### **Drought in Southern Africa – January 2019**

JRC Global Drought Observatory (GDO) and ERCC Analytical Team 23/01/2019



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### **Executive summary**

- A large area in the southern part of African continent, around the Tropic of Capricorn, is experiencing a meteorological drought, mainly as a consequence of the ongoing El Niño.
- This region has a strong precipitation seasonality, with most of the annual rainfall falling between November and March. A failure in the rainy season entails a year-long water deficit.
- In general, in most affected areas, sowing stage was delayed and food security decreased sharply for most low-income rural households, which depend on rainfed crops, in particular in southern Angola, Zimbabwe, Zambia, southern Mozambique and locally in Namibia. No issues were reported for the hydropower sector, although reservoir levels are generally decreasing across most countries.
- Good and above average rainfall are expected in eastern South Africa and in western Zambia and neighboring regions between January and February, usually the wettest months of the year. Normal precipitation elsewhere.

### Risk of drought impact for agriculture (RDrI-Agri)

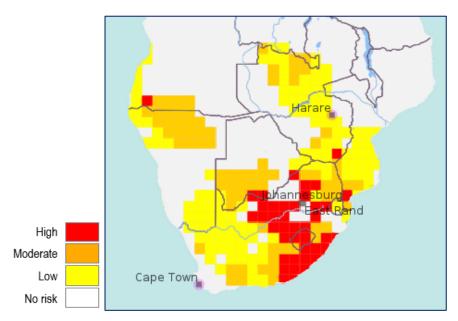
The indicator RDrI-Agri shows the risk of having impacts from a drought, by taking into account the exposure and socio-economic vulnerability of the area, with particular focus to the agricultural impacts (Figure 1).

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For the end of December 2018, the risk index shows a widespread drought situation over a very vast area of the southern part of the African continent. The picture is grim for South Africa, notably the central and eastern regions, including the nations of Swaziland and Lesotho. Other countries affected are Botswana, Zimbabwe, Zambia, Mozambique and Angola. Namibia looks affected as well, although the core of the wet season is yet to come (January and February). A rough estimate of the population living in the affected area is well above ten millions, many of which living in low-income countries and whose households are fully dependent on the drought-exposed farming sector.



**Figure 1:** Risk of drought impact for agriculture (RDrI-Agri) over southern Africa, from 21<sup>st</sup> until 31<sup>st</sup> of December 2018.

### **Precipitation**

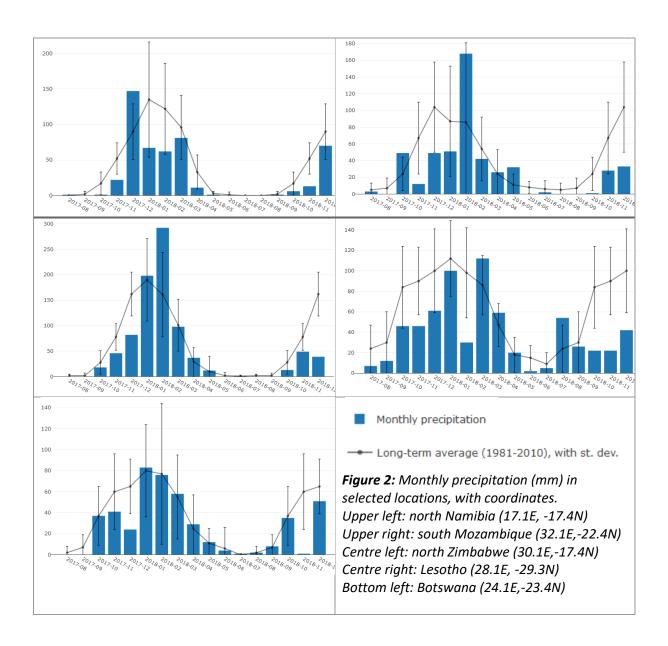
Precipitation includes total monthly of both rainfall and snow. The precipitation pattern for southern Africa is very seasonal, with most of annual rainfall accumulating in just a few months, typically between October and March, while lingering relatively dry for the rest of the year. With the exception of the south-west of South Africa, whose wet season is distinctly shifted, the period November to February gathers at least 50% of yearly precipitation; in certain regions north of the Tropic this percentage climbs up to 80%. Therefore, a lack of precipitation during this critical period likely translates into an enduring water deficit until the next rainy season. It is important to remark that, although the yearly precipitation pattern is similar, the absolute amounts are very different among regions, ranging from less than 200 mm a year in dry parts of South Africa, Botswana and Namibia to more than 500 mm further north and east (Zambia, eastern South Africa, Mozambique, Angola).

