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METEOROLOGICAL SERVICES DEPARTMENT

Minimizing Risks through Science

2019/2020 Rainfall Season Report

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Summary

The 2019/20 rainfall season started in mid-November extending to the beginning of December in most parts of the country. Very high temperatures were experienced across the country at the beginning of October and quite low maximum temperatures (climatologically) were recorded at the end of the same month. The rainfall was erratic in the first half of the season (October-November-December) but there was a significant improvement in the second half of the season (January-February-March) particularly for the months January and February. This resulted in some areas receiving normal to above normal of their long term average for the sub-season JFM. However, most stations measured rainfall which was far below their normal in the two sub-seasons looked at.

The months of January and February had a good spatial and temporal rainfall distribution. Dry spells were quite prolonged in some districts, exceeding fifty days. This resulted in a poor rainfall season in those areas particularly the southern areas which receive little rainfall generally. Extreme events (where 50 millimeters (mm) or more is received in 24 hours in a place) were experienced from November to February. Most of them took place in February. Not many significant flash flooding incidents were recorded except in Binga where the Department of Civil Protection (DCP) reported that people were marooned and at Hwange Colliery where a mine was closed due to flooding.

1. INTRODUCTION

The SADC Secretariat through the Climate Services Centre (CSC), which coordinates the Southern Africa Regional Climate Outlook Forum (SARCOF) process, held the Twenty-third Southern Africa Regional Climate Outlook Forum (SARCOF-23), in Windhoek, Namibia from the 19th to 27th August 2019**.** A consensus regional seasonal forecast was issued during the SARCOF-23 and implications for the climate-sensitive sectors were also provided.

The Meteorological Services Department, on 4 September 2019 then held the National Climate Outlook Forum (NACOF) for the dissemination of the national seasonal outlook for the 2019/2020 rainfall season. The first half of the season which covered the period October to December 2019 (OND) was forecast to receive normal to above normal rainfall across Regions 1 and 2 (mostly Mashonaland Provinces, Matabeleland North, northern areas of Midlands and Manicaland Provinces) and normal to below normal rainfall in region 3 (Masvingo, Matabeleland South and southern areas of Midlands and Manicaland). For the second half of the 2019/20 rainfall season covering the months January to March 2020 (JFM) the country was expected to receive normal to below normal rainfall in Regions 1 and 2 and below normal to normal rainfall in Region 3.

This report seeks to examine the weather events that happened during the 2019/2020 rainfall season. This was done by analysing the weather systems which affected the country including the onset and cessation of rainfall, the extreme maximum temperatures, the rainfall anomaly, comparison of what was forecast and what was observed, dry spells and extreme weather events (where a place receives 50 mm or more in 24 hours) during the course of the season.

2. START OF SEASON

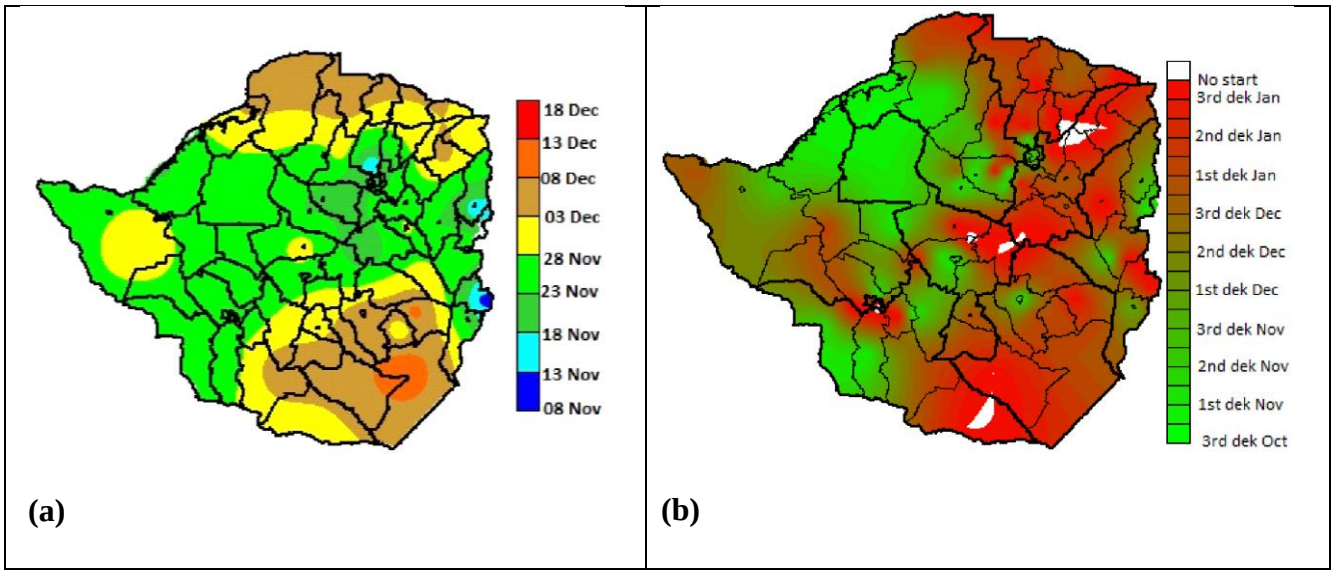


Figure 1. Start of season dates for (a) the period 1981-2010 and (b) 2019/2020 rainfall season

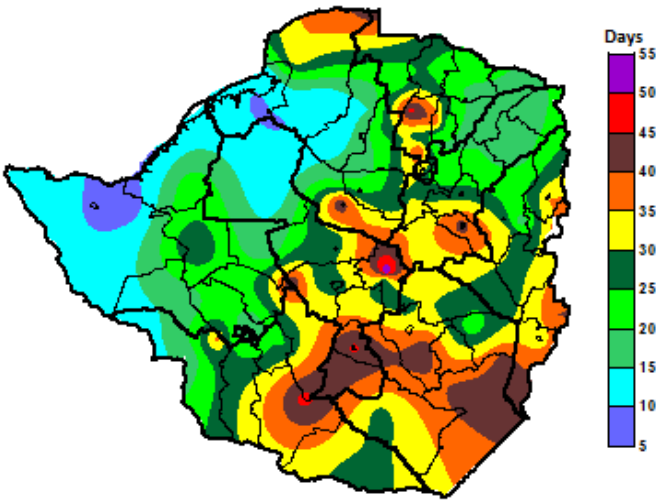
Definition: Any day after 1 October that a place receives 20 mm or more in two days or less and there is no dry spell of more than 10 days in the next 20 days

The mean start of rainfall season dates for Zimbabwe for the period from 1981 to 2010 (current climate period according to World Meteorological Organisation (WMO) guidelines) is shown in figure 1 (a). The bulk of the country receives its first effective rainfall around the second and third dekads of November into the first dekad [1] of December although there are variations around that period. The earliest effective rains are received towards the tail end of November in the central and northern parts of the country and as late as the third dekad of December especially over the southern parts of the country **(Figure 1b).**

For the 2019/2020 rainfall season, it is very interesting to note that some areas in Mashonaland West Province, all Matabeleland Provinces, the northern part of Midlands and around Nyanga in Manicaland Provinces had their season starting as early as the second dekad of November. However, the bulk of the country experienced the onset of the rainfall season at the end of December into January. Some places in Matabeleland South, Midlands and Mashonaland East received their first effective rainfall as late as the second dekad of January (white spots) **(Figure 1(b)).** A false start to the season was recorded in parts of the country after having received effective rains around the first dekad of December.

[1] A dekad is a ten-day period. A month has 3 dekads (Day 1 to Day 10 referred to as first dekad; Day 11 to 20 referred to as second dekad; Day 21 to the last day of the month referred to as third dekad)

3. DRY SPELLS



(a)

Figure 2 Longest Dry spells in 2019/2020 rainfall season

A dry day is when a station receives less than 0.85mm

Dry spells for the 2019/2020 rainfall season varied considerably from place to place. The longest dry spells were experienced in parts of Matabeleland South, the southern part of Midlands (around Zvishavane), Masvingo and southern areas of Manicaland province as well as the extreme north of the country (around Kanyemba). The longest dry spell was recorded at Mvuma where 55 days passed without any significant rainfall recorded during that period. A stretch of area from Shangani, Zvishavane extending into Mwenezi, Chivi, Zaka and Chiredzi/Chisumbanje also recorded significant dry spells too. Dry spells were relatively short in the northwest of the country **(cyan colour).** The lowest number of days without rainfall were recorded at Hwange and Victoria Falls which had 7 and 13 days respectively.

4. MONTHLY RAINFALL PERFORMANCE

4.1 Rainfall performance as at 31 October 2019

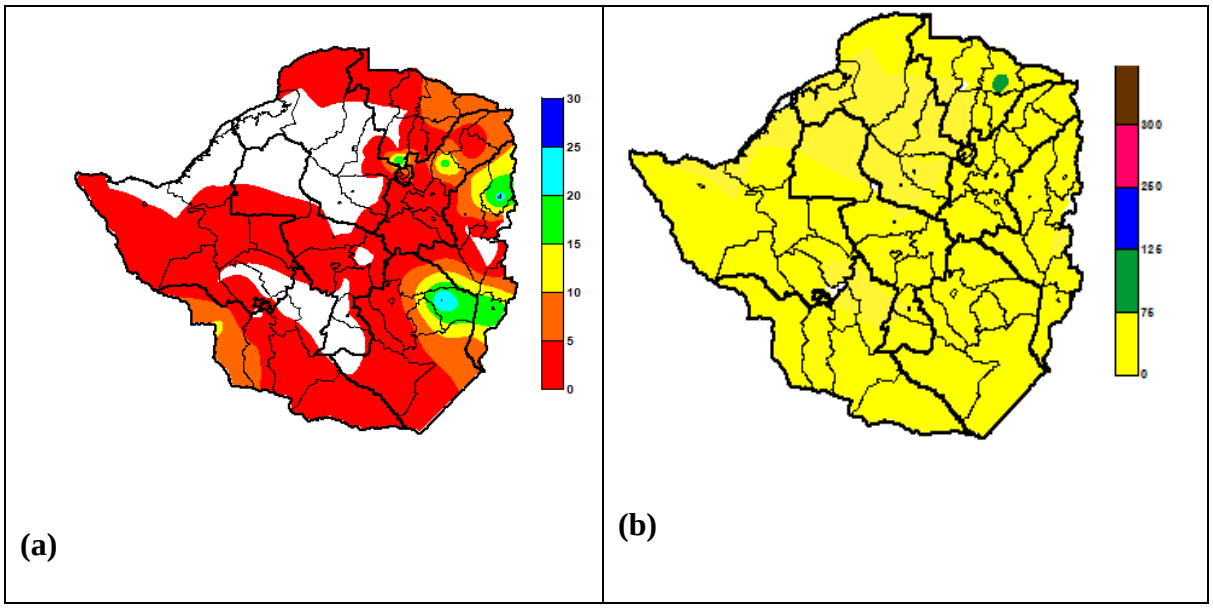


Figure 3. (a) Accumulated rainfall as at 31 October 2019 and (b) Percentage of normal rainfall for October 2019

The scale is too small as compared to other maps because rainfall amounts received during the month were too little.

