

BOTSWANA ENVIRONMENT STATISTICS

CLIMATE DIGEST MARCH 2021

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STATISTICS BOTSWANA



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PREFACE

This report is the first edition in the biannual climate statistics digest for the year 2021/22. The report represents Statistics Botswana's continued progress towards the focused monitoring of climate statistics, and the provision of data for climate trends analysis. The indicators covered in this report are guided in part by the United Nations Framework for the Development of Environment Statistics (UNFDES).

Climate statistics are useful for trends analysis and review of climate related performances in human livelihoods, health, social and economic activities. All aspects of life are affected directly by climate, which is the core determining factor of how people and other organisms live and interact on planet earth. Climate determines food availability and the habitability of regions and environments. Extreme climate events are recorded and monitored for better understanding and planning to ensure minimum casualties and disturbances to lives, as well as for adaptation strategies to climate change phenomena. Statistics Botswana strives to facilitate informed planning and decision making through trends analysis and climate statistics reporting in these submissions.

I would like to extend my gratitude and appreciation to stakeholders and data providers, particularly the Department of Meteorological Services and Southern African Science Service Centre for Climate Change and Adaptive Land Management (SASSCAL) whose contributions were invaluable in the production of this Digest.

For more information and further enquiries, contact the Directorate of Stakeholder Relations at 3671300. All Statistics Botswana outputs/publications are available on the website at www.statsbots.org.bw and at the Statistics Botswana Resource Centre (Head-Office, Gaborone).



Dr. Burton S. Mguni
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October 2021

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EXECUTIVE SUMMARY

The period under study is the warm and wet season of October 2020 to March 2021.

Ghanzi received the highest total rainfall in a month, recording 395.0 mm in February 2021, followed by Goodhope recording 243.2 mm in January 2021 and Baines Drift recording 217.6 mm in December 2020. The highest rainfall recorded in a 24 hour period is that for Ghanzi at 82.6 mm and at 78.0 mm both in February 2021, followed by Tubu at 77.0 mm in November 2020. For the study period, the wettest area was Tubu, recording a total of 879.0 mm, followed by Mahalapye at 748.4 mm and Baines Drift recording 703.4 mm.

The lowest mean monthly minimum air temperature is that for Werda at 15.0 °C recorded in March 2021, followed by Werda at 15.2 °C recorded in October 2020 and Goodhope at 15.2 °C recorded in March 2021. The highest mean monthly maximum temperature recorded during the period October 2020 to March 2021 was for Tubu at 41.2 °C in October 2020, followed by Mababe at 38.9 °C in November 2020 and Tubu at 37.6 °C in October 2020. The highest maximum temperatures for the period were recorded for Tubu at 44.3 °C followed by 43.9°C and 43.9 °C, all recorded in November 2020.

During the period under study, winds were strongest in Ghanzi, with the highest mean monthly maximum wind speed of 7.8 m/s during November 2020, followed by Tsabong at 7.6 m/s in November 2020 and Goodhope at 7.5 m/s in October 2020. Lephephe had the lowest mean monthly maximum wind speed at 0.3 m/s in November and December 2020 and 1.9 m/s in October 2020. The highest wind speed recorded during the period under review was 14.8 m/s in November and December 2020 followed at 13.6 m/s in November 2020, all for Tsabong. These wind speed recordings fall in the categories of a Near Gale and a Strong Breeze on the Beaufort scale.

The highest predominance of wind direction by station is that of Lephephe where 61.0 percent of the winds were from the north, followed by Baines Drift where 52.7 percent of the winds were from the east north east and Goodhope where 35.2 of the winds were from the north east. Nationally, winds were predominantly from the east north east 22.8 percent of the days in October 2020, followed by predominance of 21.1 percent from the east north east in February 2020, and 18.9 percent from the east north east in December 2020.

The highest predominance by maximum wind speed is that for Lephephe with 59.3 percent of the days recording strongest winds blowing from the north followed by Baines Drift where 40.1 percent of the strongest winds blew from the east north east direction, and Goodhope where 37.4 percent of the strongest winds blew from the north east.

During the study period, the strongest winds for each month for the country blew mainly from the east north east at 18.8 percent of the days in October 2020, followed by the north east at 18.0 percent of the days in both October 2020 and December 2020.

Overall, during the period, the strongest winds blew from the north east at 15.5 percent of the time, followed by the east north east at 15.1 percent, and the east at 10.1 percent.

The highest mean monthly relative humidity was recorded for Pandamatenga at 95.8 percent in January 2021, followed by 91.8 percent in February 2021 and Mababe at 90.7 percent in January 2021. The lowest mean monthly relative humidity was recorded for Ghanzi at 26.6 percent followed by Tshane at 29.1 percent and Mababe at 32.0 percent, all in October 2020. February recorded the highest relative humidity extremes for the period, whilst October recorded the lowest relative humidity extremes for the period.

1. INTRODUCTION

Climate is important to human livelihoods because it influences human life directly through wellbeing and health and indirectly through human activities such as economic or agricultural practices.

Botswana is climatically classified as arid to semi-arid, and is drought prone, with highly erratic rainfall that ranges from 250mm in the southwest to around 650mm in the north. This report covers the period of October 2020 to March 2021.

2. RAINFALL

The period under study is the wet season and is characterised by warm or hot temperatures.

2.1. Monthly Rainfall

Table 1 shows the total monthly rainfall in millimetres (mm) for the stations with data. The review period is the warm wet season, with rains and high temperatures starting mostly in October through to March of the following calendar year.

Table 1: Total monthly Precipitation (mm) October 2020 to March 2021

| | October | November | December | January | February | March |
|---------------|---------|----------|----------|---------|----------|-------|
| Goodhope | 40.0 | 113.2 | 33.6 | 243.2 | 131.2 | 62.4 |
| Mahalapye | 55.4 | 169.8 | 148.6 | 154.6 | 188.4 | 31.6 |
| Werda | 41.2 | 85.4 | 23.8 | 159.6 | 151.0 | 96.0 |
| Panda-matenga | 5.4 | 20.4 | 8.0 | 158.0 | 17.2 | 0.6 |
| Lephephe | 101.8 | 3.0 | 0.0 | 75.6 | 125.4 | 0.2 |
| Tsabong | 0.2 | 94.2 | 111.6 | 172.2 | 148.0 | 72.2 |
| Tshane | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Baines Drift | 63.6 | 55.8 | 217.6 | 167.4 | 190.2 | 8.8 |
| Tubu | 0.0 | 160.4 | 119.0 | 331.0 | 212.2 | 56.4 |
| Ghanzi | 0.0 | 121.8 | 112.2 | 20.4 | 395.0 | 52.8 |
| Shakawe | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Mababe | 0.0 | 4.0 | 0.0 | 0.8 | 8.1 | 16.0 |
| Sowa | 0.2 | 1.2 | 1.8 | 1.6 | 1.2 | 1.8 |

Source: Department of Meteorological Services and SASSCAL

Ghanzi received the highest total rainfall in a month, recording 395.0 mm in February 2021, followed by Tubu recording 331 mm and Goodhope recording 243.2 mm both in January 2021.

