GDO Analytical Report

Drought in Southern Africa – March 2019

JRC Global Drought Observatory (GDO) and ERCC Analytical Team
20/03/2019

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Executive summary – update to March 2019

This document builds on the previous report published in January[1], please refer to it for more insight on the precipitation pattern that led to the drought and earlier reported impacts.

- Compared to the situation at the end of 2018, the drought expanded further north and west, towards central Angola and over the whole of Namibia, while dwindling in Zambia, north-east South Africa and Mozambique. Food security concerns now extend to Angola.
- Due to the strong precipitation seasonality, only March is left for a meaningful recovery, before the start of the dry season. The situation is concerning especially for Namibia and Angola, where the 3 months outlook shows strong and enduring drought conditions, merging into the dry period. Elsewhere precipitation is expected within normal for the period, but unlikely to compensate cumulated water deficits.

Risk of drought impact for agriculture (RDrI-Agri)

The RDrI-Agri indicator 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).

For mid-February 2019, the risk index shows a widespread situation of high risk lingering across South Africa and including Lesotho, essentially unchanged since December.

[1] http://edo-stg.ies.jrc.it/documents/news/GDODroughtNews201901_SouthernAfrica.pdf

Underperforming rainfall in Namibia, at the core of the wet season, explains the deterioration of the index there, as well as in eastern Angola. RDr-Agri improved remarkably in southern Mozambique following rainfall. Zambia and Zimbabwe broadly improved as well compared to January, despite very poor precipitation in February that sustain the ongoing drought crisis.

Overall, the population directly exposed remains above 10 millions; given the widespread poverty in several of the affected regions, it is reasonable to assume that emergency situations are unfolding locally, whether reported or not.

The evolution and timing of the RDrI indicator resembles that of the 2015/2016 drought event, with the exception of the spatial pattern in the later stages, which is involving the western half of the southern continent, while the former event occurred mostly over the eastern half. Both cases are linked to the El Niño phenomenon, with the event of 2015/2016 induced by a strong oscillation, while weaker but persisting El Niño conditions were recorded during March 2019[2] [3].

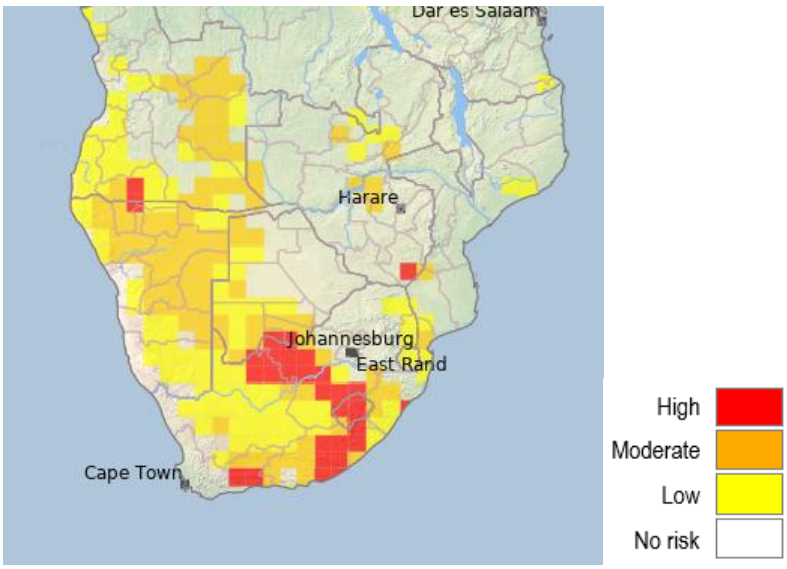

Figure 1: *Risk of drought impact for agriculture (RDrI-Agri) over southern Africa, from 11th until 20th of February 2019.*

[2] http://www.ciifen.org/index.php
[3] https://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/

Precipitation

Figure 2 shows the precipitation for five selected points and their long-term average respectively. Across southern Africa, despite zonal variations, the last trimester from December to February brought poor precipitation overall, not allowing for any meaningful water deficit recovery, but rather an increment. An exception to this general picture is found for north-eastern South Africa and southern Mozambique, where rainfall instead caused heavy floods in some locations and widespread floods further north[4].

Sample locations from Namibia and Angola show the worst pattern, with severely underperforming precipitation during the normally wettest period of the year.

