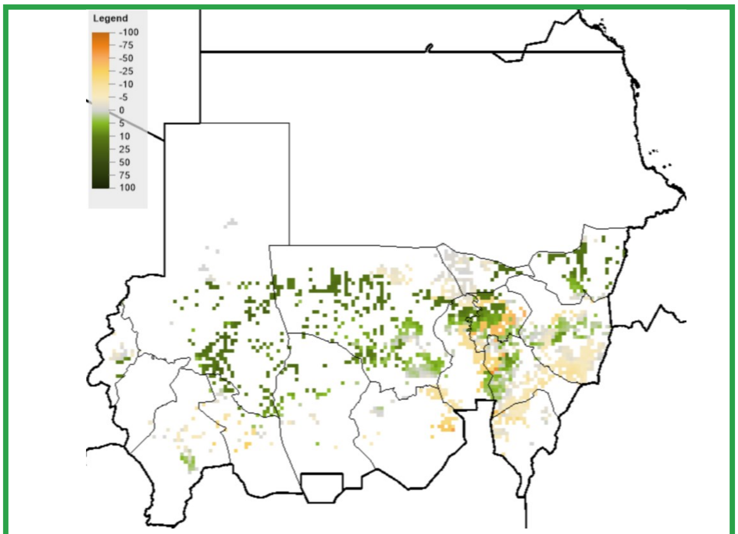

FIG 10: PROJECTED END-OF-SEASON WRSI ANOMALY AS AT 31 AUGUST 2021 (DEKAD24).

POPULATION AFFECTED

Given that the 2021 rainfall season has almost three months to finish, the precise prediction of the drought impact on the vulnerable populations is too early to make. However, the *Africa RiskView*, as at 31 August 2021, projects that 473,728 people will be affected by drought at the end of the season (Figure 9). It is important to note that, this figure is subject to change based on the rainfall performance during the remainder of the growing season ending on the 20th of November 2021.