2.2. Rainfall Extremes

Table 2 shows the highest ten (10) daily rainfall recorded in a 24 hour period by station. For the study period, the highest rainfall recorded in a 24 hour period is that for Ghanzi at 82.6 mm and 78.0 mm both in February 2021, followed by Tubu at 77.0 mm in November 2020.

Table 2: Highest ten stations rainfall (mm) recorded in 24 hours October 2020 to March 2021

| Station | Rainfall (mm) | Month |
|--------------|---------------|----------|
| Ghanzi | 82.6 | February |
| Ghanzi | 78.0 | February |
| Tubu | 77.0 | November |
| Goodhope | 72.8 | February |
| Pandamatenga | 72.8 | January |
| Baines Drift | 69.0 | February |
| Werda | 66.4 | February |
| Baines Drift | 65.8 | January |
| Lephephe | 61.8 | October |
| Ghanzi | 58.2 | December |

Source: Department of Meteorological Services and SASSCAL

Table 3 shows the total rainfall by station during the wet season from October 2020 to March 2021. The wettest area was Tubu, recording a total of 879.0 mm followed by Mahalapye at 748.4 mm and Baines Drift at 703.4 mm over the period of six months.

Table 3: Total rainfall (mm) by station October 2020 to March 2021

| Station | Total Rainfall (mm) |
|--------------|---------------------|
| Tubu | 879.0 |
| Mahalapye | 748.4 |
| Baines Drift | 703.4 |
| Ghanzi | 702.2 |
| Goodhope | 623.6 |
| Tsabong | 598.4 |
| Werda | 557.0 |
| Lephephe | 306.0 |
| Pandamatenga | 209.6 |
| Mababe | 28.9 |
| Sowa | 7.8 |
| Tshane | 0.0 |

Source: Department of Meteorological Services and SASSCAL

3. TEMPERATURES

Botswana's diurnal temperature range is high, and this is normal for semi-arid and arid climates. The temperatures also vary spatially, with extremes common in the north-eastern and the south-western regions of the country.

3.1. Minimum Air Temperatures

Table 4 shows the mean monthly minimum air temperatures in degrees Celsius (°C).

Table 4: Mean monthly minimum air temperatures (degrees Celsius) October 2020 to March 2021

| | October | November | December | January | February | March |
|--------------|---------|----------|----------|---------|----------|-------|
| Baines Drift | 18.1 | 21.1 | 20.6 | 20.9 | 19.8 | 17.1 |
| Ghanzi | 17.3 | 19.1 | 19.6 | 19.3 | 18.4 | 17.5 |
| Goodhope | 16.7 | 16.8 | 17.8 | 19.1 | 17.7 | 15.2 |
| Lephephe | 24.6 | 23.7 | 23.6 | 24.6 | - | - |
| Mababe | 22.0 | 23.0 | 22.2 | 19.2 | 18.4 | 17.8 |
| Mahalapye | 24.0 | 23.8 | 23.4 | 24.2 | 22.6 | 22.2 |
| Pandamatenga | 20.1 | 20.5 | 20.0 | 19.2 | 18.9 | 16.8 |
| Sowa | 18.2 | 20.3 | 20.2 | 20.6 | 19.3 | 17.6 |
| Tsabong | 15.6 | 16.8 | 17.0 | 17.7 | 17.0 | 15.9 |
| Tshane | 16.1 | 18.2 | 19.2 | 20.0 | 18.4 | 16.8 |
| Tubu | 24.8 | 25.6 | 25.0 | 22.0 | 23.6 | 22.9 |
| Werda | 15.2 | 16.9 | 18.7 | 19.6 | 17.9 | 15.0 |

Source: Department of Meteorological Services and SASSCAL

The lowest mean monthly minimum air temperature is that for Werda at 15.0 °C recorded in March 2021, followed by Werda at 15.2 °C recorded in October 2020 and Goodhope at 15.2 °C recorded in March 2021.

3.2. Maximum air temperatures

Table 5 shows the mean monthly maximum temperatures for the period October 2020 to March 2021. The maximum air temperatures show the hottest parts of Botswana during the spring and summer seasons.

Table 5: Mean monthly maximum air temperatures (degrees Celsius) October 2020 to March 2021

| Station | October | November | December | January | February | March |
|--------------|---------|----------|----------|---------|----------|-------|
| Baines Drift | 30.1 | 33.7 | 30.3 | 30.9 | 29.1 | 30.5 |
| Ghanzi | 35.4 | 33.8 | 32.7 | 29.3 | 27.5 | 29.4 |
| Goodhope | 30.4 | 29.4 | 30.1 | 28.4 | 27.6 | 28.0 |
| Lephephe | 31.7 | 30.4 | 30.7 | - | - | - |
| Mababe | 38.9 | 34.8 | 31.7 | 30.3 | 30.2 | 32.1 |
| Mahalapye | 30.4 | 30.0 | 28.6 | 29.9 | 28.2 | 29.0 |
| Pandamatenga | 34.7 | 33.0 | 27.6 | 26.8 | 27.9 | 30.2 |
| Sowa | 35.1 | 34.1 | 31.4 | 29.6 | 29.6 | 31.2 |
| Tsabong | 33.6 | 33.7 | 33.7 | 32.2 | 31.9 | 31.8 |
| Tshane | 33.1 | 34.1 | 33.4 | 30.9 | 29.0 | 30.0 |
| Tubu | 41.2 | 37.6 | 35.7 | 33.7 | 33.1 | 35.1 |
| Werda | 33.0 | 34.1 | 33.4 | 31.7 | 30.3 | 30.9 |

Source: Department of Meteorological Services and SASSCAL
 Dash (-) Shows no data

The highest mean monthly maximum temperature recorded during the period October 2020 to March 2021 was for Tubu at 41.2 °C in October 2020, followed by Mababe at 38.9 °C in October 2020 and Tubu at 37.6 °C in November 2020.

3.3. Maximum temperature extremes

Table 6 shows the highest maximum air temperatures recorded for the stations, during the period October 2020 to March 2021. The highest maximum temperatures for the period were recorded for Tubu at 44.3 °C followed by 43.9°C and 43.8 °C, all recorded in November 2020.

Table 6: Highest maximum temperatures recorded (degrees Celsius) October 2020 to March 2021

| Temperature (°C) | Month | Station |
|------------------|----------|---------|
| 44.3 | November | Tubu |
| 43.9 | November | Tubu |
| 43.8 | November | Tubu |

Source: Department of Meteorological Services and SASSCAL

4. WIND SPEED AND DIRECTION

Wind speed is measured in metres per second (m/s) while wind direction is expressed in degrees. Wind direction is expressed in terms of the direction that the wind is blowing from. For example, northerly winds blow from the north to the south.

4.1. Monthly maximum wind speed

Table 7 shows the mean monthly maximum wind speed for the period October 2020 to March 2021.