The month of October was characterised by high temperatures in the first dekad whilst isolated storms were confined to the eastern and south-eastern parts of the country. The rainfall amounts received were less than 10mm in most parts of the country (**Figure 3(a)).** . The start of the rainfall season is characterised by light and erratic rains and thus the light falls were normal for the time of the rainfall season.

The notable rainfall figures recorded in 24 hours were 22.6mm (Henderson) on 2 October 2019 and 25.6mm (Bikita) on 31 October 2019**.** Some areas did not receive any rains (white coloured regions). During the second dekad as well as the early part of the third dekad, the country experienced very cold, cloudy and windy conditions. Some areas in the Eastern Highlands recorded a maximum temperature of 12°C (Chisengu and Nyanga) with areas along and south of the watershed measuring daytime temperatures ranging between 15°C and 20°C (Sunday, 21st October 2019). This was caused by episodes of pressure rises along the southeast coast of South Africa, together with an inversion of high level clouds on the 22nd of October 2019 which inhibited insolation. Regardless of all this, no temperature records were broken for the month.

Another episode of sunny and hot conditions was experienced from the 26th to 30th of October 2019. This episode was marked by very high temperatures especially in low-lying areas (Zambezi and Limpopo Valleys) where record and near record breaking afternoon temperatures were registered **(Table 1).** In light of this significant rise in temperatures and associated very hot conditions, the Meteorological Services Department (MSD) issued out a heat wave warning, advising the public to avoid exposure to direct sunlight and keeping themselves well hydrated.

Table 1: Record Breaking Temperatures for October

Station	Previous Record °C	Year	New Record °C	Year
Chiredzi	44.4	11 Oct 2010	47.6	28 Oct 2019
Beitbridge	44.4	11 Oct 2010	46.8	28 Oct 2019
West Nicholson	42.8	11 Oct 2010	44.3	28 Oct 2019
Zvishavane	41.3	11 Oct 2010	41.8	28 Oct 2019
Hwange	38.8	30 Oct 2010	40.5	28 Oct 2019
Tsholotsho	40.0	12 Oct 2011	40.8	28 Oct 2019
Bulawayo	37.8	24 Oct 2011	39.2	28 Oct 2019
Gweru	36.3	11 Oct 2010	37.4	28 Oct 2019
Harare	35.5	22 Oct 2010	36.6	28 Oct 2019

Globally, October 2019 has been the second warmest on record [https://www.ncdc.noaa.gov/sotc/global/201910]. For Zimbabwe, October 2019 recorded some of the highest temperatures at some locations (Table 1). NOAA also reported that the 10 warmest Octobers have occurred since 2003. However, a further closer look also revealed that the five warmest Octobers have all occurred since 2015 providing further evidence of increase in temperatures in recent years as proof of global warming.

When the rainfall received in October was compared with the long-term average, the whole country was below normal as shown by the yellow-coloured region **(figure 3(b))**. These areas had received total rainfall less than 75% of their long-term mean during the month of October**.** Hence the country has received less rainfall than is usual for this period.

4.2 Rainfall performance as at 31 November 2019

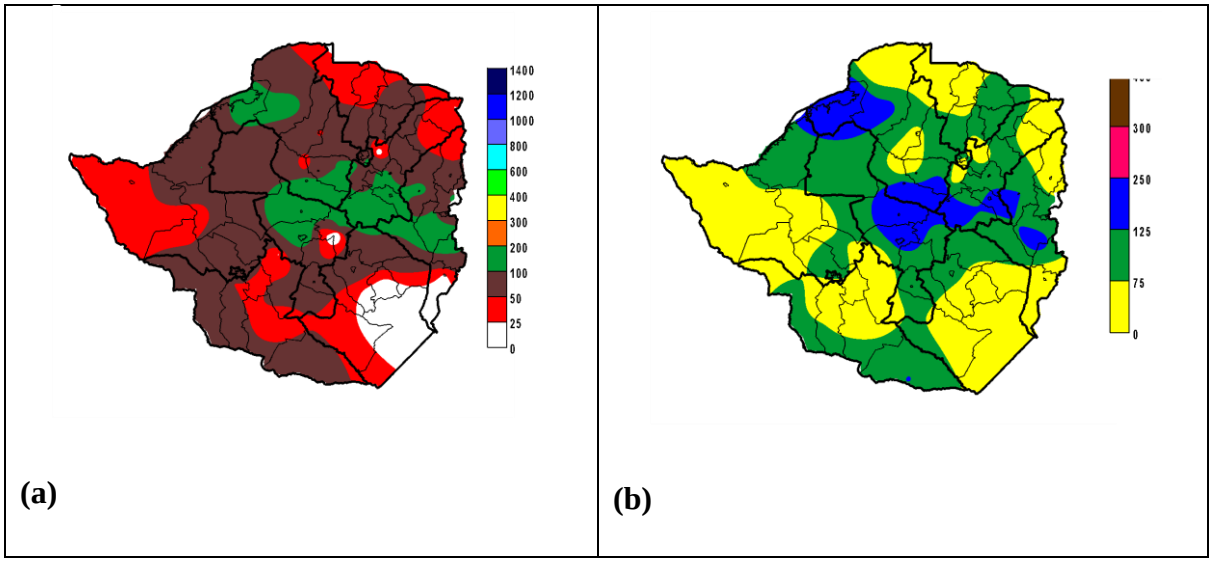


Figure 4. (a) Accumulated rainfall for November at 30 November 2019 and (b) Percentage of normal rainfall for November 2019

Transitory cloud bands affected much of the country during the month of November. Most areas experienced increased rainfall activity with the central parts of the country receiving the highest rainfall totals. This was mainly due to several rain bearing systems that affected the country during that month. A cloud system which infiltrated the western borders of the country through Matabeleland South in the second dekad of November traversed the country moving eastwards resulting in scattered thunderstorms across the country. The rainfall activity was concentrated in areas along and north of the watershed where Kwekwe recorded 132mm in 24 hours. These storms were accompanied by lightning, strong winds and hail as well as sharp downpours in places. The second dekad of November signified the start of season in most areas. Showery activity extended into the third dekad of November. However, areas mostly in the south-eastern part of the country did not receive any meaningful rainfall as shown by the white coloured region in Figure 4(a). These areas received rainfall which was below 25mm for the month.

In terms of percentage of normal, generally the central areas recorded normal to above normal rainfall (green and blue coloured regions) **(figure 4(b))**. Parts of Matabeleland Provinces, Masvingo and northern part of Mashonaland Provinces and Manicaland recorded below normal rainfall during the month of November (yellow coloured regions)

Table 2: Heavy rainfall events **(50mm and above in 24 hours)** for November 2019.

Station	Rainfall amount (mm)	Date	Station	Rainfall amount (mm)	Date
Beitbridge	56.6	21-Nov	Bikita	52	15-Nov
Binga	50.9	14-Nov	Chibero	56.6	11-Nov
Chivhu	76.5	16-Nov	Concession	51	15-Nov
Kariba	70.3	13-Nov	Kwekwe	131.5	13-Nov
Marondera	54.2	17-Nov	Mhondoro	64.5	17-Nov
Plumtree	52.5	20-Nov	Selous	81	18-Nov

4.3 Rainfall performance as at 31 December 2019

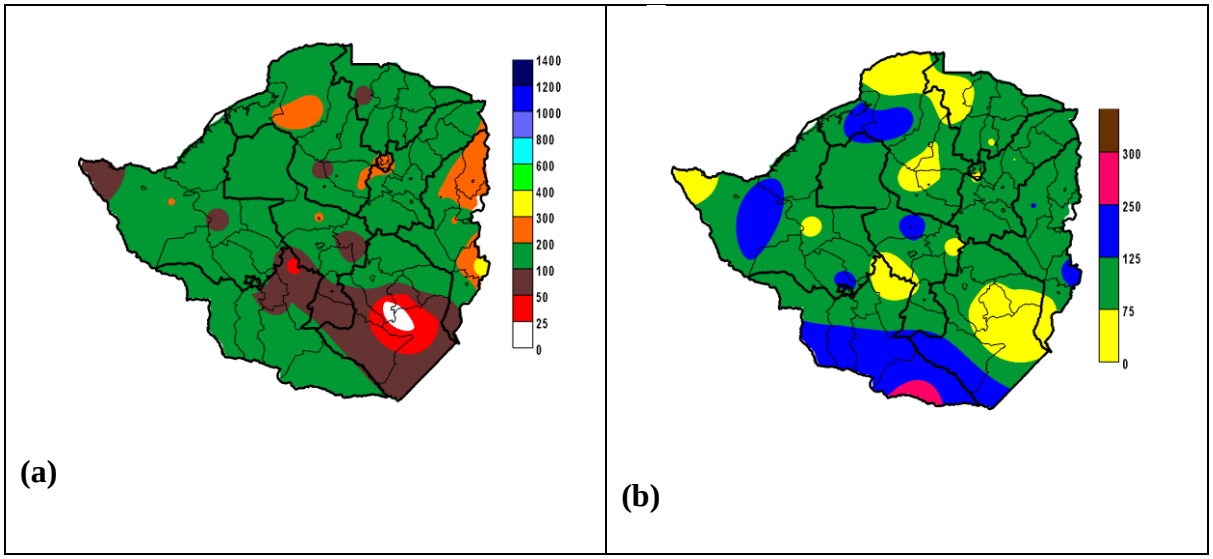


Figure 5. (a)Accumulated rainfall as at 31 December 2019 and (b) Percentage of normal rainfall for December 2019

Most of the rainfall in Zimbabwe is received during the months of December and January and this is the period when the Inter-Tropical Convergence Zone (ITCZ) will be over the northern part of the country. The first part of the dekad of the month was relatively dry. Around the 8th up to 13th of December, widespread rainfall activity with some localised heavy downpours mainly along and north of the watershed was experienced across the country. This was due to the ITCZ which remained anchored over the northern areas of the country. During the same period, a cloud system from Botswana traversed the country enhancing the rainfall activity in most areas. Thereafter, relatively dry air was circulating across the country. Sunny and hot conditions prevailed throughout the country with records for daytime temperatures being broken especially along the Zambezi and Limpopo Valleys (**Table 3**). This persisted to the end of the month, including Christmas. See Table 3 below.