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Figure 2 shows the precipitation pattern for five selected points. A common feature is the lack of rain in November and December, plus a visible deficit during the first half of the rainy season 2017/18, more or less compensated later in February/March.



### **Standardized Precipitation Index (SPI)**

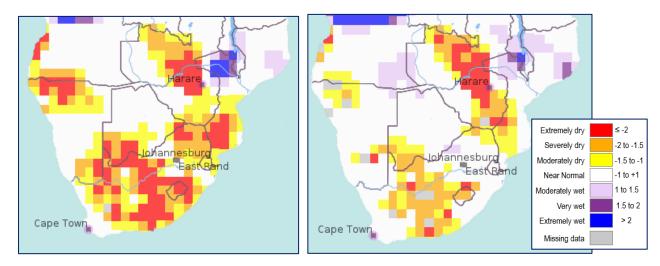
The SPI indicator is used to monitor the occurrence of meteorological drought. The lower (i.e. more negative) the SPI, the more intense is the drought.

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There is a clear and strong pattern of precipitation deficit during the last trimester (i.e. October-December) over most of South Africa, southern Mozambique, northern Zimbabwe, central Zambia and northern Namibia (Figure 3 left). The timing of deficits accumulation is slightly different across the wide area considered though. In fact, considering December only (Figure 3 right), some areas recorded abundant precipitation (north-east), thus October and November are responsible for the deficit, and vice versa for the other regions, where December rainfall failed. Concerning Namibia, while a substantial deficit compared to the long-term average is recorded in November, the core of the wet season are the months of January and February, especially in the north-east of the country. Therefore, the current SPI-3 values should be interpreted accounting for this difference. It is rather the last wet season that received poor precipitation and concurred mostly to the 2018 deficit overall (e.g. Figure 2, upper left).



**Figure 3:** SPI for the accumulation period October to December 2018 (SPI-3, left) and for December 2018 (SPI-1, right) over central and southern Africa.

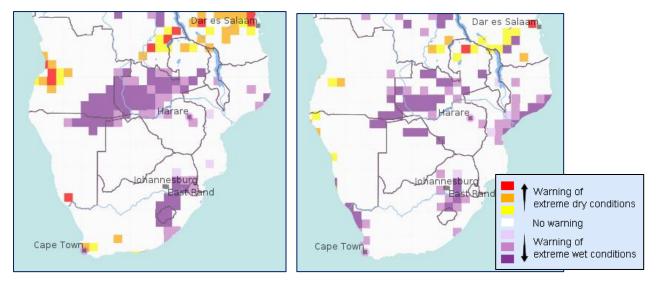
#### **SPI** outlook

According to the SPI forecast for January and the trimester until March, abundant and above average rainfall are expected in eastern South Africa, specifically between Swaziland and Lesotho and down to the coast (Figure 4), currently experiencing high precipitation deficits. This is very important because the period is at the core of the rainy season and therefore capable of compensate water deficits. Similarly for the extreme north-east of Namibia towards central Zambia, where January and February are overall the wettest months of the year. Elsewhere precipitation are expected around the average for the season. This is significant as these months are key for annual water supply, although a water deficit may persist over these regions on the yearly balance.

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**Figure 4:** SPI forecast for January (SPI-1, left) and the trimester January to March (SPI-3, right) over central and southern Africa.