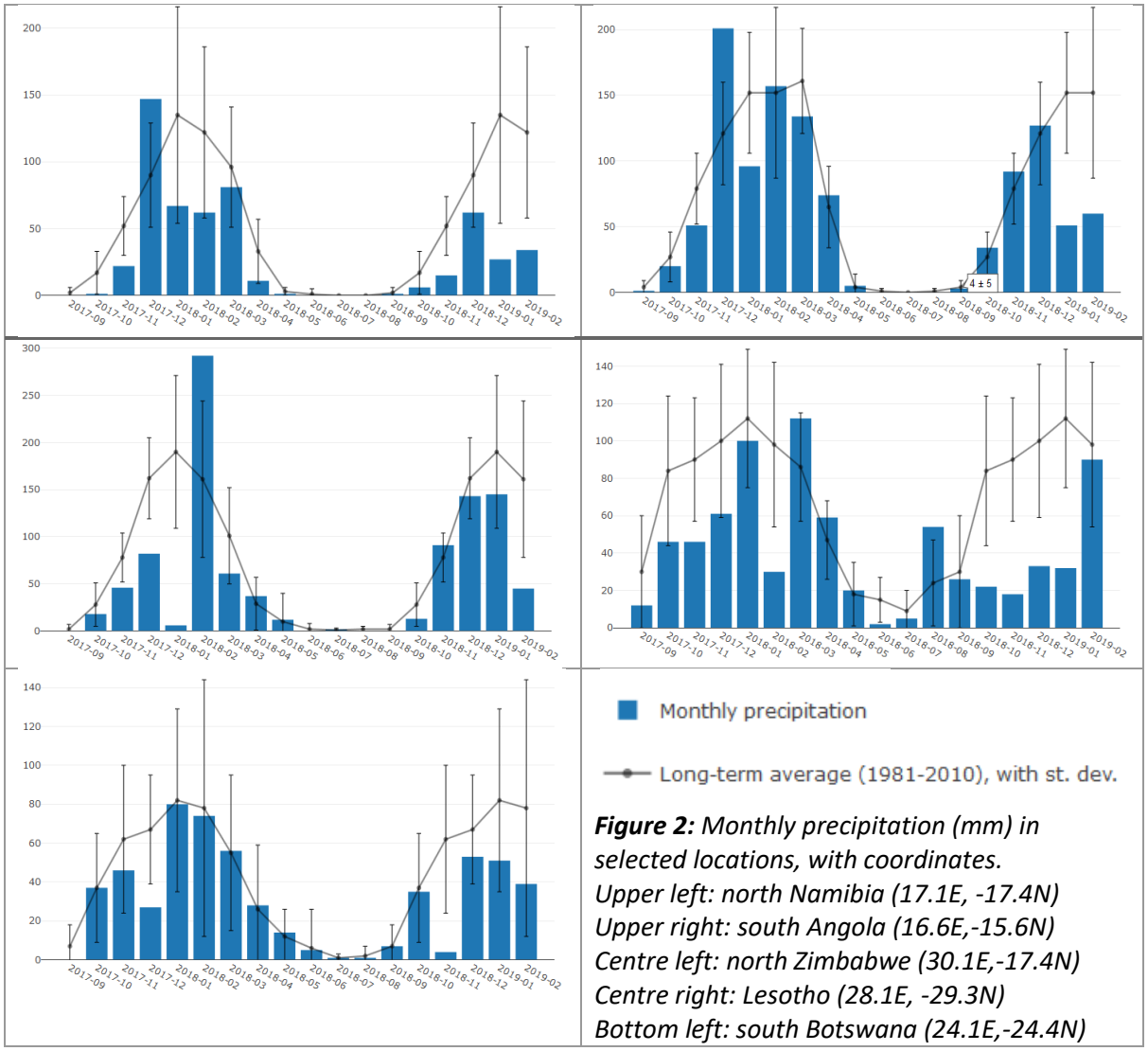

Figure 2: *Monthly precipitation (mm) in selected locations, with coordinates.*
Upper left: north Namibia (17.1E, -17.4N)
Upper right: south Angola (16.6E,-15.6N)
Centre left: north Zimbabwe (30.1E,-17.4N)
Centre right: Lesotho (28.1E, -29.3N)
Bottom left: south Botswana (24.1E,-24.4N)

[4] http://www.gdacs.org/report.aspx?eventid=1000227&episodeid=1&eventtype=FL

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.