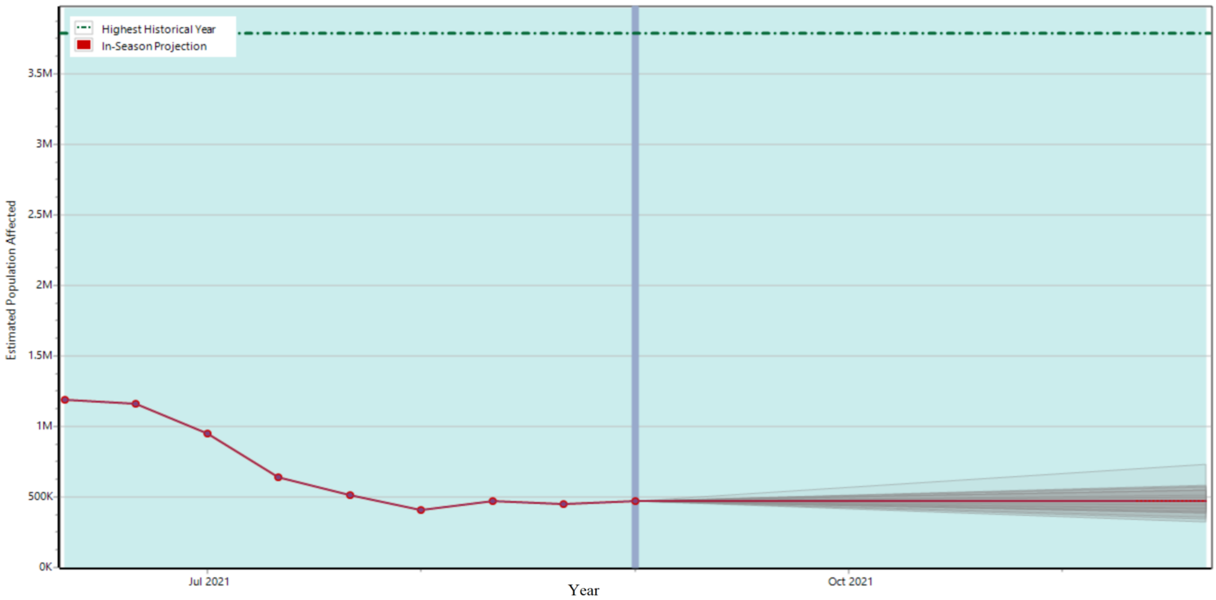

FIG 13: ESTIMATED NUMBER OF PEOPLE AFFECTED BY DROUGHT THE END OF SEASON

The Integrated Food Security Phase Classification (IPC) (Phase 3^{+}) estimated 5,514,537 to be food insecure between October 2021-February 2021. These estimates are for all states excluding Northern, River Nile and Red Sea which are not covered by the ARV estimates. The IPC figures vary much from ARV estimates because they consid-

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er multiple drivers of food insecurity. The IPC figures of food insecure population were driven by inter-communal conflicts (mostly in Darfur & Kordofan), high prices, low purchasing power and seasonal floods . Despite the mis-match between the IPC and ARV estimates, the IPC map (Figure 10) shows that most of the country is not under IPC Phase 3 classification (crisis) which is consistent with the rainfall and WRSI maps. The Phase 3 classification (crisis) is mostly in the eastern parts of the country and localities bordering North Darfur and North Kordofan (Figure 10). These areas under crisis are also the same areas which had negative rainfall and WRSI anomaly.

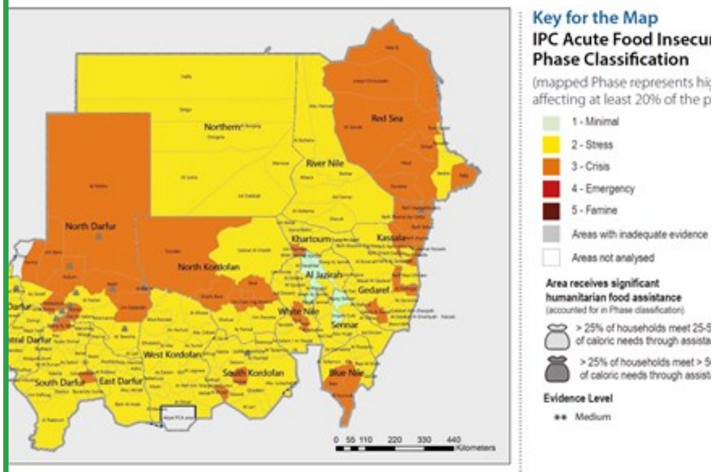

FIG 17:

ANNEX 1: RAINFALL PERFORMANCE GRAPHS

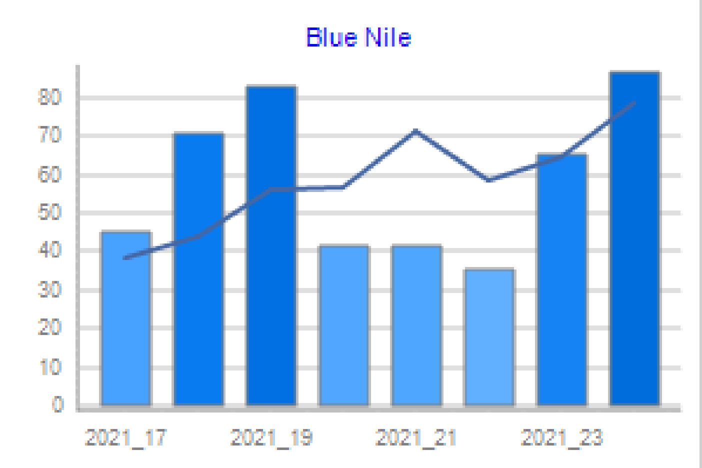

FIG 16: TEMPORAL DISTRIBUTION OF RAINFALL IN COPPERBELT COMPARED TO THE LONG-TERM AVERAGE (DEKAD 32 TO DEKAD 12), RFE 2.