### **fAPAR** anomaly

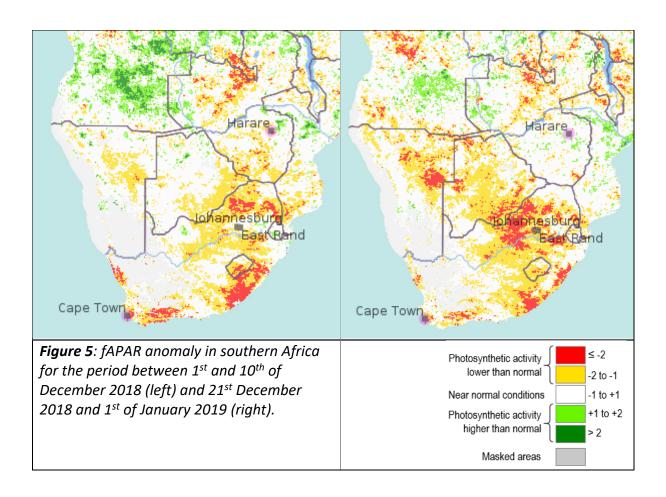
The fraction of Absorbed Photosynthetically Active Radiation (fAPAR) represents the fraction of the solar energy absorbed by leaves. fAPAR anomalies, specifically the negative deviations from the long term average over the same period, are a good indicator of drought impacts on vegetation (Figure 5).

The onset of dryness in the vegetation cover is detected from the first dekad of November, primarily in South Africa, Zimbabwe and central Zambia, at the northern limit of the area of interest. At the end of December, it extended towards the north-west to affect Botswana and Namibia as well, with an apparent improvement in Zimbabwe.

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### Soil moisture anomaly

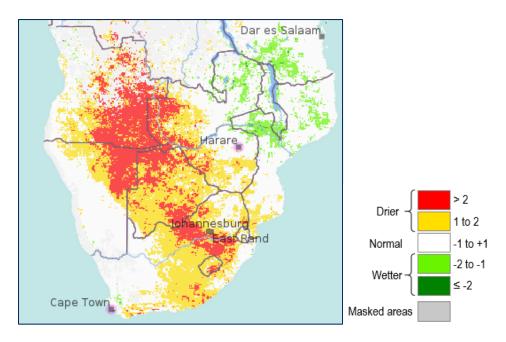
The aim of this indicator is to provide an assessment of the top soil water content, which is a direct measure of drought conditions, specifically the difficulty for plants to extract water from the soil.

In December, a strong soil moisture anomaly is detected over a very wide area, ranging from Angola to South Africa, including the whole of Botswana and big parts of Namibia, Zimbabwe and Zambia (Figure 6). The area matches with the reports of drought issues persisting since mid-2018.

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**Figure 6:** Soil moisture anomaly in southern Africa for the period between the 1st of December 2018 and 1st of January 2019.

### **Reported impacts**

In general, the southern African continent is highly vulnerable to extreme climatological events, due to the combination of insufficient coping capacity, widespread poverty and strong seasonal rainfall patterns. Representatives from the countries affected have gathered to discuss mitigation measures in December<sup>2</sup>.

In late 2018, sowing was delayed in most affected areas, and farmers are waiting for substantial rainfall. The current risk entails that the end of the season arrives as usual, while crops have not fully completed their cycle, thus leading to early and lower harvests, even in the presence of normal precipitation.

In **Botswana** sectorial sources expect grain prices to rise, due to the general situation of drought in the wider southern African region, and South Africa in particular, which is a major source of imported agricultural commodities<sup>3</sup>. Botswana has an unfavorable climate for agriculture and is almost completely dependent on grain imports, thus highly susceptible to price volatility<sup>4</sup>. Earlier in 2018, the government approved financial aid to farmers, to support

All links accessed on 23/01/2019

<sup>&</sup>lt;sup>2</sup> https://southerntimesafrica.com/site/news/sadc-faces-another-bout-of-el-nio-induced-drought

<sup>&</sup>lt;sup>3</sup> https://africandailyvoice.com/en/2019/01/21/botswana-citizens-cautioned-on-drought/

<sup>&</sup>lt;sup>4</sup> http://www.fao.org/giews/countrybrief/country.jsp?code=BWA

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the poor harvest season in the first half of 2018 and to stock grain reserves<sup>5</sup>, which are the only safeguard from food insecurity.

In **South Africa** the livestock sector is suffering, as the combination of drought, which propped animal feed prices up, and the outbreak of the foot and mouth disease among cattle in Limpopo halted beef exports abroad<sup>6</sup>. Maize harvest and consequent prices will be critical for neighboring countries as well. During mid-January fire hazard reached the highest warning level in the innermost regions of South Africa<sup>7</sup>. The South Africa Department of Water and Sanitation advised about the non-optimal status of reservoirs, with several locations currently under drought facing declining water levels, despite the majority standing at above 50% <sup>8</sup>. They raised concerns about the Integrated Vaal River System in particular<sup>9</sup>. Water restrictions are in place in Free State<sup>10</sup>

In **Namibia**, livestock losses were reported, plus a general high and extensive exposure of farmers and herders<sup>11</sup>. However, the situation is patchy, with some areas coping well and recovering, thanks to precipitation in mid-December (north-east), and others still struggling (north-west). Reservoirs are at very low levels, forcing water authorities to impose rationing of water in some locations<sup>12</sup> <sup>13</sup>.