The above-mentioned deficit for Angola and Namibia is well pictured by the 3-months SPI as a large patch of dry anomaly across the two countries (Figure 3, left). The same indicator looks about normal for the remaining of southern Africa, as either precipitation was good or, more often, still within the normal fluctuations for the period, although below average. The SPI-3 for February does not account for deficits cumulated before December 2018. Looking at the SPI over a period of nine months until February 2019 (Figure 3, right) provides a more thorough view of the drought event, by including all wet months relevant for the diversity of climates over such a large area. Again, the region between Angola and Namibia stands out clearly, in contrast to the earlier situation in January, when the deficit was centred over central and eastern South Africa. From these indicators, Zambia and Zimbabwe do not seem to experience a severe precipitation deficit except for North Zimbabwe and the bordering Zambia area, where nonetheless February was well below average.

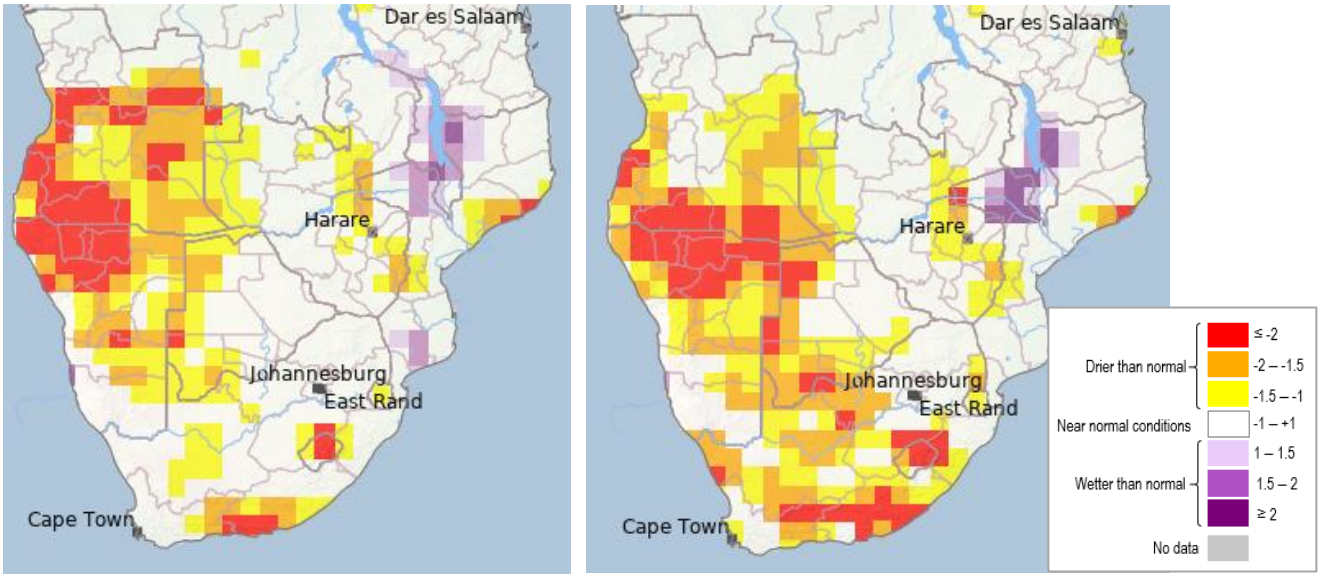

Figure 3: *SPI for the accumulation period December to February 2019 (SPI-3, left) and for June 2018 to February 2019 (SPI-9, right) over central and southern Africa.*

SPI outlook

According to the SPI forecast for the trimester February to April further drought conditions may be expected for Namibia and Angola (Figure 4), wiping out chances of recovery before entering the dry season.

Elsewhere in the eastern half of southern Africa, about average precipitation is expected in the 3 months outlook. This may avoid a further deepening of water deficits, but is unlikely to

compensate the cumulated deficit for the next-coming months, as the current trimester already fades into the dry period for most locations.