Table 3 Record Breaking Temperatures for December

Station	Previous Record °C	Year	New Record °C	Year
Chiredzi	41.6	27 Dec 1988	44.0	27 Dec 2019
Beitbridge	43.1	17 Dec 1997	44.0	03 Dec 2019
West Nicholson	41.7	20 Dec 1988	42.0	27 Dec 2019
Zvishavane	39.0	25 Dec 1988	40.0	27 Dec 2019
Chinhoyi	35.2	03 Dec 1982	36.0	31 Dec 2019
Lupane	38.9	19 Dec 1958	40.0	20 Dec 2019
Kadoma	36.5	18 Dec 1994	38.0	20 Dec 2019
Gweru	33.0	29 Dec 1997	35.0	26 Dec 2019
Makoholi	36.8	20 Dec 1989	38.0	25 Dect 2019
Zaka	39.8	20 Dec 1989	41.0	27 Dec 2019
Wedza	33.2	20 Dec 1989	35.0	25 Dec 2019
Victoria Falls	38.2	04 Dec 1992	39.0	25 Dec 2019

However, it is important to note that during that dry spell, isolated thundershowers were experienced in some areas. Isolated thunderstorms of trace amounts occurred over the northern half (Matabeleland North, All Mashonaland and northern areas of Manicaland provinces) of Zimbabwe.

Localised sharp downpours occurred on Saturday 28 December resulting in Chisengu and Chipinge (both in Manicaland Province) recording 98mm and 96mm respectively and Hwange measuring 50mm. An area around Mwenezi recorded little or no rains during the month of December (**figure 5 (a)**). Within the month, heavy rains were recorded across the country. See **Table 4 below**.

The prolonged dry spell kept temperatures in the upper thirties for most places. NOAA concluded that the southern hemisphere had the highest land temperatures when compared to past 140 years by around 1.50°C more [https://www.ncdc.noaa.gov/sotc/global/201912].

Looking at the percentage of normal rainfall map **(figure 5(b)),** meteorologically, December was wet as about 90% of the country received normal to above normal rainfall during the month. It has to be noted that most of the rainfall was received around the second dekad of December with prevalent dry and sunny conditions being experienced for most of the month.

Parts in the extreme north and southeast of the country received below normal rainfall for December as shown by the yellow coloured region in Figure 5(b).

Table 4 Heavy rainfall events for the month of December 2019

Station	Rainfall (mm)	Date	Station	Rainfall (mm)	Date
Beatrice	55	08 Dec	Chibero	52.7	09 Dec
Chimhanda	54.5	12 Dec	Chisengu	61.9	05 Dec
Crowborough	110	09 Dec	Harare Belvedere	82.8	09 Dec
Kanyemba	50.7	09 Dec	Karoi	59.1	09 Dec
Mkandi	84.4	10 Dec	Mupfurudzi	55	10 Dec
Mwenezdi	60	09 Dec	Nyanga	84.6	05 Dec
Pioneer	53.5	09 Dec	Shurugwi	53	11 Dec
Chipinge	54.6	29 Dec	Chipinge	95.6	30 Dec
Hwange	50.5	29 Dec			

4.4 Rainfall performance as at 31 January 2020

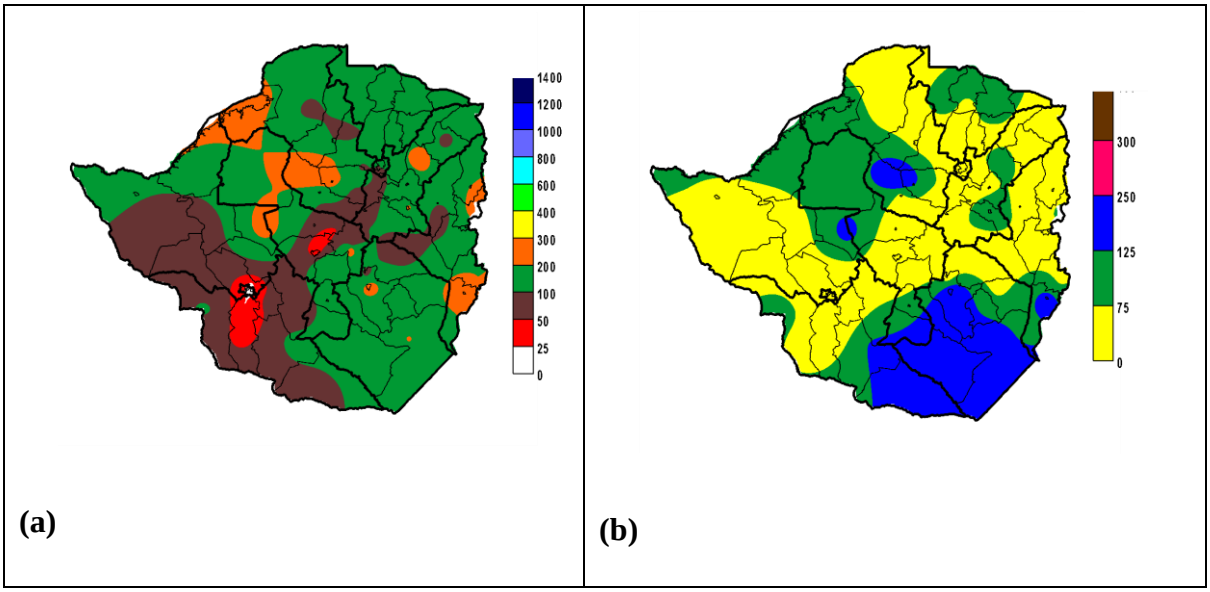


Figure 6. (a) Accumulated rainfall for January 2020 and (b) Percentage of normal rainfall for January 2020

Clear skies and hot weather experienced at the end of December 2019 extended to the beginning of January 2020. The very high temperatures caused a lot of discomfort among people though no temperature record was broken. The temperatures were in the mid to upper

thirties across much of the country. Buffalo Range and Beitbridge, all along the Limpopo Valley, each recorded 41°C on Sunday, 5 January 2020. Beitbridge recorded 40°C on Monday, 6 January 2020. However, during the same period, isolated thunderstorms occurred over the northern parts of the country under those hot conditions.

From the second dekad of January, which is normally our driest period during the crop growing season, the country experienced widespread thunderstorm activity. The fringes of the Inter-Tropical Convergence Zone were affecting much of the country resulting in widespread thunderstorms with localized heavy rains in some areas **(See Table 5)**.

The following were notable figures recorded in 24 hours during the month: Murehwa (Mashonaland East) 138mm, Chibero and Chegutu (101 mm and 95 mm respectively) both in (Mashonaland West) as well as 81 mm recorded in Harare Metropolitan. In Manicaland alone, the following stations recorded rainfall figures in excess of 50mm: Buffalo Range (72mm), Chisumbanje (74mm), Chipinge (76mm), Chisengu (96mm), Mukandi (68mm), Rusape (56mm) and Mutasa DC (58mm)). Although the first dekad of January experienced isolated thunderstorms which were localised, the second dekad contributed significantly resulting in much of the country getting to between 200mm and 300mm in accumulated rainfall since the 1st of October 2019. For the month of January alone, most areas received 100 to 200mm as shown in **Figure 6 (a)**.

The heavy rainfall events which were experienced across the country in January are recorded in **Table 5.**

For January, parts of Masvingo, Matabeleland North, Manicaland, Midlands and Mashonaland West received above normal rainfall whilst the bulk of the country received below normal rainfall **(Figure 6(b)).**

Table 5 Heavy rainfall events for the month of January 2020

Station	Rainfall (mm)	Date	Station	Rainfall (mm)	Date
Acturus	60.5	10 Jan	Binga	73.6	18 Jan
Buffalo Range	75.5	11 Jan	Buffalo Range	71.5	20 Jan
Centenary	68.2	12 Jan	Chakari	85	20 Jan
Chegutu	52	06 Jan	Chegutu	95	15 Jan

Chibero	101.1	15 Jan	Chimanimani	75	20 Jan
Chimhanda	72.5	05 Jan	Chimhanda	65	13 Jan
Chipinge	52.1	11 Jan	Chipinge	76.3	20 Jan
Chisengu	61.4	11 Jan	Chisengu	96	20 Jan
Chisumbanje	74.4	20 Jan	Chivhu	96.1	09 Jan
Dotito	60	16 Jan	Gokwe	54.7	15 Jan
Gwangwawa	50	14 Jan	Macheke	65	19 Jan
Masvingo	63.1	08 Jan	Masvingo	51.3	11 Jan
Masvingo	55.3	29 Jan	Murehwa	59	18 Jan
Murehwa	137.5	13 Jan	Mukandi	71.4	16 Jan
Mukandi	67.6	20 Jan	Mupfurdza	64	10 Jan
Mupfurudza	55	16 Jan	Mutasa DC	54	15 Jan
Mutasa DC	57	20 Jan	Nkayi	76.7	09 Jan
Nkai	123.8	19 Jan	Nyanga	58.2	09 Jan
Nyazura	60	19 Jan	Plumtree	68.3	09 Jan
Rusape	55.9	20 Jan	Selous	76	15 Jan
Trelawney	52	16 Jan	Wedza	85.4	18 Jan