Table 7: Mean monthly maximum wind speed (m/s) October 2020 to March 2021

| Stations | October | November | December | January | February | March |
|---------------|---------|----------|----------|---------|----------|-------|
| Baines Drift | 5.7 | 5.6 | 4.9 | 5.1 | 4.3 | 4.2 |
| Ghanzi | 6.5 | 7.8 | 6.8 | 6.5 | 5.8 | 5.5 |
| Goodhope | 7.5 | 7.4 | 7.2 | 6.6 | 5.9 | 5.4 |
| Lephephe | 1.9 | 0.3 | 0.3 | 2.5 | 5.7 | 5.3 |
| Mababe | 7.2 | 6.6 | 5.3 | 4.8 | 5.1 | 4.8 |
| Mahalapye | 7.1 | 5.7 | 5.6 | 5.7 | 5.3 | 4.8 |
| Panda-matenga | 6.0 | 5.5 | 4.0 | 4.2 | 4.6 | 4.4 |
| Sowa | 6.4 | 6.2 | 5.4 | 4.7 | 4.8 | 4.4 |
| Tsabong | 6.8 | 7.6 | 7.3 | 6.3 | 6.0 | 5.8 |
| Tshane | 5.7 | 6.7 | 6.3 | 5.7 | 4.9 | 4.9 |
| Tubu | 6.3 | 5.3 | 5.1 | 4.4 | 4.6 | 4.3 |
| Werda | 5.6 | 6.2 | 5.9 | 5.4 | 4.6 | 4.7 |

Source: Department of Meteorological Services and SASSCAL

During the period under study, winds were strongest in Ghanzi, with the highest mean monthly maximum wind speed of 7.8 m/s during November 2020, followed by Tsabong at 7.6 m/s in November 2020 and Goodhope at 7.5 m/s in October 2020. Lephephe had the lowest mean monthly maximum wind speed at 0.3 m/s in November and December 2020 and 1.9 m/s in October 2020.

4.2. Highest wind speed recorded

Table 8 shows the highest wind speed recorded during the period October 2020 to March 2021. The wind speed recordings are the highest recorded in a 24 hour period.

The highest wind speed recorded during the period under study was 14.8 m/s in November and December 2020 followed by 13.6 m/s in November 2020, all for Tsabong. These wind speed recordings fall in the categories of Near Gale and Strong Breeze on the Beaufort scale. (See **Table 17** in **appendix**)

Table 8: Maximum wind speed (m/s) October 2020 to March 2021

| Speed m/s | *Beaufort classification | Month | Station |
|-----------|--------------------------|----------|---------|
| 14.8 | Near Gale | November | Tsabong |
| 14.8 | Near Gale | December | Tsabong |
| 13.6 | Strong Breeze | November | Tsabong |

*See Table 17 in appendix

Source: Department of Meteorological Services and SASSCAL

4.3. Wind direction

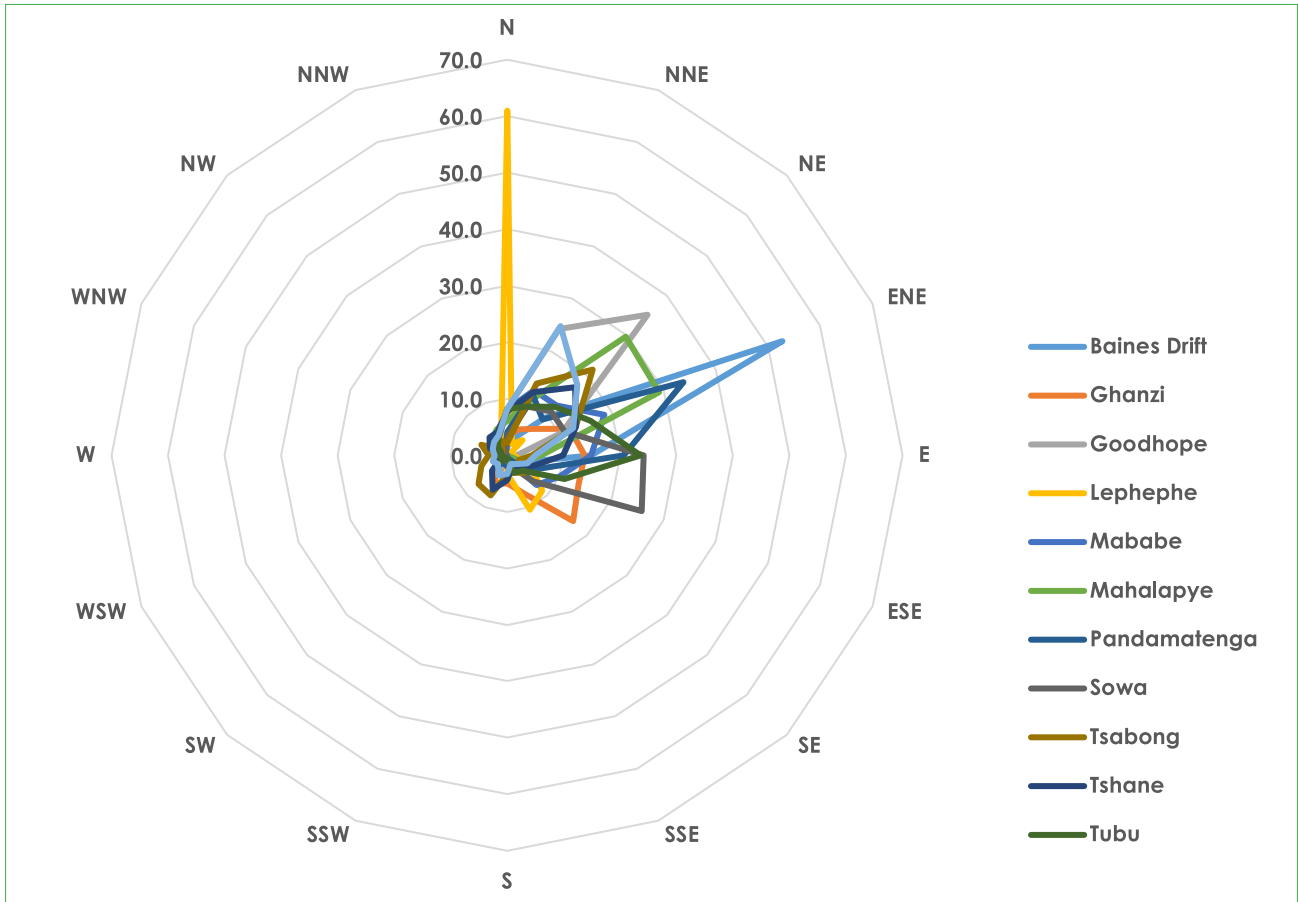
Table 9 shows the stations' predominant wind direction as a percentage of the days recorded between October 2020 and March 2021. The highest predominance is that of Lephephe where 61.0 percent of the winds were from the north, followed by Baines Drift where 52.7 percent of the winds were from the east north east and Goodhope where 35.2 percent of the winds were from the north east. **Figure 1** shows this graphically.