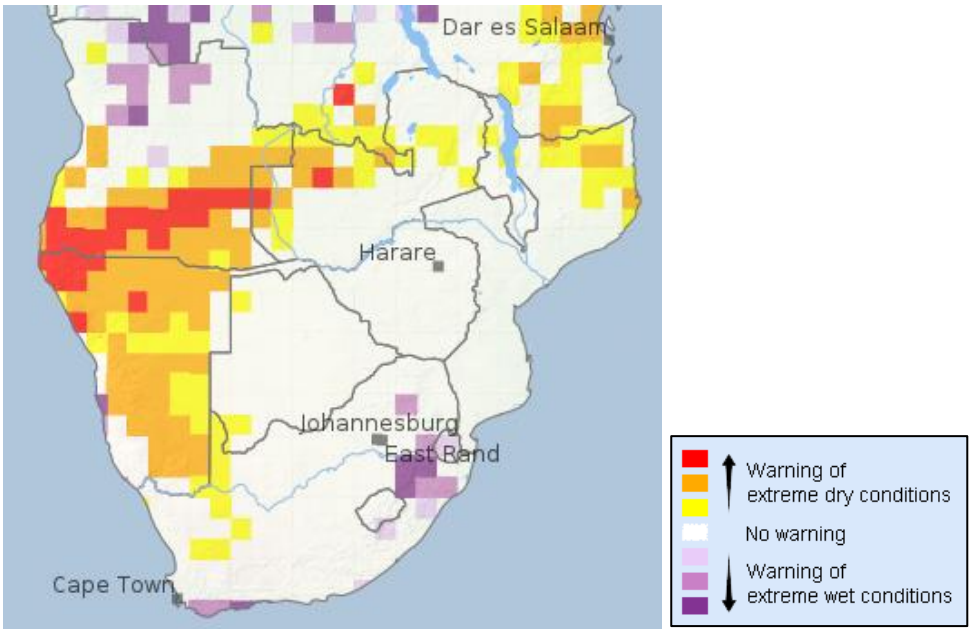

Figure 4: *SPI forecast for the trimester February to April 2019 (SPI-3) over central and southern Africa (based on ECMWF S5 ensemble forecasts).*

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).

Vegetation stress coincides spatially with the meteorological drought detected by SPI over most of the affected areas (Figure 7, right), substantially unchanged since mid-January (Figure 7, left), with the exception of the northernmost part of the area of interest (south-east Angola and western Zambia)[5].

[5] This area shows highly positive values, with an apparent stark recovery compared to January and in contrast to the other drought indicators. A partial explanation of this behavior is the extreme stability of fAPAR in the long-term over this area, host to a dense natural vegetation, which allows for high anomalies in presence of even small deviations from the normal. Given the situation, the indicator was compared against third party independent sources of fAPAR and they confirmed GDO maps. When compared with the previous drought of 2015/2016, a very similar pattern of fAPAR emerged.