4.5 Rainfall performance as at 29 February 2020

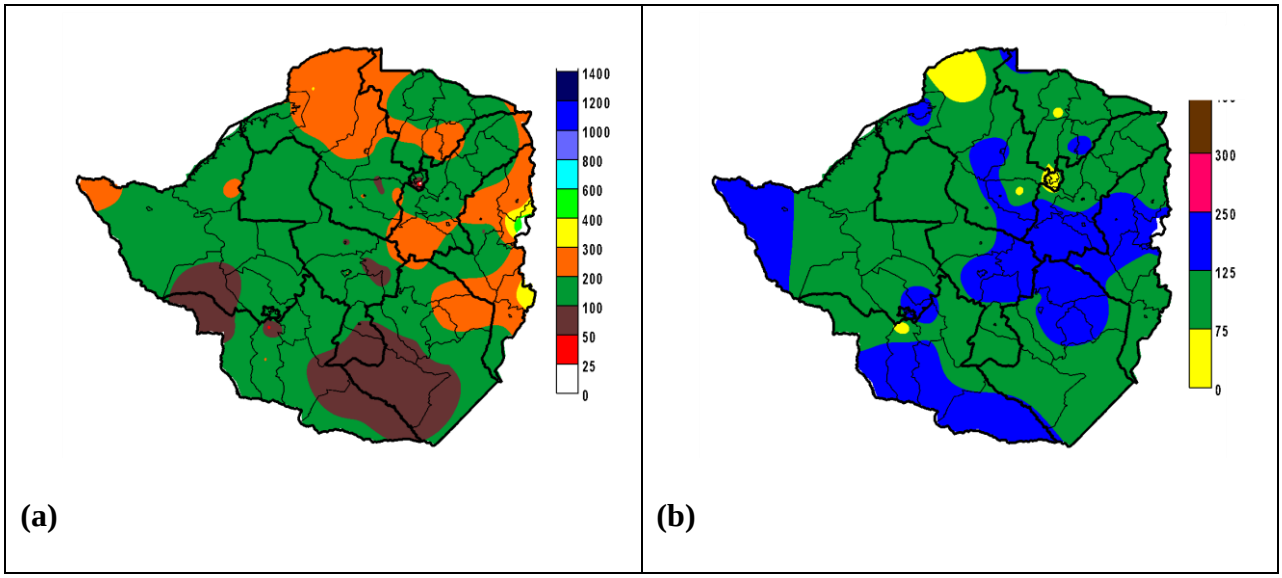


Figure 7. (a) Accumulated rainfall for February 2020 and (b) Percentage of normal rainfall for February 2020

The month of February experienced a significant improvement in the rainfall activity both spatially and temporally. It was generally wet. Most of the rainfall was experienced in two peaks realised around 12 and 24 February whilst the beginning and at the end of the month had light rains (light showers).

The first two days of the months experienced relatively dry conditions. From Monday, 03 February, winds veered to a north-easterly direction drawing in moisture from Zambia into the country through all Mashonaland Provinces and Matabeleland North Province. On Tuesday, 6 February, widespread thunderstorms occurred in areas along and to the north of the main watershed. Another cloud mass from Mozambique entered the eastern borders through Mashonaland East and Manicaland Provinces on Tuesday 11 February. This increased the rainfall activity across the country with some localised heavy downpours.

During the first dekad, 7 stations recorded extreme events **(Chivhu, Kariba Kanyemba, Mukandi, Mvuma, Nyakomba and Nyamaropa**) **(Table 6).** The second dekad had 24 stations recording such events **(Beatrice, Chegutu, Chimanimani, Chipinge, Concession, Mhondoro, Mkandi, Mutasa, Norton, Nyakomba, Nyanga, Shangani, Shurugwi, Zaka, Centenary, Chibero, Chinhoyi, Chisengu, Chivhu, Kezi, Mkandi, Rusape, Shurugwi and Trelawney)**.

The most notable rainfall figures were as follows: **109mm (Chimanimani), 122.7mm (Chinhoyi), 179.5mm (Chisengu), 108.2mm (Kezi), 118.6mm (Bindura), 119.5mm (Rusape), and 115mm Shamva). See Table 6 below.** The heavy rains were accompanied by strong winds and lightning

There was a gradual decrease in the intensity of the rains particularly in the south and south-western parts of the country from 14 to 20 February although some thunder showers occurred in some places.

In the Muzvezve area of Sanyati District, Mashonaland West **five members of a family** were killed by lightning on Monday, 17 February after they sought shelter under a tree. (**The Herald online: 19 Feb, 2020).**

From Saturday, the 22nd of February, another cloud system which was over Botswana and South Africa moved into the western areas of Zimbabwe. This resulted in widespread thunderstorm activity over the country as it swept across the country from the west. The peak of the rainfall activity from this cloud system was on 24 February.

Thereafter, a high pressure system that was rather quasi-stationary pushed the rain bearing clouds northwards. It was steering in a moist and cool airflow from the Indian Ocean over the southern parts of the country which resulted in a huge drop in temperatures in Matabeleland South, Midlands, Masvingo and southern areas of Manicaland Province. However, showery activity persisted over the northern areas, though rainfall amounts were low, up to the end of the month.

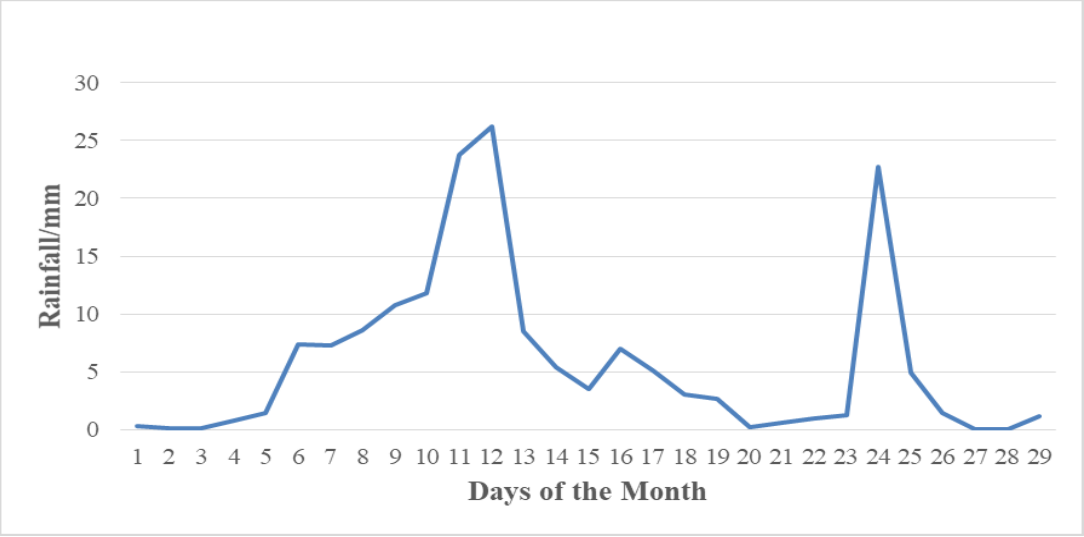


Figure 8 Time series of rainfall events in February

Overally, February was a wet month as compared to other months and thus contributed significantly to the rainfall totals for the season. With all the heavy downpours recorded in 24 hours within the month, **the highest** accumulated monthly rainfall figures were recorded at **Mukandi (530mm) and Chisengu (346mm)** both in **Manicaland Province. The lowest** were recorded at **Matopos (37mm) in Matabeleland South, Mwenezi (57mm)** in **Masvingo** province **(figure 7(a)).** The greater part of the country ranged between **100mm and 200m (green colour) in terms of the monthly totals.**

Table 6. Notable rainfall figures for February 2020

Station	Rainfall Amount (mm)	Date	Station	Rainfall Amount (mm)	Date
Beatrice	62	16-Feb	Centenary	79	14-Feb
Chegutu	71	11-Feb	Chibero	50	11-Feb
Chimanimani	109	12-Feb	Chinhoyi	122.7	11-Feb
Chipinge	55.7	12- Feb	Chisengu	179.5	12 -Feb
Chivhu	51.3	07-Feb	Chivhu	55.7	12-Feb
Concession	66	12-Feb	Kanyemba	51	10-Feb
Kariba	50.7	08-Feb	Kezi	108.2	11-Feb
Mhondoro	80.2	18-Feb	Mukandi	64.4	09-Feb
Mkandi	60.1	14 Feb	Mkandi	78.5	17-Feb
Mutasa	55.5	13-Feb	Mvuma	63	10-Feb
Norton	50	11-Feb	Nyakomba	105	10-Feb
Nyakomba	75	11-Feb	Nyamaropa	116	10-Feb
Nyanga	62.5	13-Feb	Rusape	62.2	16-Feb
Shangani	62	11-Feb	Shurugwi	81.2	11-Feb
Shurugwi	51.5	12-Feb	Trelawney	51	11-Feb
Zaka	82.3	11-Feb	Bikita	72	24-Feb
Bindura	118.6	24-Feb	Goetz	54.5	24-Feb
Concession	70	24-Feb	Kotwa	79	23-Feb
Macheke	83	24-Feb	Makuti	60.5	25-Feb
Mkandi	73.3	24-Feb	Mvuma	75	24-Feb
Mvurwi	52.4	24-Feb	Nyazura	81.5	24-Feb
Rusape	119.5	24-Feb	Rushinga	57	24Feb
Shamva	115	24-Feb	Victoria Falls	61.9	24-Feb
Victoria Falls	63.5	25-Feb			

This **percentage** of normal also shows the improved rainfall performance for February as the bulk of the country was in the normal to above normal category **(Figure 7(b))**. Some pockets that received more rainfall compared to their long-term average included around Victoria Falls,

southwest of Matabeleland South and the central areas of the country extending to the Eastern Highlands) (blue coloured region in figure 7(b)).