Table 9: Percentage predominant winds by station October 2020 to March 2021

| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW |
|---------------------|------|------|------|------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|
| Baines Drift | 1.6 | 3.3 | 9.3 | 52.7 | 14.8 | 3.3 | 3.3 | 0.0 | 2.2 | 0.5 | 1.6 | 1.6 | 1.6 | 2.2 | 1.6 | 0.0 |
| Ghanzi | 3.3 | 4.9 | 6.6 | 12.1 | 13.7 | 13.7 | 16.5 | 7.1 | 4.9 | 5.5 | 2.7 | 2.2 | 1.6 | 1.6 | 1.1 | 2.2 |
| Goodhope | 8.2 | 24.2 | 35.2 | 10.4 | 1.6 | 1.6 | 1.1 | 2.2 | 0.0 | 2.7 | 1.6 | 1.6 | 0.0 | 2.7 | 2.2 | 4.4 |
| Lephephe | 61.0 | 2.2 | 3.8 | 0.5 | 1.1 | 4.4 | 8.8 | 10.4 | 3.3 | 0.0 | 0.5 | 0.0 | 0.0 | 0.0 | 1.1 | 2.7 |
| Mababe | 8.1 | 12.4 | 12.4 | 18.6 | 14.9 | 9.9 | 7.5 | 1.2 | 0.6 | 0.6 | 0.6 | 1.2 | 2.5 | 1.9 | 3.7 | 3.7 |
| Mahalapye | 6.0 | 10.4 | 29.7 | 29.1 | 6.0 | 2.7 | 0.0 | 2.2 | 0.0 | 0.0 | 0.5 | 0.5 | 0.0 | 3.8 | 3.8 | 4.9 |
| Pandamatenga | 4.1 | 11.7 | 9.0 | 33.8 | 20.7 | 6.2 | 2.1 | 0.7 | 2.1 | 1.4 | 2.8 | 0.7 | 0.7 | 1.4 | 2.1 | 0.7 |
| Sowa | 3.3 | 9.3 | 11.0 | 11.0 | 24.2 | 25.8 | 6.6 | 2.2 | 1.1 | 0.5 | 0.0 | 1.1 | 1.1 | 1.1 | 1.1 | 0.5 |
| Tsabong | 2.2 | 13.7 | 21.4 | 13.2 | 4.4 | 2.2 | 4.4 | 3.3 | 3.3 | 7.7 | 7.1 | 4.9 | 3.3 | 4.9 | 1.1 | 2.7 |
| Tshane | 7.7 | 12.1 | 17.0 | 13.2 | 9.9 | 4.9 | 3.3 | 2.2 | 4.4 | 6.6 | 3.8 | 1.1 | 1.6 | 3.3 | 4.4 | 4.4 |
| Tubu | 8.2 | 9.3 | 12.1 | 15.9 | 23.6 | 11.0 | 3.8 | 3.3 | 0.5 | 0.5 | 1.6 | 0.5 | 2.2 | 1.1 | 2.2 | 3.8 |
| Werda | 8.2 | 24.7 | 17.6 | 12.6 | 4.9 | 3.8 | 2.2 | 1.6 | 3.3 | 3.8 | 2.2 | 2.7 | 2.2 | 2.7 | 3.3 | 3.8 |

Source: Department of Meteorological Services and SASSCAL

Figure 1: Percentage predominant winds by station October 2020 to March 2021



4.4. National wind direction

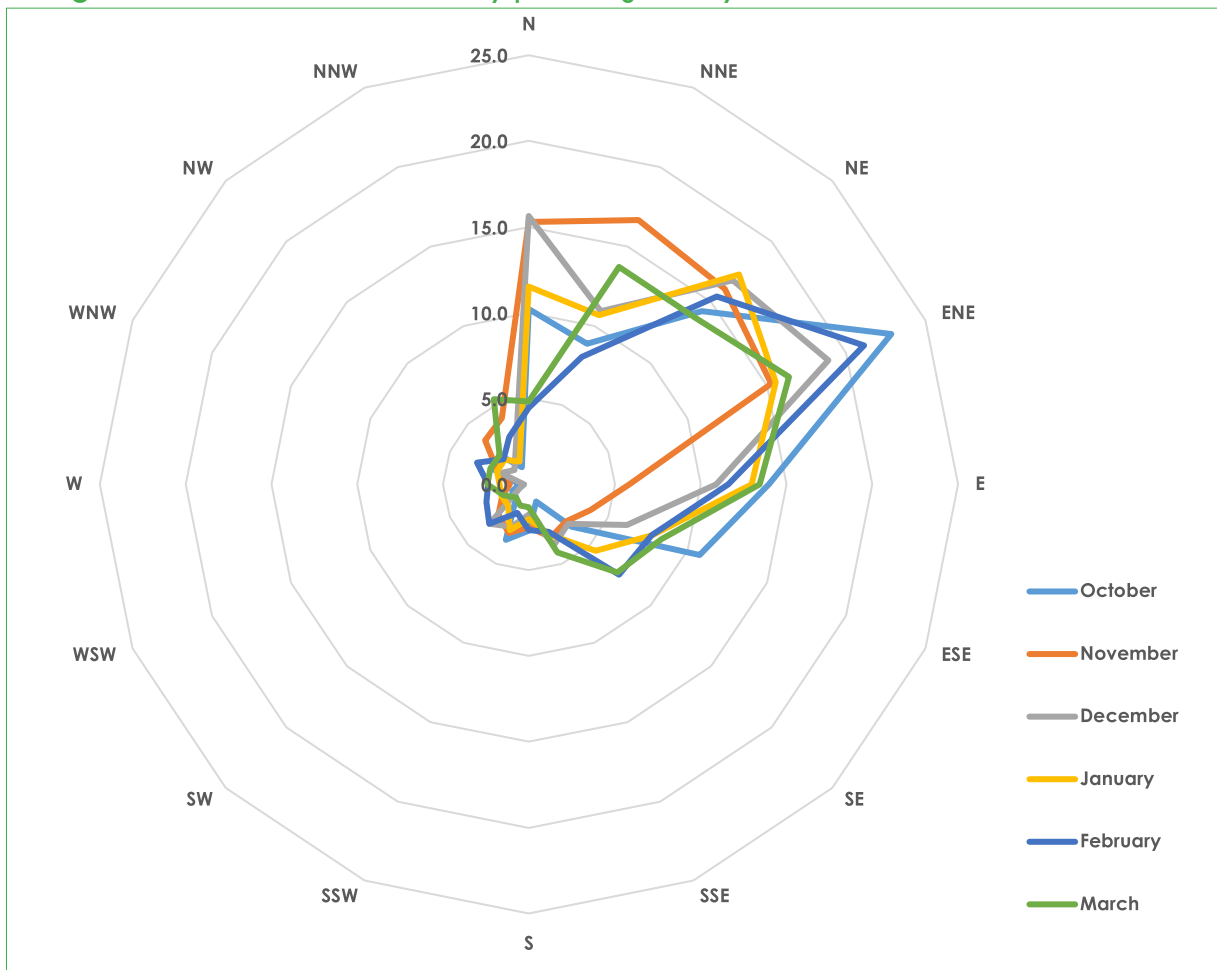
Table 10 shows the country's wind direction for the period of October 2020 to March 2021 as a percentage of the total number of days for that period. Nationally, winds were predominantly from the east north east 22.8 percent of the days in October 2020, followed by predominance of 21.1 percent from the east north east in February 2021, and 18.9 percent from the east north east in December 2020. **Figure 2** shows the country's predominant winds graphically.