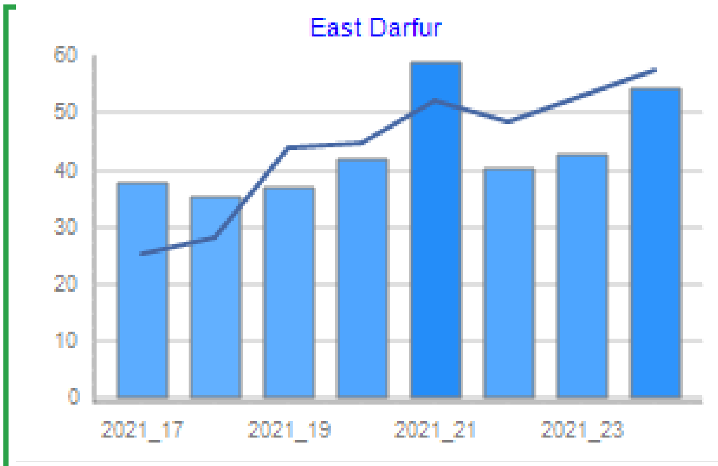

FIG 17: TEMPORAL DISTRIBUTION OF RAINFALL IN EASTERN COMPARED TO THE LONG-TERM AVERAGE (DEKAD 32 TO DEKAD 12), RFE 2.

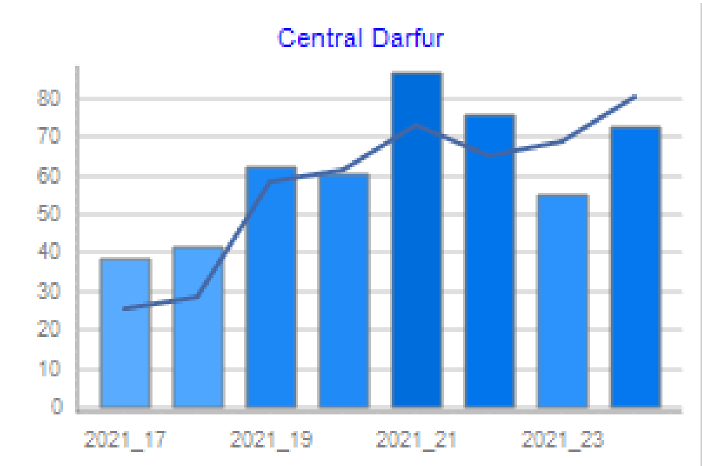

FIG 18: TEMPORAL DISTRIBUTION OF RAINFALL IN LUAPULA COMPARED TO THE LONG-TERM AVERAGE (DEKAD 32 TO DEKAD 12), RFE 2.

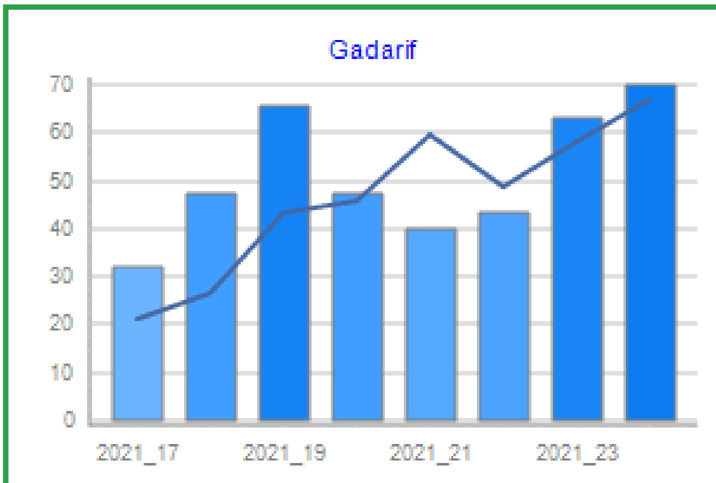

FIG 19: TEMPORAL DISTRIBUTION OF RAINFALL IN LUSAKA COMPARED TO THE LONG-TERM AVERAGE (DEKAD 32 TO DEKAD 12), RFE 2.