4.6 Rainfall performance as at 31 March 2020

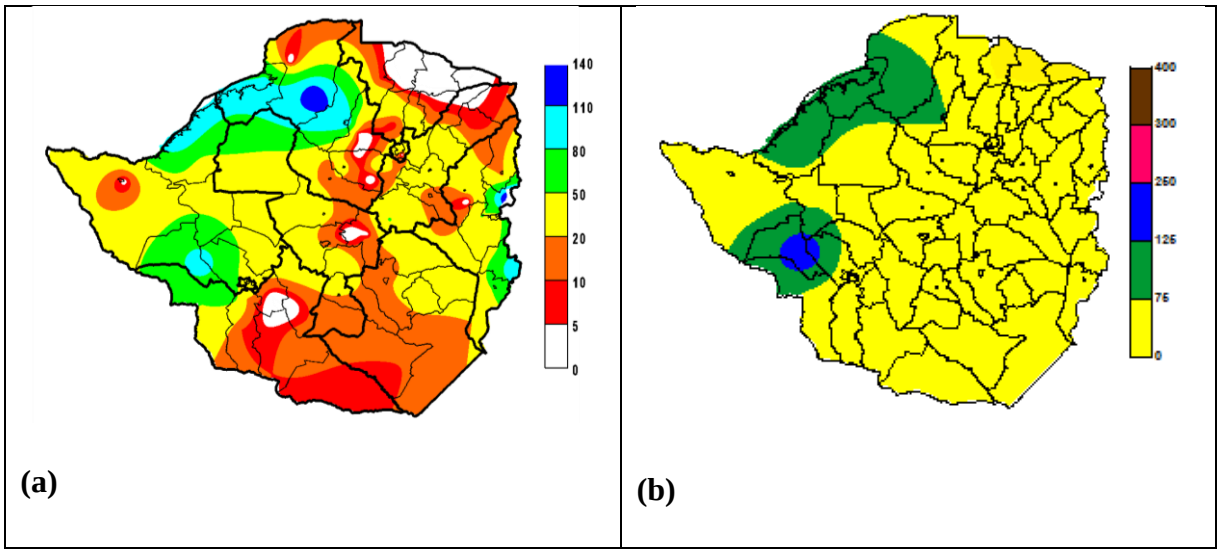


Figure 9. (a) Accumulated rainfall for March 2019 and (b) Percentage of normal rainfall for March 2020

A continental high pressure system which developed in the interior of South Africa started drying out the atmosphere over the southern districts of the country (southern districts of Manicaland and Midlands, Masvingo and Matabeleland South provinces) spreading northwards, resulting in clear skies and warm daytime conditions in most areas. This was interrupted by drizzly weather and slightly cooler conditions over these areas. However, the northern areas (Matabeleland North, northern districts of Midlands, all Mashonaland provinces, Harare Metropolitan and northern parts of Manicaland province) experienced mostly partly cloudy weather with isolated showers.

The notable accumulated rainfall amount for the month was **147mm (Mukandi)** in Manicaland province. Considerable amounts were recorded in the northern areas and along the Zambezi Valley**: Karoi (129mm), Binga (111mm) and Chinhoyi (103mm)**. The remainder of the country recorded rainfall amounts below 100mm **(Figure 9(a)).** There were white spots indicative of rainfall below 5mm or there were no rains received during the month. In essence, there was an abrupt cessation of rain over the southern districts.

In terms of percentage of normal, much of the country was in the below normal category indicating that there was reduced rainfall activity during March with most areas receiving less that their long-term average rainfall (yellow coloured region) **(figure 9(b)).** The exception was

along the Zambezi Valley which was in the normal category for the month. This was due to the showery activity which persisted over the northern districts during the month.

5 RAINFALL AMOUNTS EXCEEDING 50MM IN 24 HOURS IN 2019/2020 RAINFALL SEASON

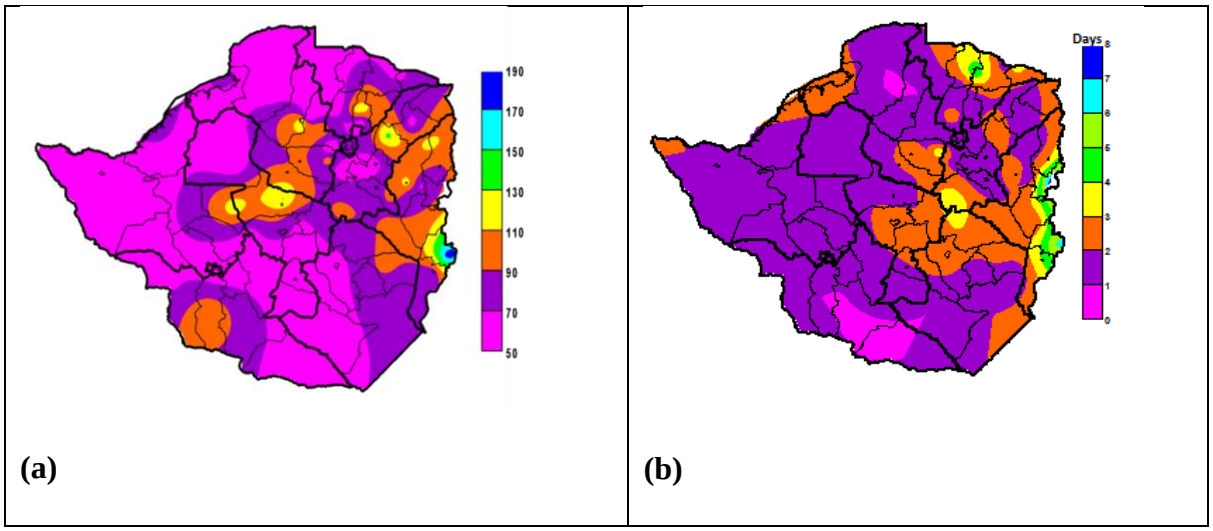


Figure 10. (a) Heavy rainfall events for the 2019/2020 season (rainfall exceeding 50mm in 24hours) and (b) Number of heavy rainfall events per area for the season.

In recent seasons, extreme weather events are becoming more intense and are also occurring at an increased frequency as well**. Figure 10(a)** shows the extreme rainfall events during the 2019/2020 rainfall season. More events (where 50mm and above was received during a 24hr period) occurred over the eastern half of the country. The most notable figures were **179.5mm** (Chisengu) and **137.5mm** (Murehwa). No records were broken as they were far below what was recorded at Chisengu **(407.5mm)** during **Cyclone IDAI** in the **2018/2019** rainfall season.

Figure 10(b) shows the number of extreme events during the rainfall season. A high frequency was recorded over Manicaland Province where Mukandi and Chisengu had 8 and 6 events respectively. The majority of stations across the country (deep purple colour**)** recorded at least one extreme rainfall event during the season.

6 SUB SEASON RAINFALL ANALYSIS

6.1 Rainfall performance for the OND sub-season of the 2019/2020 rainfall season in comparison with the sub-seasonal forecasts

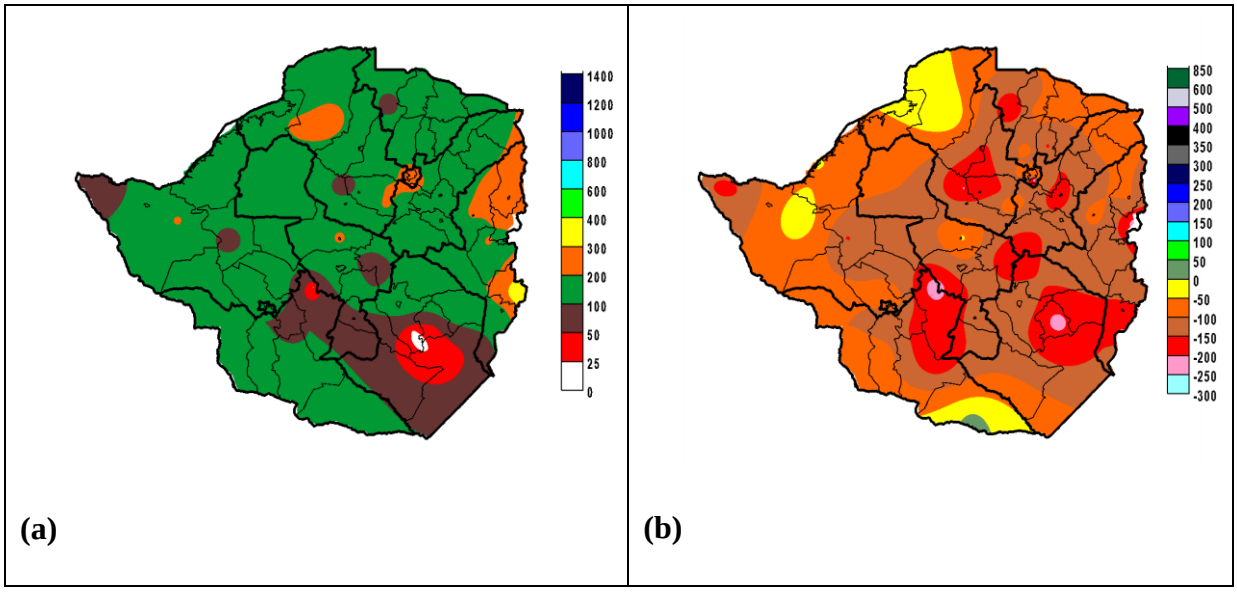


Figure 11. (a) Accumulated rainfall for OND and (b) Anomaly rainfall for OND 2019

The country experienced a poor start to the 2019/20 rainfall season. Erratic rains and high temperatures were predominant in October. From the second dekad of November rainfall extended into the first dekad of December the country experienced the presence of the **Inter Tropical Convergence Zone**. These rains marked the start of the 2019/20 rainfall season in areas along the central watershed. This was then followed by another period of poor rainfall activity which extended to the end of the month, including Christmas when the country experienced dry conditions and very high temperatures.

The accumulated rainfall totals for the sub-season OND were mostly 200 mm and below whilst higher totals (200mm and 300mm) occurred mostly in parts of Manicaland Province (**figure 11(a)**). The highest cumulative totals for the three-month period OND were as follows: **372.9mm (Chisengu)** and **288.6 mm (Nyanga).** The **lowest** rainfall totals were recorded at Rupike (**21.8mm)** in Masvingo and Shangani (**23.7mm)** in Matabeleland South. These stations are included in a stretch from Esigodini going south-eastwards covering Insiza, Shangani, Rupike, Zaka, Buffalo Range into Chisumbanje which recorded rainfall totals less than 100m during the sub season (dark brown coloured region)**.** The greater part of the country measured between 100mm and 200mm **(green coloured region)**.

The anomaly map **(figure 11 (b))** shows that about 99% of the country received rainfall totals well below their long term mean for the first half of the season (October to December 2020).

Some stations were below by more than 200mm. The most notable stations were Shangani (-229mm), followed by Mukandi (-222mm) and Zaka (-218mm). Beitbridge, along the Limpopo Valley and an area around Kariba were near their long term mean.