Just across the northern border, in **Angola**, the dryness is worsening the chronic malnutrition that affects poor rural communities in the south of the country. International institutions are already providing financial  $aid^{14}$  <sup>15</sup>.

In **Zimbabwe**, the situation is very concerning, as according to the Government (ZimVAC) more than 2.4 million rural citizens are facing acute food insecurity at the peak of the current

<sup>&</sup>lt;sup>5</sup> https://allafrica.com/stories/201808120194.html

<sup>&</sup>lt;sup>6</sup> https://www.reuters.com/article/us-safrica-farmers/drought-animal-disease-threaten-south-african-farmers-idUSKCN1PC1OT

<sup>&</sup>lt;sup>7</sup> http://www.weathersa.co.za/warnings

<sup>8</sup> http://www.dwa.gov.za/Communications/PressReleases/2019/MS%20-

<sup>%20</sup>Concern%20as%20rainy%20season%20fails%20to%20impress.pdf

<sup>9</sup> http://www.dwa.gov.za/Communications/PressReleases/2019/MS%20-

<sup>% 20</sup> Continued % 20 drop % 20 in % 20 the % 20 Vaal % 20 Dam % 20 could % 20 have % 20 serious % 20 impact % 20. pdf 10 to 10 drop % 20 in % 20 the % 20 Vaal % 20 Dam % 20 Could % 20 have % 20 Serious % 20 impact % 20 Dam % 20

http://www.dwa.gov.za/Communications/PressReleases/2019/MEDIA%20statement%20Dam%20levels%2015%2001%202019.pdf

<sup>&</sup>lt;sup>11</sup> https://www.namibian.com.na/74512/read/Dry-sky-scares-farmers

<sup>&</sup>lt;sup>12</sup> https://www.namibian.com.na/74519/read/Water-rationing-for-Gobabis-as-dams-go-empty

<sup>&</sup>lt;sup>13</sup> https://economist.com.na/41268/general-news/nationwide-dam-figures-remain-below-average/

https://eeas.europa.eu/delegations/angola/56506/sociedade-civil-consultada-no-lubango-sobre-agriculturae-nutri%C3%A7%C3%A3o pt

<sup>15</sup> http://www.angop.ao/angola/en\_us/noticias/sociedade/2019/0/3/Over-one-million-Angolans-affected-drought,638afdce-2c5a-4db9-81c7-c99056e8446c.html

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lean season (January – March 2019)<sup>16</sup>, even before accounting for the drought, which will probably increase sensibly the number of people in need; international aid was already triggered<sup>17</sup>. On top of recurring food security problems, Zimbabwe is going through its worst economic crisis in a decade and relevant political unrest<sup>18</sup> <sup>19</sup>, factors that may further aggravate the humanitarian situation or hinder prompt aid. Optimistic reports exist as well, referring to recent rains to downsize the drought issue<sup>20</sup>. A detailed report on the food security outlook is provided by FEWS<sup>21</sup>. Zimbabwe water levels in reservoirs are for the most in fairly good conditions<sup>22</sup>, despite some concerns over the mid-term availability of water<sup>23</sup>

Water Authority sources confirm such concerns, despite being optimistic on the capability to meet all demand<sup>24</sup>.Food insecurity is spreading over southern **Mozambique**, due to the poor rainfall affecting crops for the second season in a row, combined to the high vulnerability of population and crop pests<sup>25</sup>. A large area of crops have reportedly been lost to drought in the south<sup>26</sup>. A detailed by UN OCHA assessed the current humanitarian situation and plans are being implemented to mitigate impacts<sup>27</sup>

**Zambia** government has released an early warning in which it declares emergency measures to cope with floods and droughts through the period December-April<sup>28</sup>. In the statement, it was anticipated that 42 districts will require support in order to soften impacts from floods and/or dry spells (equivalent to 46,803 households). In the Zambezi basin, farmers are hoping for a good farming season, as sufficient water availability was reported<sup>29</sup>.