Table 10: National wind direction by percentage of days October 2020 to March 2021

| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | Total |
|-----------------|------|------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------------|
| October | 10.2 | 8.9 | 14.2 | 22.8 | 14.0 | 10.8 | 3.5 | 1.1 | 2.7 | 3.5 | 1.1 | 1.1 | 0.5 | 2.2 | 2.4 | 1.1 | 100.0 |
| November | 15.3 | 16.7 | 16.1 | 15.3 | 5.8 | 3.9 | 3.1 | 3.3 | 2.5 | 3.1 | 2.5 | 1.7 | 1.1 | 1.9 | 3.6 | 4.2 | 100.0 |
| December | 15.6 | 10.9 | 16.8 | 18.9 | 10.9 | 6.2 | 3.2 | 3.8 | 1.8 | 2.7 | 3.2 | 0.6 | 0.3 | 1.8 | 1.2 | 2.1 | 100.0 |
| January | 11.5 | 10.7 | 17.3 | 15.6 | 13.0 | 7.8 | 5.5 | 3.2 | 2.0 | 2.9 | 1.7 | 1.7 | 1.7 | 2.0 | 2.0 | 1.4 | 100.0 |
| February | 4.5 | 8.0 | 15.5 | 21.1 | 11.6 | 7.7 | 7.4 | 3.0 | 2.7 | 1.8 | 3.3 | 2.7 | 2.4 | 3.3 | 2.1 | 3.0 | 100.0 |
| March | 4.8 | 13.7 | 13.7 | 16.4 | 13.4 | 8.3 | 7.3 | 4.3 | 1.3 | 1.3 | 1.1 | 1.6 | 2.4 | 2.4 | 2.4 | 5.4 | 100.0 |

Source: Department of Meteorological Services and SASSCAL

Figure 2: National wind direction by percentage of days October 2020 to March 2021



4.5. Maximum wind speed by direction

Maximum wind speed by direction is an indication of the direction of the maximum wind speed recorded. It indicates the direction of the strongest winds for the stations and the country.

Table 11 and **Figure 3** show the percentage maximum wind speed directions for the stations, which is, a percentage of the number of days the recordings were taken during the period October 2020 to March 2021.

Table 11: Percentage maximum wind speed directions by station October 2020 to March 2021

| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | Total |
|---------------------|------|------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--------------|
| Mababe | 8.7 | 14.3 | 16.1 | 15.5 | 7.5 | 6.2 | 7.5 | 3.7 | 1.9 | 2.5 | 0.6 | 1.9 | 3.7 | 1.9 | 3.7 | 4.3 | 100.0 |
| Mahalapye | 3.8 | 13.2 | 22.0 | 25.8 | 7.1 | 2.7 | 3.8 | 1.6 | 2.2 | 1.1 | 1.6 | 3.8 | 0.5 | 2.2 | 3.8 | 4.4 | 100.0 |
| Pandamatenga | 2.1 | 6.9 | 20.7 | 18.6 | 17.2 | 6.9 | 3.4 | 2.8 | 2.8 | 0.7 | 3.4 | 0.7 | 2.1 | 2.8 | 3.4 | 5.5 | 100.0 |
| Sowa | 3.8 | 7.1 | 13.2 | 13.7 | 15.4 | 12.1 | 6.6 | 1.6 | 2.7 | 1.6 | 6.0 | 4.4 | 2.7 | 2.2 | 2.2 | 4.4 | 100.0 |
| Tsabong | 3.8 | 11.0 | 14.8 | 9.9 | 9.9 | 5.5 | 5.5 | 2.2 | 2.7 | 7.7 | 7.1 | 3.8 | 3.3 | 5.5 | 3.3 | 3.8 | 100.0 |
| Tshane | 8.2 | 2.2 | 9.3 | 12.6 | 10.4 | 6.6 | 4.9 | 4.9 | 4.9 | 6.6 | 6.0 | 4.4 | 3.3 | 4.9 | 7.1 | 3.3 | 100.0 |
| Tubu | 8.8 | 11.0 | 18.1 | 18.1 | 11.5 | 5.5 | 7.1 | 5.5 | 2.2 | 1.1 | 0.5 | 0.5 | 2.2 | 1.6 | 3.8 | 2.2 | 100.0 |
| Werda | 11.0 | 15.9 | 16.5 | 7.7 | 3.8 | 4.9 | 1.6 | 2.2 | 3.8 | 6.6 | 2.7 | 1.1 | 5.5 | 5.5 | 4.4 | 6.6 | 100.0 |
| Ghanzi | 3.3 | 7.7 | 3.8 | 12.6 | 14.3 | 12.6 | 8.8 | 7.1 | 6.6 | 4.9 | 3.8 | 3.8 | 3.3 | 3.8 | 1.6 | 1.6 | 100.0 |
| Baines Drift | 3.3 | 1.1 | 13.7 | 40.1 | 18.7 | 3.8 | 0.0 | 0.5 | 0.5 | 2.7 | 3.8 | 2.2 | 2.2 | 2.7 | 0.0 | 4.4 | 100.0 |
| Lephephe | 59.3 | 1.6 | 1.6 | 0.0 | 2.2 | 6.6 | 6.0 | 5.5 | 4.9 | 2.7 | 3.3 | 0.5 | 1.1 | 0.5 | 2.2 | 1.6 | 100.0 |
| Goodhope | 1.1 | 13.2 | 37.4 | 7.1 | 3.8 | 2.7 | 5.5 | 3.8 | 1.6 | 1.6 | 4.4 | 2.7 | 5.5 | 3.8 | 2.7 | 2.7 | 100.0 |

Source: Department of Meteorological Services and SASSCAL

The highest predominance by maximum wind speed is that for Lephephe with 59.3 percent of the days recording strongest winds blowing from the north followed by Baines Drift where 40.1 percent of the strongest winds blew from the east north east direction, and Goodhope where 37.4 percent of the winds blew from the north east.