The anomaly map (fig 10 (b)) is indicating that about 99% of the country received rainfall totals well below their long term mean. Some stations were below by more than 200mm. The stations which recorded the most notable deficits were Shangani (-229mm), followed by Mukandi (-222mm) and Zaka (-218mm). Beitbridge along the Limpopo Valley and an area around Kariba were near their mean.

6.2 Forecast for October-November-December (OND) vs the actual performance for OND

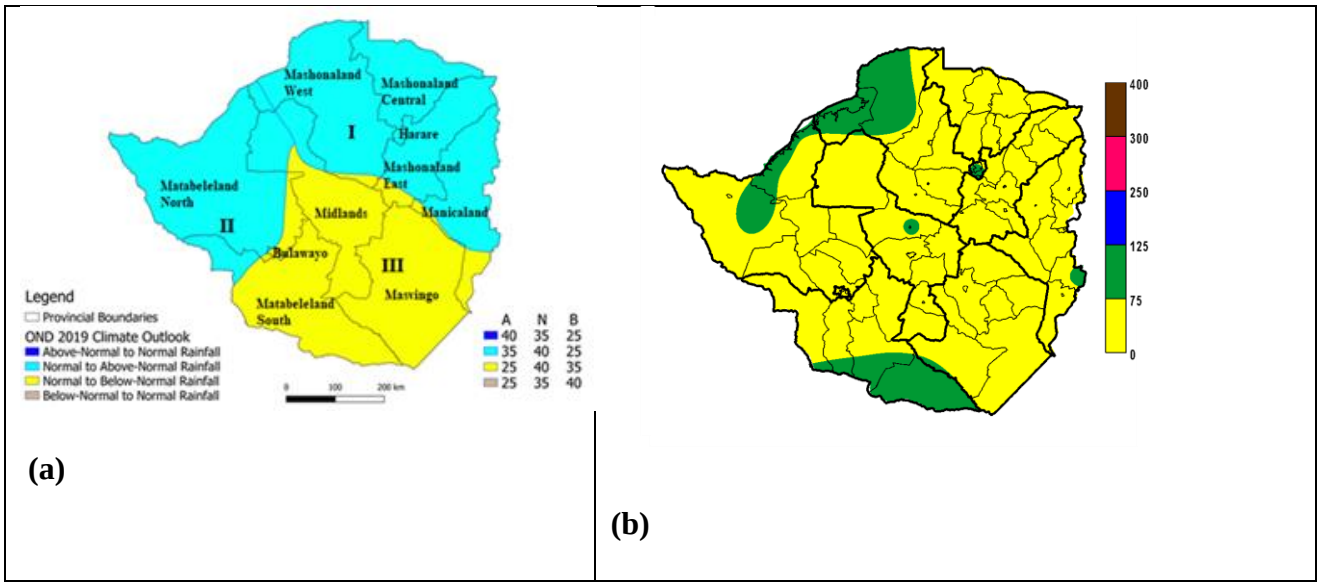


Figure 12. (a) Forecast for the OND sub season and (b) Percentage of normal rainfall for OND

The Meteorological Services Department in September issued a forecast that Regions 1 and 2 covering northern Manicaland, northern Midlands, Matabeleland North and the the Mashonaland Provinces were to receive normal with a bias towards above normal rainfall whilst Region 3 (Masvingo, Matabeleland South, southern parts of Manicaland and Midlands would receive normal to below normal rainfall **(figure 12 (a))**.

The observed percentage of normal for the season OND 2019 in **figure 12(b)** is showing that more than 98% of the country was in the **below normal category** (yellow coloured region). Hence most areas received rainfall that was less than their long-term mean except in a few areas where it was comparable.

It was in the normal category (75% to 125% of their long-term rainfall mean) around Beitbridge along the Limpopo Valley and a stretch from Kariba to Lusulu along the Zambezi Valley.
In statistical terms the forecast issued for the sub-season OND, was not a hit particularly for Regions 1 and 2.

6.3 Rainfall performance for the JFM sub-season of the 2019/2020 rainfall season in comparison with the sub-seasonal forecasts

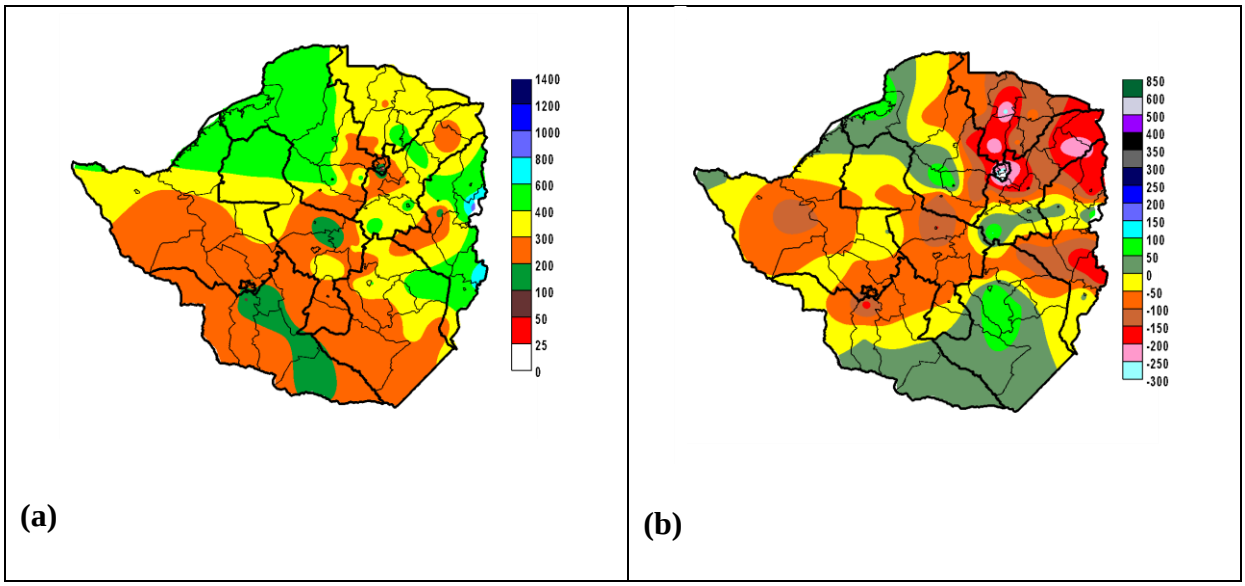


Figure 13 (a) Accumulated rainfall for JFM and (b) Anomaly rainfall for JFM 2020

Dry conditions were experienced in the first dekad of January with relatively low rainfall amounts being received in the western parts of the country. The second dekad of January experienced widespread rains which were thundery in places with localised heavy downpours. The last dekad of January was characterised by mostly dry and hot conditions with light showers in places. The situation extended into the earlier part of the first dekad of February.

However, from Tuesday, 6 February, moisture moved into the country from Zambia resulting in widespread thunderstorms in areas along and to the north of the main watershed with some localised heavy downpours (in excess of 50mm in 24 hours). The rainfall activity persisted up to 13 February. First dekad of February saw 7 stations recording extreme events and the second dekad had 24. There was a gradual decrease of rains particularly in the south and south-western parts of the country from 14 to 20 February (dekad 2) with some thunder showers occurring in places.

There was another cloud system which moved into the western areas of Zimbabwe from Botswana and South Africa on Saturday 22 February. This resulted in widespread thunderstorm activity as it swept across the country from the west. The peak of the rainfall activity was on 24 February.

There was a decline of rainfall activity into March as dry and hot conditions interspersed with some cloudy, cool and windy conditions (Guti) dominated the month. Showery rains were reported mostly in the northern districts with drizzle occurring over the southern areas.

The ITCZ, which normally brings rains especially over the northern areas of the country during the season, was not as active or did not develop. This explains, to some extent, why there was some relatively poor seasonal performance.

In general, the sub-season (JFM) performed better than OND with February contributing significantly in terms of accumulated rainfall amounts. Much of the country received rainfall amounts from 200mm to 600mm for the second half of the season **(figure 13 (a)).** The highest was **642mm (Chisengu)** followed by **574 mm (Chipinge)** (light green). **Mukandi** which measured **936mm** was an outlier. The lowest rainfall totals (within the dark green coloured region) which were below 200mm occurred in Matabeleland South and Masvingo and a spot around Whawha near Gweru.

The greater part of the country performed far below their average by their standards **(figure 13 (b)).** The highest anomaly was **-268mm** (Centenary) followed by Concession which recorded a **-236mm**. A few stations recorded above their long term average. The notable ones are Mukandi **(109mm)** and Masvingo **(98mm)** which are just paltry as compared to a normal year.

6.4 Forecast for January-February-March (JFM) vs the actual performance for JFM

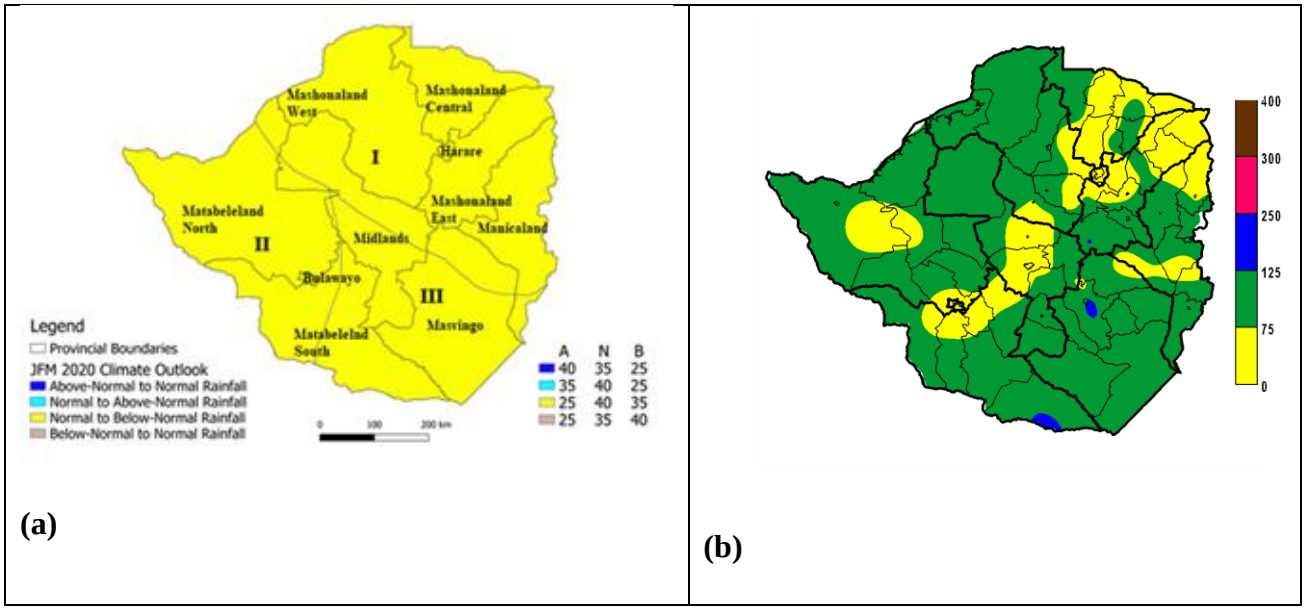


Figure 14. (a) Forecast for the JFM sub-season and (b) Percentage of normal rainfall for JFM 2020