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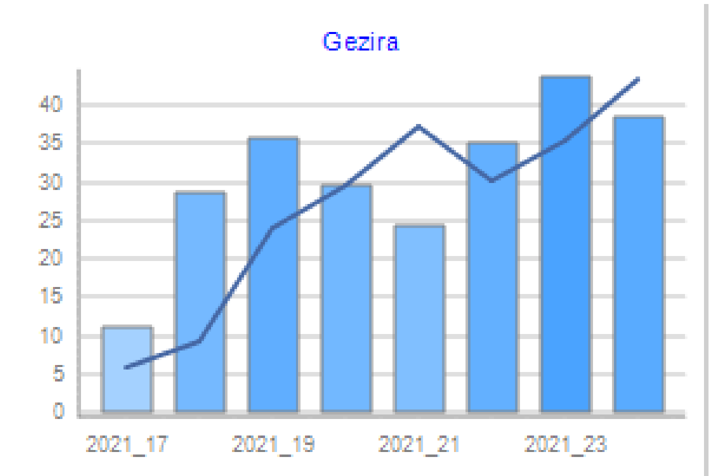

Fig 20: Temporal distribution of rainfall in Northern compared to the long-term average (dekad 32 to dekad 12), RFE 2.

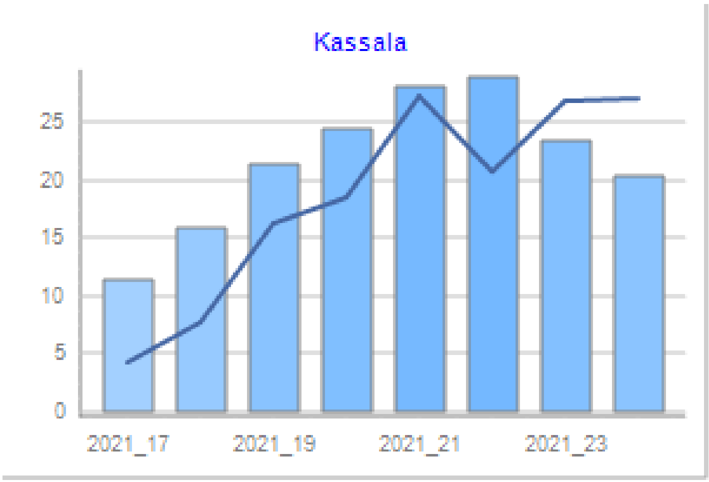

Fig 21: Temporal distribution of rainfall in North-Western compared to the long-term average (dekad 32 to dekad 12), RFE 2.

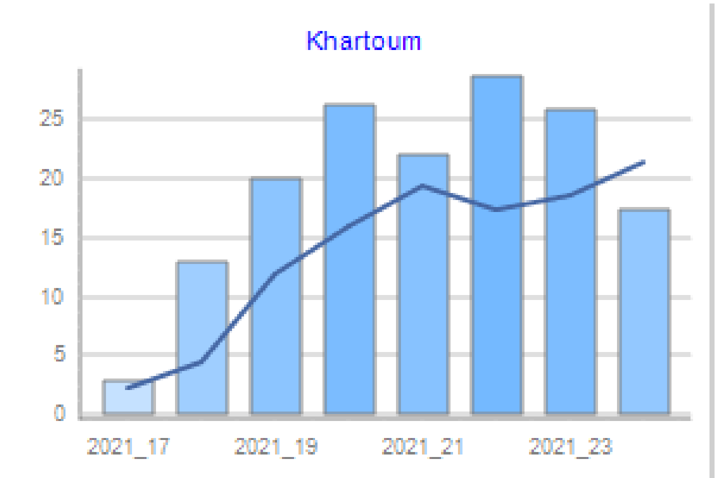

Fig 22: Temporal distribution of rainfall in Southern compared to the long-term average (dekad 32 to dekad 12), RFE 2.