Figure 3: Percentage maximum wind speed directions by station October 2020 to March 2021

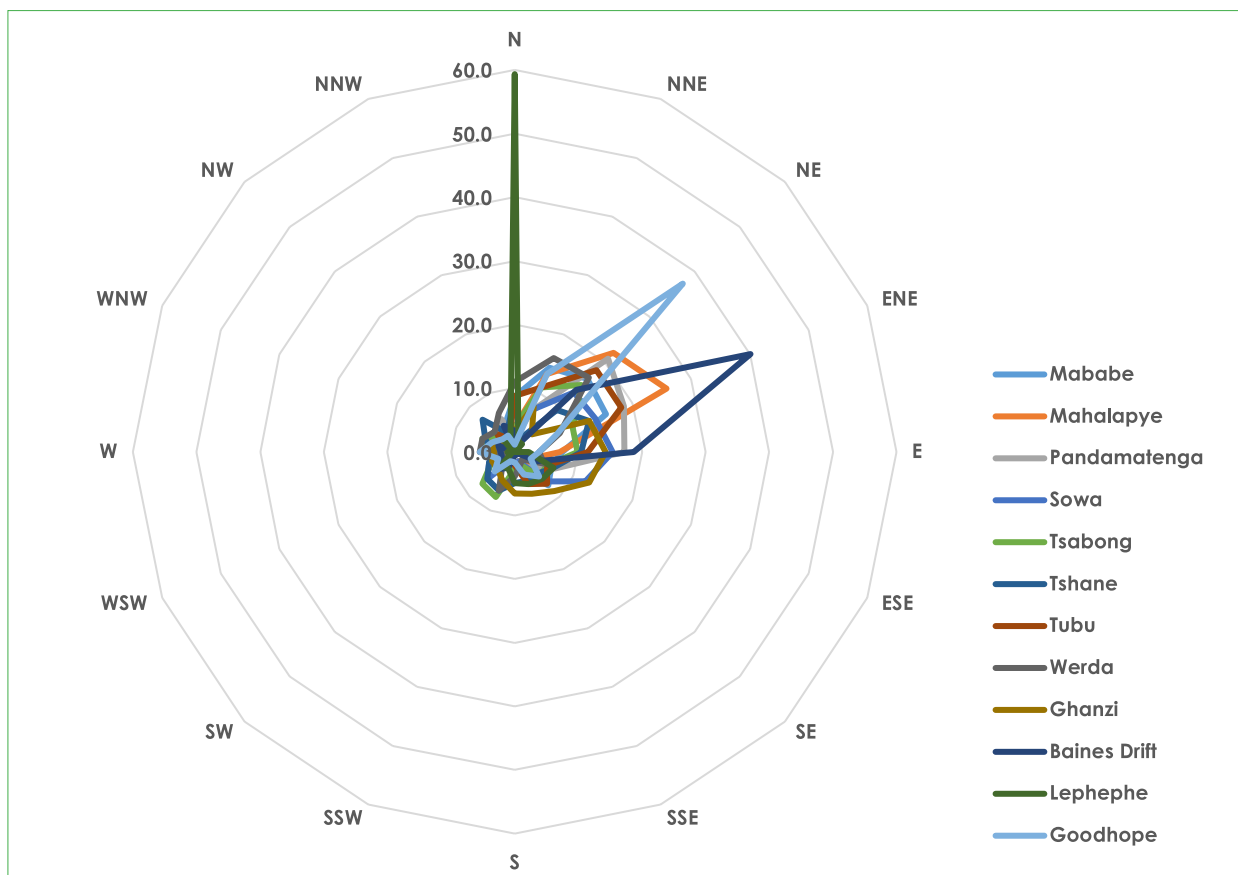


Table 12 and Figure 4 show the maximum wind speed directions for the country as a percentage of the days recordings were taken by month, for the period October 2020 to March 2021.

Table 12: National percentage maximum wind speed directions October 2020 to March 2021

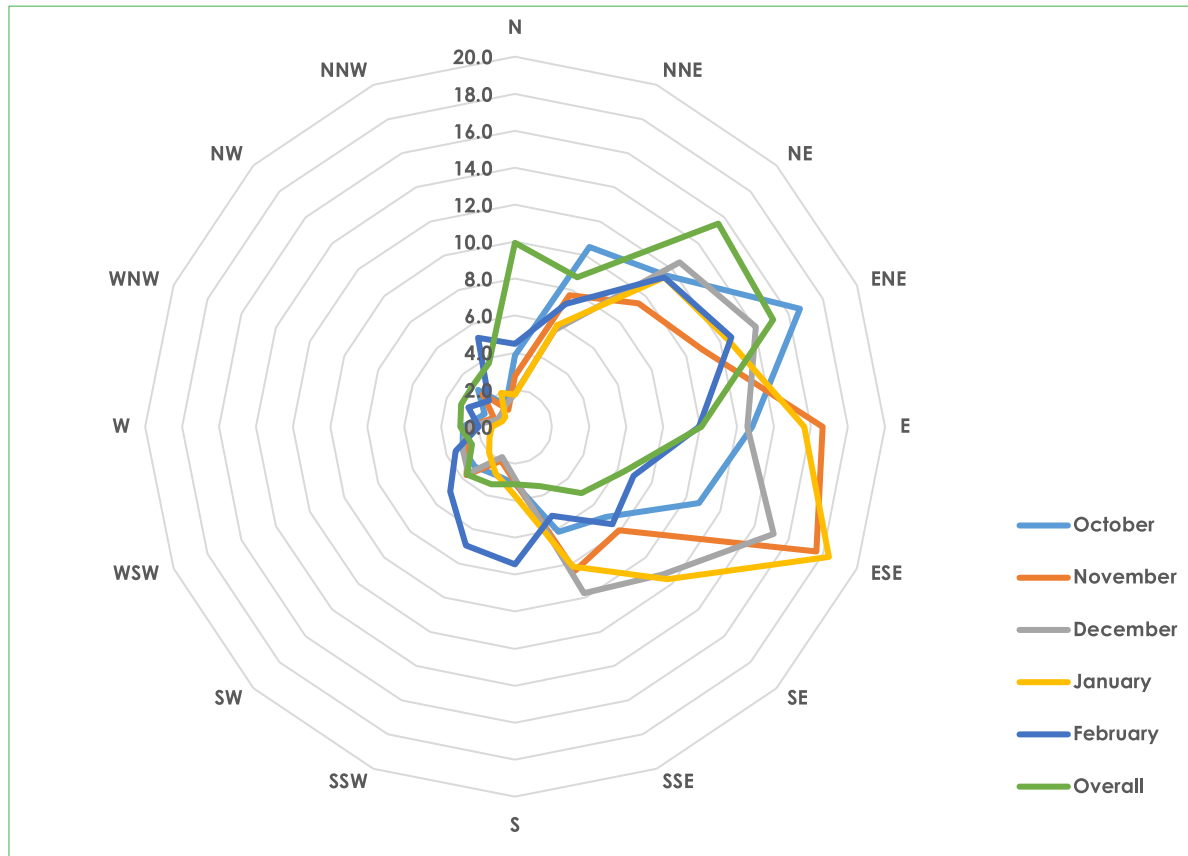
| | N | NNE | NE | ENE | E | ESE | SE | SSE | S | SSW | SW | WSW | W | WNW | NW | NNW | Total |
|----------|------|------|------|------|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-------|
| October | 10.2 | 7.5 | 18.0 | 18.8 | 13.7 | 6.2 | 5.1 | 2.2 | 2.2 | 4.0 | 2.7 | 1.9 | 1.9 | 2.4 | 1.3 | 1.9 | 100.0 |
| November | 12.5 | 10.6 | 13.9 | 11.4 | 4.4 | 4.4 | 3.1 | 3.9 | 4.2 | 5.3 | 2.8 | 4.7 | 4.4 | 5.6 | 4.7 | 4.2 | 100.0 |
| December | 14.5 | 9.1 | 18.0 | 14.5 | 8.6 | 3.8 | 6.5 | 2.9 | 3.2 | 2.4 | 4.1 | 1.2 | 1.5 | 2.4 | 3.5 | 3.8 | 100.0 |
| January | 12.1 | 10.7 | 15.0 | 14.4 | 11.5 | 7.5 | 4.3 | 3.5 | 3.2 | 2.6 | 3.5 | 3.5 | 2.3 | 1.4 | 1.2 | 3.5 | 100.0 |
| February | 7.1 | 6.8 | 13.1 | 14.0 | 10.4 | 8.9 | 6.3 | 2.7 | 2.7 | 4.2 | 6.3 | 1.2 | 4.2 | 4.2 | 3.3 | 4.8 | 100.0 |
| March | 3.5 | 7.8 | 15.1 | 17.2 | 11.6 | 7.3 | 5.4 | 5.6 | 3.2 | 1.9 | 3.0 | 2.7 | 3.5 | 3.0 | 5.1 | 4.3 | 100.0 |
| Overall | 9.9 | 8.7 | 15.5 | 15.1 | 10.1 | 6.3 | 5.1 | 3.5 | 3.1 | 3.4 | 3.7 | 2.5 | 3.0 | 3.2 | 3.2 | 3.7 | 100.0 |