The seasonal forecast for the period JFM given in September went for normal to below normal rainfall throughout the whole country **(figure 14(a)).**

Although March's contribution in terms of rainfall amounts was less as compared to the other two months (January and February), the percentage of normal for the sub-season was normal across much of the country **(figure 14(b)).**

There were some parts of the Matabeleland Provinces, Midlands, Mashonaland Central and Mashonaland East extending into Manicaland which were below normal as shown by the yellow coloured regions in **Figure 14(b).**

In meteorological terms, JFM performed well despite the early cessation of rains across much of the country in March.

Comparing **figures 14 (a) and (b)**, the forecast issued in August 2019 was a hit for much of Regions 1, 2 and 3.

6.5 Rainfall performance for the October-March (ONDJFM) sub-season of the 2019/2020 rainfall season and Anomaly for the October-March (ONDJFM)

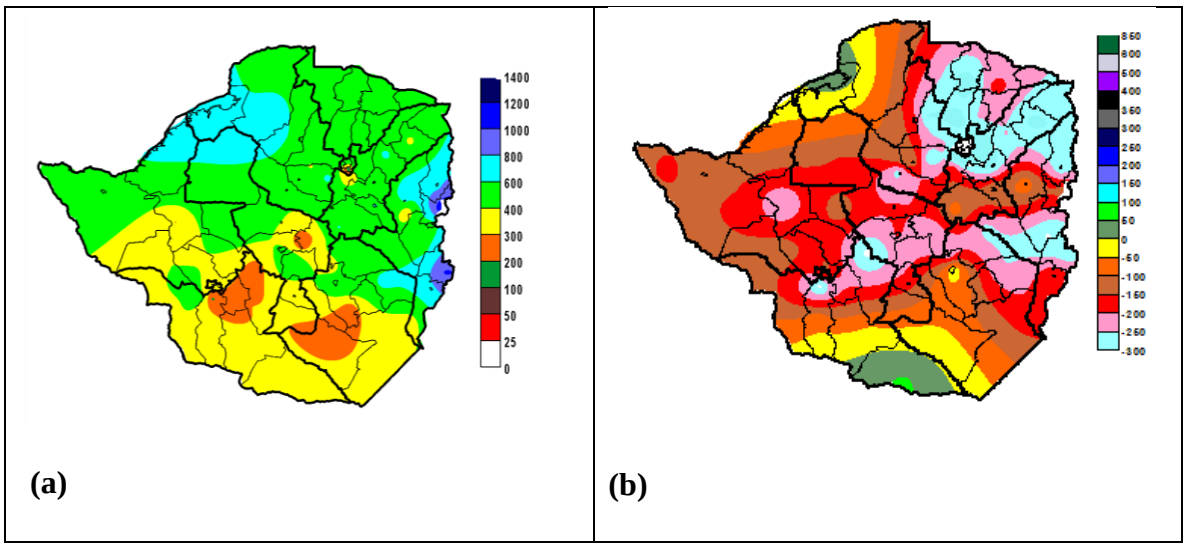


Figure 15. (a) Accumulated rainfall for ONDJFM and (b) Anomaly rainfall for ONDJFM 2019/2020

Accumulated rainfall totals ranged between 300mm and 600mm for the greater part of the country. It was above 600mm around Kariba and parts of Manicaland where Nyanga recorded 769mm followed by Chipinge (728mm). Mukandi recorded **1179mm** which was the highest followed by Chisengu with **1015 mm**. These were the only stations that recorded rainfall totals above **1000mm** for the rainfall season. The least rainfall totals were recorded in Matabeleland South and Masvingo and a spot at around Whawha in the Midlands as shown by the light brown coloured region **(figure 15(a)).**

For the comparison with the mean rainfall, it shows that across the greater part of the country, the rainfall received for the six-month period was below their mean for these areas. A couple of stations in Mashonaland Provinces, Harare Metropolitan, Manicaland and parts of Masvingo showed deficits of greater than 200mm (from their long term average) **(figure 15(b)).** The highest anomalies were **-359mm** at Marondera, followed by Centenary **(-351mm)** and Acturus **(-349mm).** Areas around Beitbridge in Matabeleland South and Kariba in Mashonaland West received rainfall comparable to the long-term average.

When compared to past seasons, starting from the 1991/92 season to date, the 2019/2020 rainfall season with a mean total of **467mm** ranks fifth lowest with 1991/92 (392.6mm), 1994/95 (418.8 mm) and 2015/16 (430.2mm) being the worst seasons.

Starting from the 2010/11 rainfall season, **2019/2020** rainfall season with a mean total of 467mm is ranked **second** after 2015/16 (430.2mm). The 2018/2019 rainfall season is ranked third with a mean of 510.4mm. The highest was recorded in 2016/17 **(893mm),** followed by 2013/14 (796mm) and 2010/11 (776mm).

6.6 Percentage of normal rainfall for ONDJFM

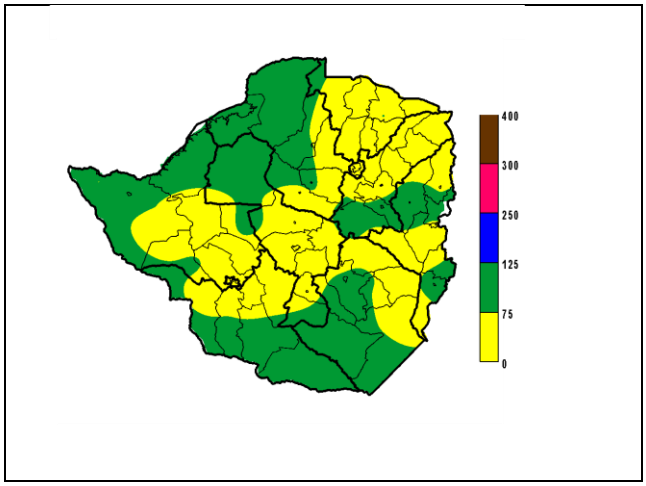


Figure 16. Percentage of normal rainfall for ONDJFM 2019/2020

The season ended up in the below normal category across the greater part of the country with parts of all Matabeleland Provinces, Masvingo and Mashonaland West Province recording normal rains (**figure 16**).

6.7 Comparison of percentage of normal rainfall for OND/JFM

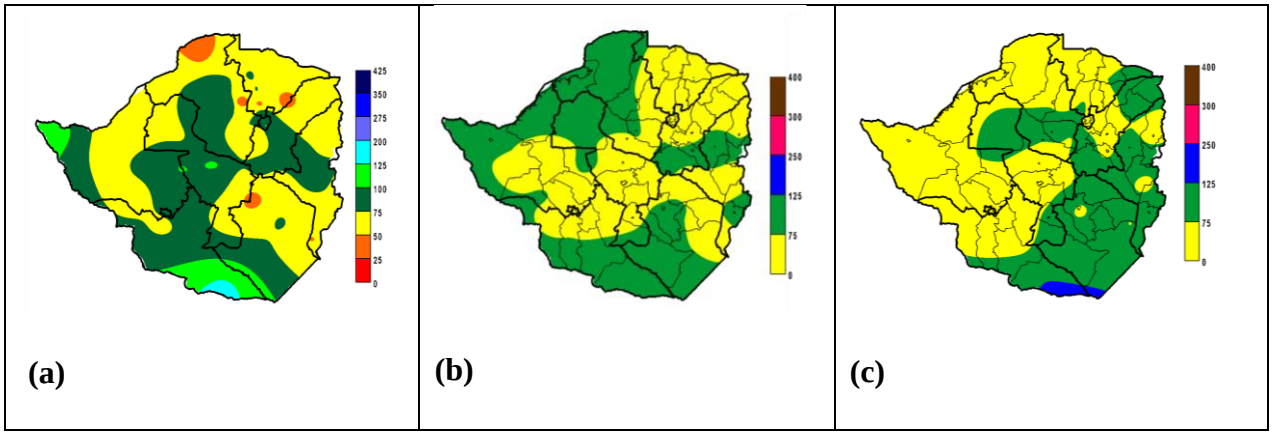


Fig 17. (a) Percentage of normal for 2015, (b) Percentage of normal for 2019 and (c) Percentage of normal for 2018

The comparison of percentage of normal maps (**figure 17 (a, b and c)**) shows that the southernmost part of the country received either normal or above normal rains in these

referenced seasons. It is however important to note that the normal rainfall for that area is between 300 and 400 mm per season.

The Mashonaland Provinces which are the bread basket of the nation were mostly in the below normal category with a considerable part still within the normal category for the 2019/2020 season (**figure 17 (b)**).