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<sup>&</sup>lt;sup>16</sup>https://reliefweb.int/sites/reliefweb.int/files/resources/SADC Zimbabwe snapshot 10July2018 final-v1.pdf

<sup>&</sup>lt;sup>17</sup> https://www1.wfp.org/news/dfid-contribution-assist-116000-wfp-supported-zimbabweans-during-hunger-season

<sup>18</sup> https://www.timeslive.co.za/sunday-times/news/2019-01-13-drought-adds-to-zimbabwes-economic-woes/

<sup>&</sup>lt;sup>19</sup> https://www.newsday.co.zw/2019/01/im-happy-that-the-country-is-quiet-says-zim-president-as-he-arrives-home-after-protest-crackdown/

<sup>&</sup>lt;sup>20</sup> https://www.thezimbabwemail.com/farming-environment/farmers-bullish-of-decent-harvest/

<sup>&</sup>lt;sup>21</sup> http://fews.net/southern-africa/zimbabwe/food-security-outlook/december-2018

<sup>&</sup>lt;sup>22</sup> https://www.zinwa.co.zw/dam-levels/

<sup>&</sup>lt;sup>23</sup> https://www.chronicle.co.zw/bulawayos-dams-hold-30-months-water-supply/

<sup>24</sup>https://news.pindula.co.zw/2018/12/31/bulawayo-dam-levels-drop-5-due-to-excessive-temperaturescontinued-withdrawal-and-low-rainfall-activity/

<sup>&</sup>lt;sup>25</sup> https://reliefweb.int/sites/reliefweb.int/files/resources/Mozambique%20Country%20Brief%20-%20December%202018.pdf

<sup>&</sup>lt;sup>26</sup> http://www.xinhuanet.com/english/2018-12/27/c 137702857.htm

https://reliefweb.int/sites/reliefweb.int/files/resources/Mozambique%20Humanitarian%20Response%20Plan\_210119\_FI NAL.pdf

http://www.xinhuanet.com/english/africa/2018-12/14/c\_137674667.htm . Original press release not available, for an (alleged) copy of the full press release please look at https://www.zambiawatchdog.com/govt-says-there-will-be-drought-diseases-in-2019/

<sup>&</sup>lt;sup>29</sup> https://neweralive.na/posts/zambezi-farmers-experience-sporadic-rains

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Due to its relatively short duration, the current drought is not exposing seriously the power sector. However it should be noted that in many southern (and central) African countries, electricity supply is very vulnerable, as they are highly reliant on hydropower and experience similar rainfall patterns throughout the territory<sup>30 31</sup>; a drought is likely to hamper production in a cluster of power plants at the same time.

UN OCHA released a snapshot about the overall humanitarian situation in southern Africa<sup>32</sup>.

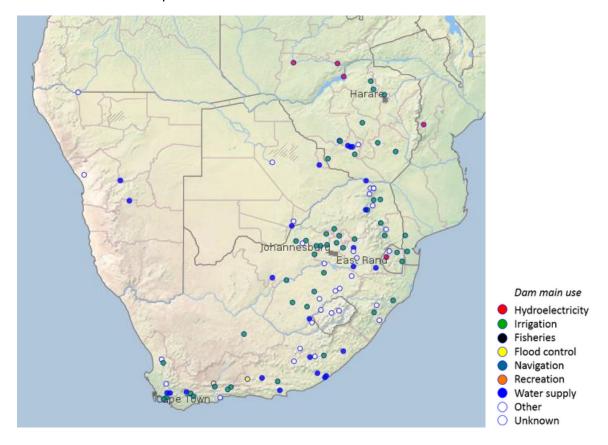


Figure 7: map of some of the main reservoirs across southern Africa.

<sup>30</sup> https://www.nature.com/articles/s41560-017-0037-4

<sup>31</sup> https://theconversation.com/new-dams-in-africa-could-add-risk-to-power-supplies-down-the-line-89789

<sup>32</sup>https://reliefweb.int/sites/reliefweb.int/files/resources/SA\_humanitarian\_snapshot\_22Jan2018\_final%20%2 81%29.pdf

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#### **Information sources**

Global Drought Observatory (GDO) - Joint Research Centre of European Commission

**Distribution**: for ERCC and related partners use.

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