Source: Department of Meteorological Services and SASSCAL

During the study period, the strongest winds for each month for the country blew mainly from the east north east at 18.8 percent of the days in October 2020, followed by the north east at 18.0 percent of the days in October 2020 and north east at 18.0 percent of the days in December 2020.

Overall, the strongest winds blew from the north east at 15.5 percent of the time, followed by the east north east at 15.1 percent, and the east at 10.1 percent of the time.

Figure 4: National percentage maximum wind speed directions October 2020 to March 2021



5. RELATIVE HUMIDITY

Relative humidity is a measure of the amount of water vapour in the air in relation to the maximum amount of vapour or moisture the air can hold at a given temperature, expressed as a percentage. The higher the temperature, the higher the amount of vapour or moisture the air can hold. Moisture is added to the air by evaporation and removed from the air by condensation.

Humidity has an effect on human wellbeing through the prevalence of microorganisms that need moisture in the air, such as dust mites, which in turn can lead to allergies and disease such as asthma. Extremely low humidity can cause dryness of the eyes and the skin, exacerbating conditions such as eczema. Humidity also determines how comfortable or uncomfortable the weather feels.

5.1 Mean monthly relative humidity

Table 13 shows the mean monthly relative humidity for the period from October 2020 to March 2021.

Table 13: Mean Monthly relative humidity (Percentage) October 2020 to March 2021

| | October | November | December | January | February | March | Station average |
|------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-----------------|
| Pandamatenga | 37.5 | 60.5 | 89.6 | 95.8 | 91.8 | 74.5 | 74.9 |
| Mababe | 32.0 | 61.2 | 83.1 | 90.7 | 89.8 | 80.2 | 72.8 |
| Tubu | 34.1 | 60.7 | 75.5 | 87.7 | 87.9 | 76.9 | 70.5 |
| Sowa | 40.4 | 57.0 | 71.8 | 81.6 | 81.9 | 63.5 | 66.0 |
| Ghanzi | 26.6 | 52.7 | 62.8 | 81.5 | 85.9 | 72.8 | 63.7 |
| Baines Drift | 54.8 | 49.8 | 74.4 | 72.2 | 82.2 | 68.3 | 67.0 |
| Mahalapye | 54.6 | 70.6 | 82.4 | 77.7 | 85.9 | 75.1 | 74.4 |
| Lephephe | 52.1 | 74.4 | 82.1 | 76.8 | - | - | 71.4 |
| Tshane | 29.1 | 41.9 | 51.9 | 68.0 | 73.0 | 62.7 | 54.4 |
| Werda | 37.4 | 47.9 | 58.8 | 71.1 | 74.2 | 66.9 | 59.4 |
| Goodhope | 45.2 | 62.0 | 63.6 | 75.4 | 78.3 | 69.0 | 65.6 |
| Monthly Average | 40.3 | 58.0 | 72.4 | 79.9 | 83.1 | 71.0 | 67.3 |

Source: Department of Meteorological Services and SASSCAL

Dash (-) Shows no data

The highest mean monthly relative humidity was recorded for Pandamatenga at 95.8 percent in January 2021, followed by 91.8 percent in February 2021 and for Mababe at 90.7 percent in January 2021. The lowest mean monthly relative humidity was recorded for Ghanzi at 26.6 percent followed by Tshane at 29.1 percent and Mababe at 32.0 percent, all in October 2020.

5.2 Highest relative humidity

Table 14 shows the highest relative humidity recorded for each station by month, during the period October 2020 to March 2021.

Table 14: Highest relative humidity (Percentage) of month by station October 2020 to March 2021

| | October | November | December | January | February | March |
|------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| Pandamatenga | 66.0 | 88.0 | 100.0 | 100.0 | 99.3 | 100.0 |
| Mababe | 54.3 | 85.2 | 99.9 | 99.5 | 97.3 | 94.4 |
| Tubu | 53.6 | 89.6 | 99.7 | 98.7 | 97.1 | 93.0 |
| Sowa | 69.9 | 87.8 | 93.6 | 95.8 | 96.2 | 86.0 |
| Ghanzi | 64.8 | 88.0 | 95.7 | 98.7 | 97.9 | 86.6 |
| Baines Drift | 93.0 | 79.3 | 97.5 | 94.5 | 93.5 | 79.8 |
| Mahalapye | 92.0 | 92.5 | 99.9 | 95.2 | 100.0 | 92.8 |
| Lephephe | 93.1 | 93.7 | 100.0 | 97.8 | - | - |
| Tshane | 85.6 | 66.0 | 81.1 | 90.0 | 99.0 | 90.3 |
| Werda | 93.3 | 83.4 | 77.5 | 94.6 | 98.5 | 92.7 |
| Goodhope | 95.8 | 97.1 | 81.4 | 99.7 | 100.0 | 95.2 |
| Monthly average | 78.3 | 86.4 | 93.3 | 96.8 | 97.9 | 91.1 |

Source: Department of Meteorological Services and SASSCAL

Dash (-) Shows no data

High relative humidity extremes were reached during the months from December 2020 to March 2021. February recorded the highest average relative humidity extreme for the period at 97.9 percent.

5.3 Lowest relative humidity

Table 15 shows the lowest relative humidity recordings for the stations, during the period October 2020 to March 2021. The lowest humidity extremes were recorded during October, November and December 2020. October recorded the lowest relative humidity extremes for the period.