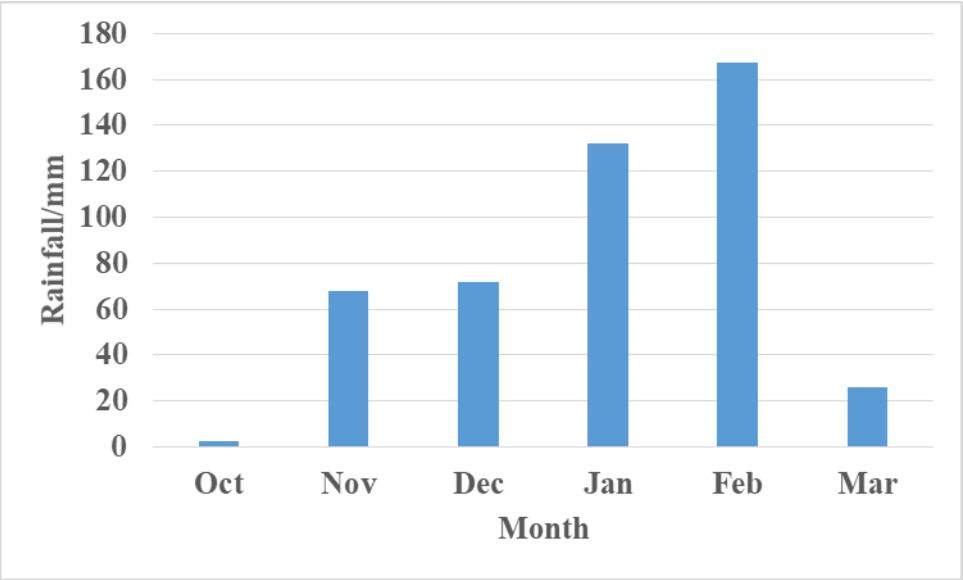


Figure 18 Month -on-month variation of mean rainfall for 2019/20 Rainfall Season

Figure 18 shows that the rainfall activity abruptly ceased in most areas in March. This therefore prompted an early end to the rainfall season in most parts of the country.

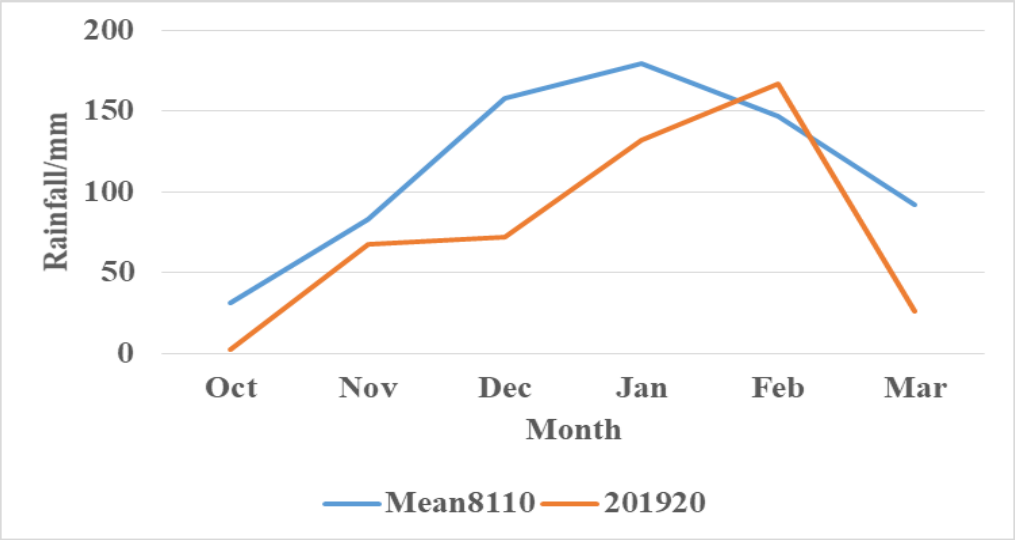


Figure 19 Comparison of Mean Rainfall (1981-2010) vs 2019/20 Season

The comparison of the climatological mean (1981/2010) and 2019/20 rainfall season time series shows that the seasonal rainfall was below normal. Our rainfall should have a peak in January (blue) but this time around, it was in February (orange). A closer look at the graphs also shows that the country had a drier than normal December with a deficit of more than 75 mm on average. The decrease in mean rainfall between February and March was also very sharp as compared to the reference period of 1981 to 2010.

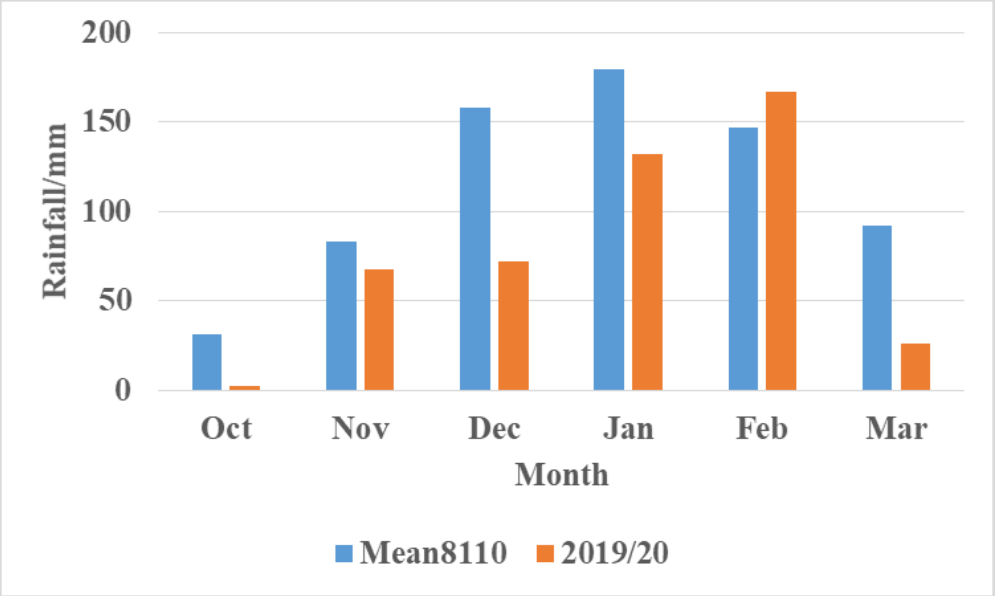


Figure 20 Comparison of Mean Rainfall (1981-2010) vs 2019/20 Season

The bar chart as well indicates that the highest rainfall over Zimbabwe is usually received in January (blue colour) but this past season, it was in February. It was even more than the average for the month of February. The difference between the rainfall values for each of the months of December and March was very significant.

7 END OF SEASON

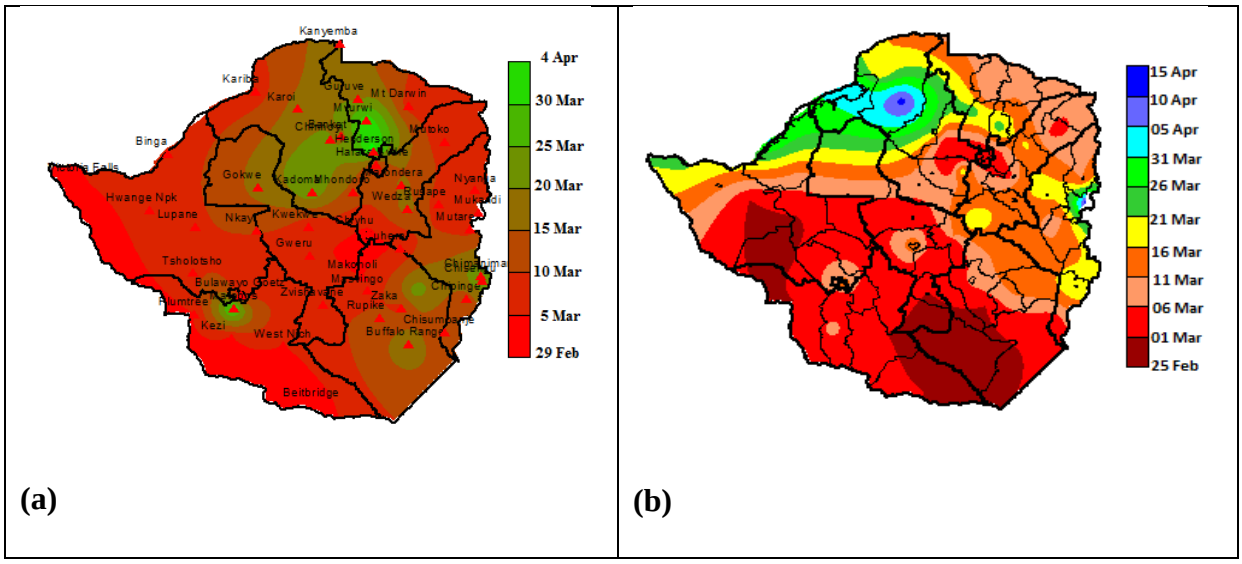


Figure 21 (a) Mean end of season dates for the period from 1981 to 2010 and **(b)** end of season dates for the 2019/2020 season

Figures 21a and **21b** show the mean end of season dates for Zimbabwe and the end of the 2019/20 rainfall season dates respectively. On average, the western parts of the country experience the earliest cessation of rainfall **(Figure 21a).** This usually is between the 28/29th of February and the 5th of March. In most parts of the country their last effective rainfall is around the second and third dekads of March. However, parts of Mashonaland Central and Mashonaland West (green) experience a late cessation of the rainfall which extend into April.

The end of season dates for the 2019/20 rainfall season show that the western and southern parts of the country covering all Matabeleland Provinces, southern areas of the Midlands, Masvingo and southern areas of Manicaland received their last effective rainfall around the end of February into early March (red coloured region). However, the stretch covering Mwenezi, Chivi in Masvingo province into Esigodini in Matabeleland South Province, experienced the earliest cessation which was by 25 February **(brown coloured region) (Figure 21(b))**.

8 OVERVIEW OF THE SEASON PERFORMANCE IN SPACE AND TIME DISTRIBUTION

The 2019/20 rainfall season did not perform as had been forecast particularly for the first half of the season. The greater part of the country ended the season in the below normal category. The Zambezi and Limpopo valley parts of the country were all within the normal category.

- The start of the season was from the second and third dekad of November and an early cessation of rains especially the southern areas.
- A false start was experienced in some areas and dry spells were too long.
- Temporal distribution of rainfall was generally bad although February had the best temporal and spatial distribution for the season
- The season was characterized by several dry spells of different duration. These dry spells coincided with periods of very high temperatures.
- Several storms of 50+ mm were recorded during the season especially in January and February.
- High temperatures were common during the season with some record highs recorded in October and December.
- The first half of the season (OND) ended in the below normal category. Rainfall received in most parts of the country was less than the long-term average for these areas. This had serious implications on agricultural activities.
- The second half of the season (JFM) was mostly in the normal category throughout the country. Rainfall received during sub-season JFM was comparable to the long-term average for these areas.