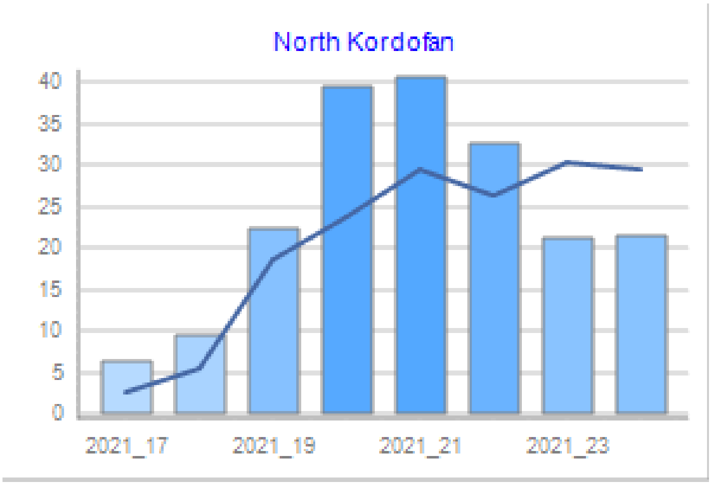

Fig 23: Temporal distribution of rainfall in Western compared to the long-term average (dekad 32 to dekad 12), RFE 2.

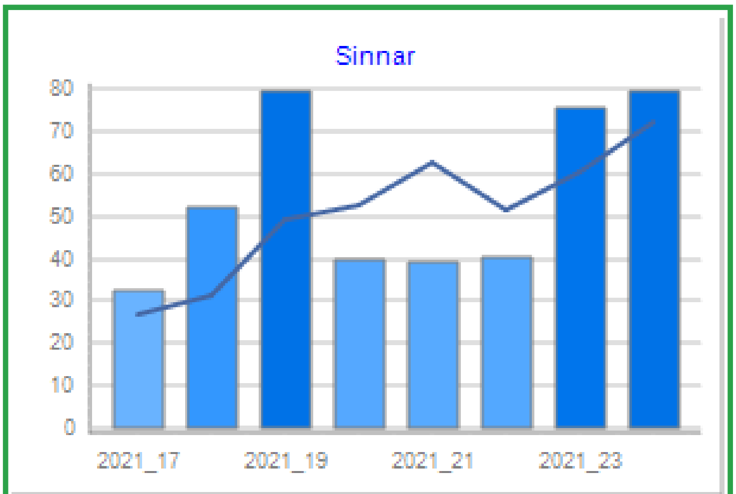

Fig 22: Temporal distribution of rainfall in Southern compared to the long-term average (dekad 32 to dekad 12), RFE 2.

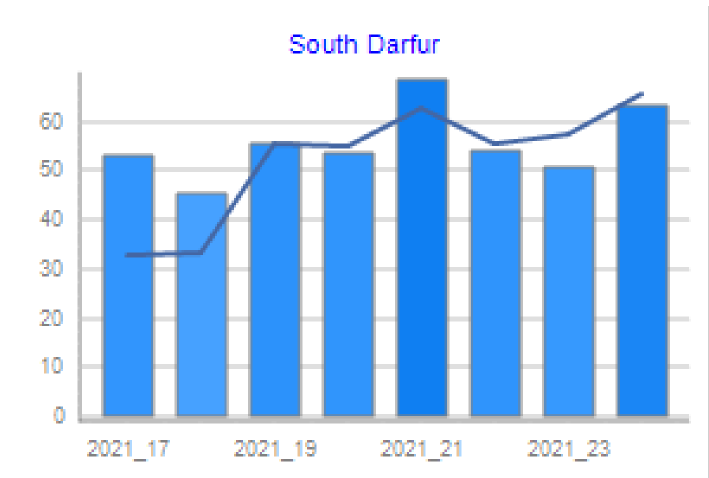

Fig 23: Temporal distribution of rainfall in Western compared to the long-term average (dekad 32 to dekad 12), RFE 2.