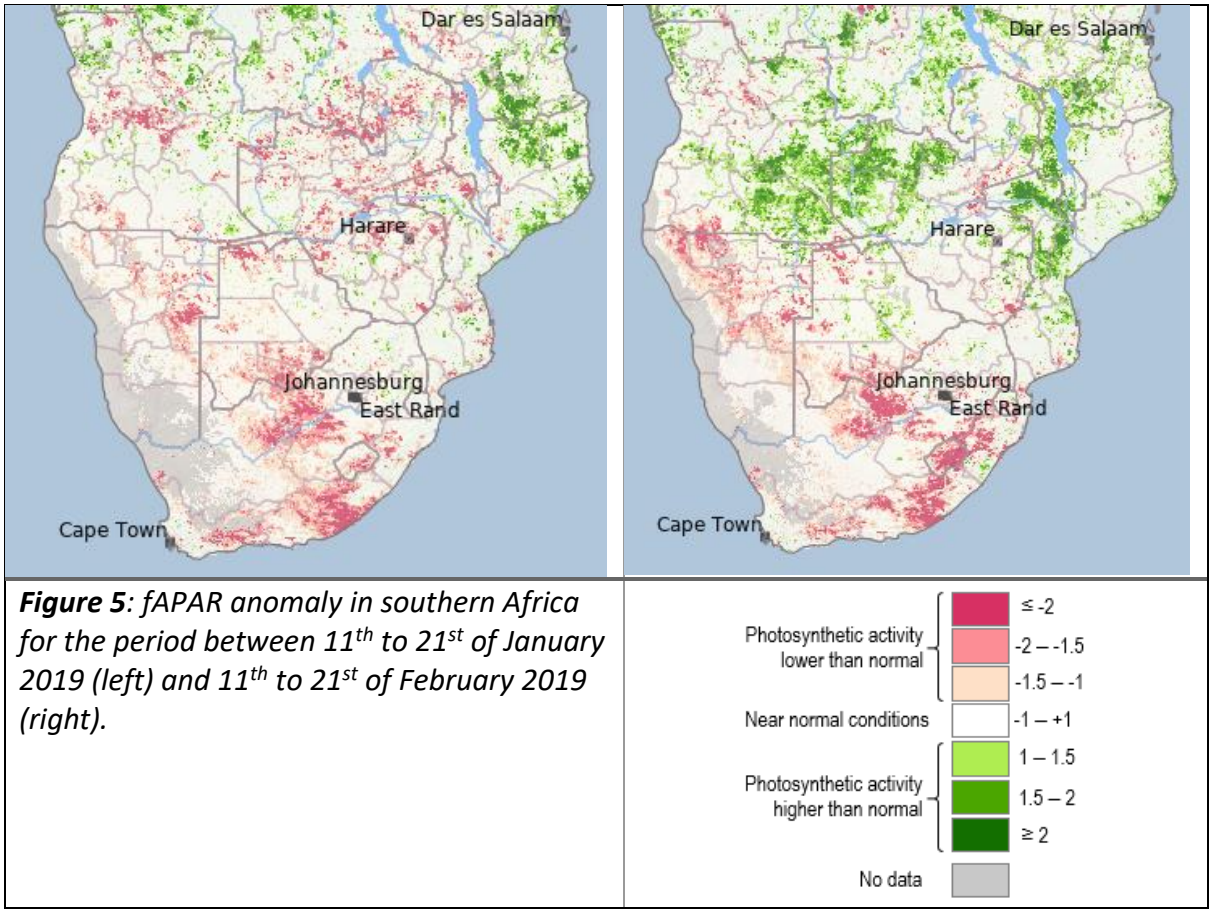

***Figure 5**: fAPAR anomaly in southern Africa for the period between 11th to 21st of January 2019 (left) and 11th to 21st of February 2019 (right).*

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.

Northern Namibia and eastern Angola show the worst levels of soil moisture anomaly for mid-February, together with south-western Zambia and northern Zimbabwe (Figure 6, right), where February precipitation failed.

Compared to the previous month (Figure 6, left), distribution of the dry anomalies changed remarkably, fading away from most of South Africa and emerging further north.

The dynamic of anomalies across the whole region resembles that of 2015/2016, particularly during the interval November 2018 to January 2019.