Table 15: Lowest relative humidity (Percentage) of month by station October 2020 to March 2021

| | October | November | December | January | February | March | Station average |
|------------------------|-------------|-------------|-------------|-------------|-------------|-------------|-----------------|
| Pandamatenga | 17.2 | 26.2 | 76.3 | 87.2 | 79.0 | 57.3 | 57.2 |
| Mababe | 15.2 | 26.6 | 68.9 | 81.1 | 78.3 | 61.3 | 55.2 |
| Tubu | 19.0 | 28.7 | 48.2 | 73.1 | 67.1 | 63.9 | 50.0 |
| Sowa | 16.5 | 36.7 | 61.0 | 68.1 | 71.9 | 47.4 | 50.3 |
| Ghanzi | 9.7 | 19.2 | 36.1 | 51.0 | 54.9 | 56.8 | 38.0 |
| Baines Drift | 20.1 | 24.0 | 41.1 | 59.1 | 72.9 | 49.3 | 44.4 |
| Mahalapye | 22.7 | 41.8 | 53.8 | 58.5 | 68.9 | 59.8 | 50.9 |
| Lephephe | 20.6 | 57.2 | 56.3 | 48.5 | - | - | 45.7 |
| Tshane | 10.8 | 17.1 | 17.7 | 35.1 | 35.2 | 35.9 | 25.3 |
| Werda | 14.7 | 20.2 | 30.2 | 47.6 | 48.1 | 46.0 | 34.5 |
| Goodhope | 21.5 | 29.7 | 33.5 | 39.5 | 35.1 | 41.3 | 33.4 |
| Monthly average | 17.1 | 29.8 | 47.6 | 59.0 | 61.1 | 51.9 | 44.1 |

Source: Department of Meteorological Services and SASSCAL

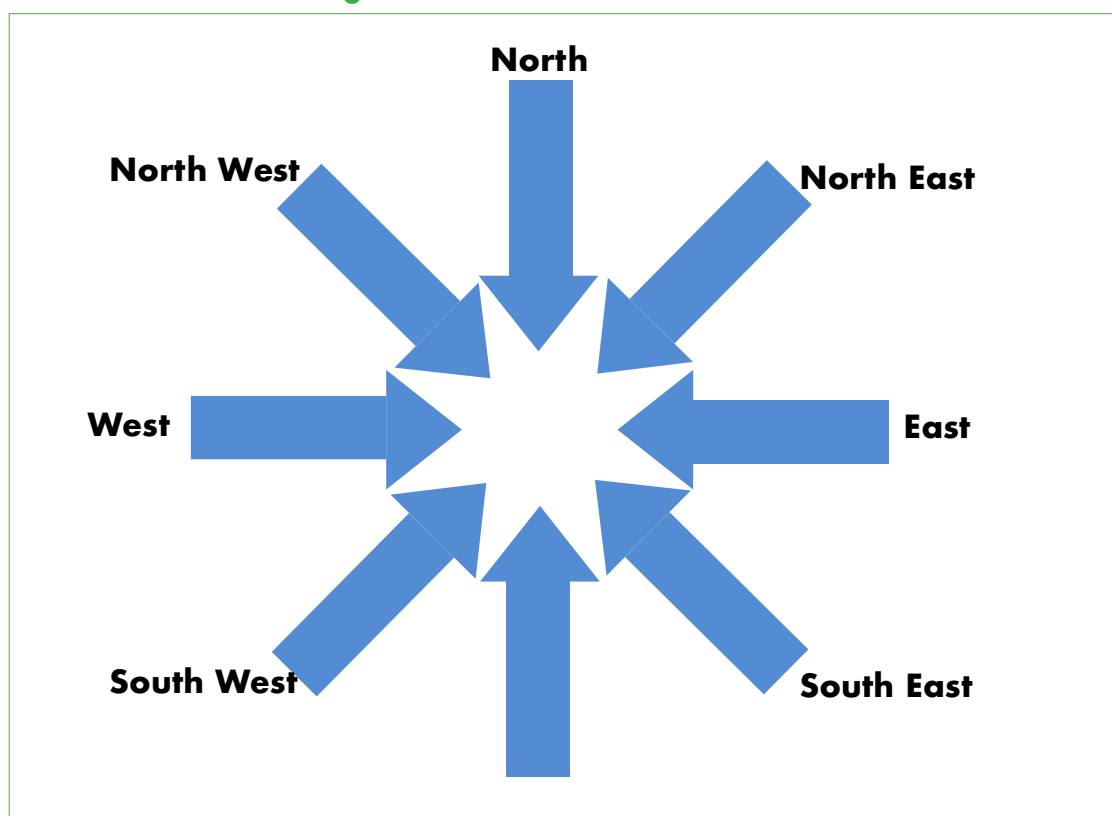
Dash (-) Shows no data

5. APPENDIX

Table 16: Wind Scale

| m/s | Km/h | Beaufort scale | Label | Effects |
|-----------|---------|----------------|-----------------|---|
| 0 - 0.2 | 1 | 0 | Calm | Calm. Smoke rises vertically. |
| 0.3-1.5 | 1-5 | 1 | Light Air | Wind motion visible in smoke. |
| 1.6-3.3 | 6-11 | 2 | Light Breeze | Wind felt on exposed skin. Leaves rustle. |
| 3.4-5.4 | 12-19 | 3 | Gentle Breeze | Leaves and smaller twigs in constant motion. |
| 5.5-7.9 | 20-28 | 4 | Moderate Breeze | Dust and loose paper raised. Small branches begin to move. |
| 8.0-10.7 | 29-38 | 5 | Fresh Breeze | Branches of a moderate size move. Small trees begin to sway. |
| 10.8-13.8 | 39-49 | 6 | strong Breeze | Large branches in motion. Whistling heard in overhead wires. Umbrella use becomes difficult. Empty plastic garbage cans tip over. |
| 13.9-17.1 | 50-61 | 7 | Near Gale | Whole trees in motion. Effort needed to walk against the wind. Swaying of skyscrapers may be felt, especially by people on upper floors. |
| 17.2-20.7 | 62-74 | 8 | Gale | Twigs broken from trees. Cars veer on road. |
| 20.8-24.4 | 75-88 | 9 | Severe Gale | Larger branches break off trees, and some small trees blow over. Construction/ temporary signs and barricades blow over. Damage to circus tents and canopies. |
| 24.5-28.4 | 89-102 | 10 | Storm | Trees are broken off or uprooted, saplings bent and deformed, poorly attached asphalt shingles and shingles in poor condition peel off roofs. |
| 28.5-32.6 | 103-117 | 11 | Violent Storm | Widespread vegetation damage. More damage to most roofing surfaces, asphalt tiles that have curled up and/or fractured due to age may break away completely. |
| >32.7 | >118 | 12 | Hurricane | Considerable and widespread damage to vegetation, a few windows broken, structural damage to mobile homes and poorly constructed sheds and barns. Debris may be hurled about. |

Figure 5: Winds Direction illustration



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