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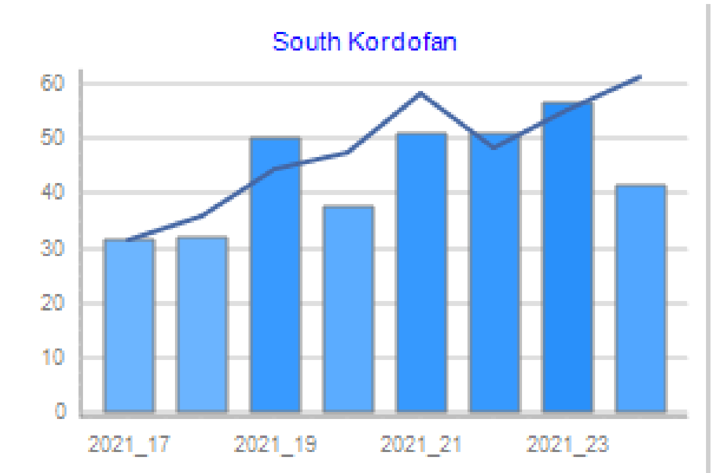

Fig 20: Temporal distribution of rainfall in Northern compared to the long-term average (dekad 32 to dekad 12), RFE 2.

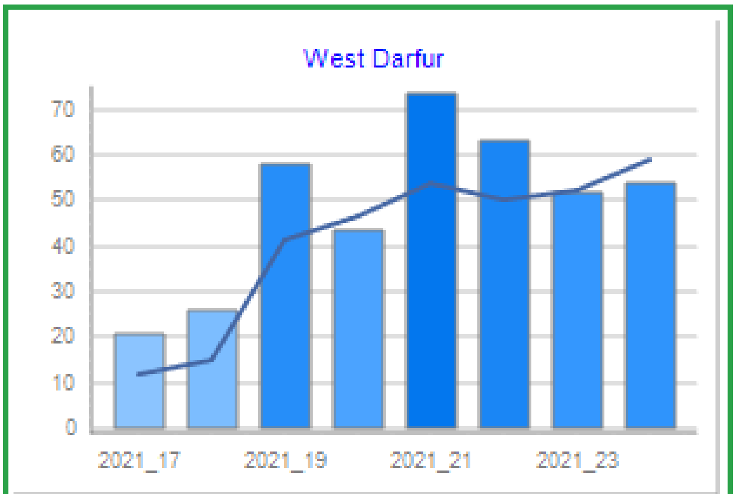

Fig 21: Temporal distribution of rainfall in North-Western compared to the long-term average (dekad 32 to dekad 12), RFE 2.

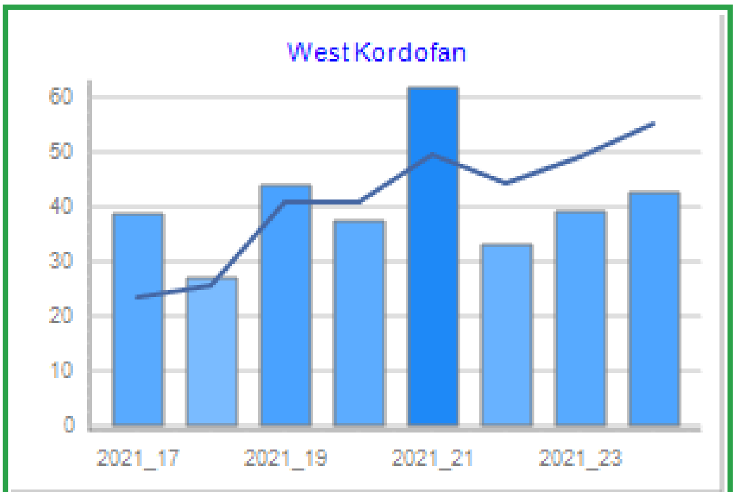

Fig 22: Temporal distribution of rainfall in Southern compared to the long-term average (dekad 32 to dekad 12), RFE 2.

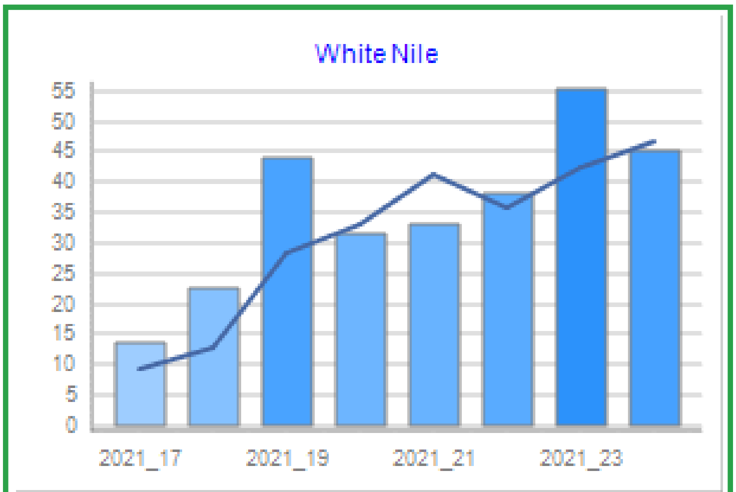

Fig 23: Temporal distribution of rainfall in Western compared to the long-term average (dekad 32 to dekad 12), RFE 2.

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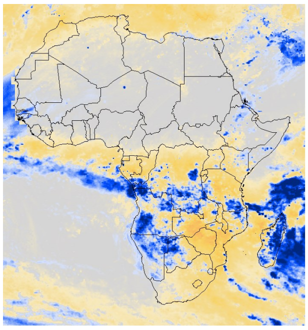
About ARC:

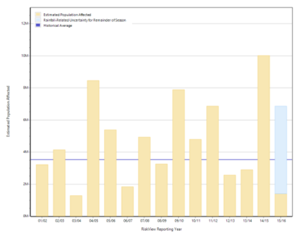
The **African Risk Capacity (ARC)** is a specialised agency of the African Union designed to improve the capacity of AU Member States to manage natural disaster risk, adapt to climate change and protect food insecure populations.

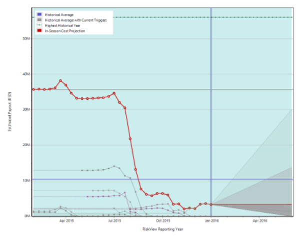
The ***Africa RiskView*** software is the technical engine of ARC. It uses satellite-based rainfall information to estimate the costs of responding to a drought, which triggers a corresponding insurance payout.

The **ARC Insurance Company Limited** is the financial affiliate of the ARC Agency, which pools risk across the continent through issuing insurance policies to participating countries.

Note on *Africa RiskView's* Methodology:







Rainfall: *Africa RiskView* uses various satellite rainfall datasets to track the progression of rainy seasons in Africa. Countries intending to participate in the ARC Risk Pool are required to customise the rainfall component by selecting the dataset which corresponds the best to the actual rainfall measured on the ground.

Drought: *Africa RiskView* uses the Water Requirements Satisfaction Index (WRSI) as an indicator for drought. The WRSI is an index developed by the Food and Agriculture Organisation of the United Nations (FAO), which, based on satellite rainfall estimates, calculates whether a particular crop is getting the amount of water it needs at different stages of its development. To maximise the accuracy of *Africa RiskView*, countries intending to take out insurance customise the software's parameters to reflect the realities on the ground.

Affected Populations: Based on the WRSI calculations, *Africa RiskView* estimates the number of people potentially affected by drought for each country participating in the insurance pool. As part of the in-country customisation process, vulnerability profiles are developed at the sub-national level for each country, which define the potential impact of a drought on the population living in a specific area.

Response Costs: In a fourth and final step, *Africa RiskView* converts the numbers of affected people into response costs. For countries participating in the insurance pool these national response costs are the underlying basis of the insurance policies. Payouts will be triggered from the ARC Insurance Company Limited to countries where the estimated response cost at the end of the season exceeds a pre-defined threshold specified in the insurance contracts.

For more information visit our website: www.africanriskcapacity.org

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