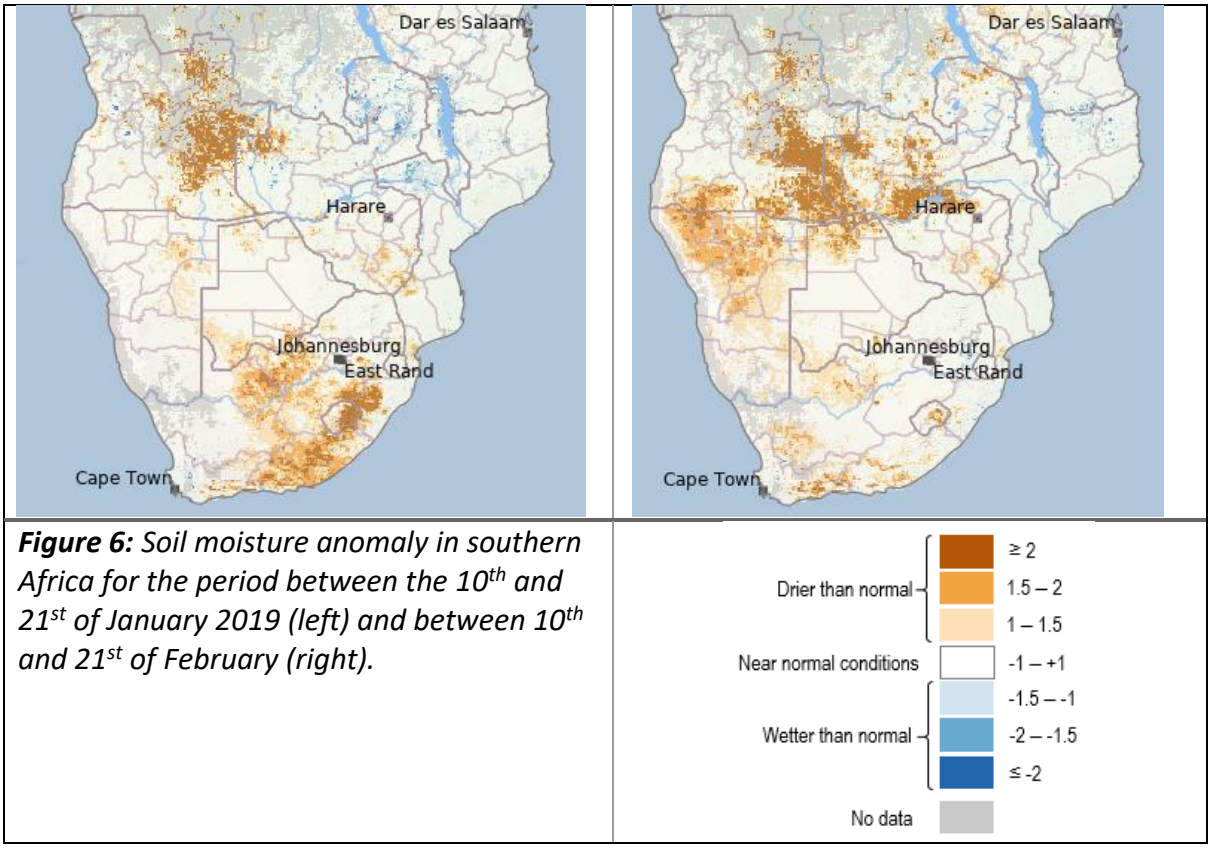

Figure 6: *Soil moisture anomaly in southern Africa for the period between the 10th and 21st of January 2019 (left) and between 10th and 21st of February (right).*

Reported impacts

The following information complement those already provided by previous report[7]. The months of January and February are key for staple crops in southern Africa and agricultural production was severely hit by the ongoing drought[8] [9]. High levels of food insecurity have been estimated for March 2019 for eastern and western Zambia, much of Zimbabwe, southern Malawi, southern Mozambique, western Swaziland, southern Lesotho and southern Madagascar[10]. Concerns for the risk of conflicts due to the lack of water emerged[11].

All links accessed on 18/03/2019

[7] http://edo-stg.ies.jrc.it/documents/news/GDODroughtNews201901_SouthernAfrica.pdf

[8] https://mars.jrc.ec.europa.eu/asap/ ;

[9] https://ec.europa.eu/jrc/en/science-update/crops-severely-affected-southern-africa-good-conditions-winter-crops-north-africa-middle-east-and

[10] https://reliefweb.int/sites/reliefweb.int/files/resources/SADC%20Agromet%20Update%20Issue-04%20-%202018-2019%20Season.pdf

[11] http://www.cajnews.co.zw/sadc-wary-of-drought-driven-conflicts/

In **Angola**, UN Agencies have already agreed to allocate funds to mitigate the impacts of drought on people[12] and food aid was deemed necessary to cope with the disaster[13]. Local governments are trying to implement emergency plans too[14], as from hundreds of thousands of people to above a million[15] have been reported as affected by drought to some degree[16].

In **Namibia**, local aid schemes are deployed and confirm the dire situation of rural communities[17] [18] [19] as well as claims of food shortages related to the drought[20]. The government tried to raise awareness towards the current drought situation internationally[21], while evaluating further actions[22]. Unauthorized water diversions were reported in relation to the lack of water[23]. Conflicts with wildlife over water resources have emerged too[24].

Concerning **Zimbabwe**, the UN has released an appeal for funding, in order to cover the insufficient grain reserves[25]. Power generation at the Kariba dam, supplying both Zambia and Zimbabwe, was halved due to low storage[26], standing at about 40% of total capacity in early March[27]. The dam is the main electricity supplier in both countries and proved exposed to drought in recent years[28].

Food aid was distributed in **Zambia**, to compensate the yield gap affecting farmers[29] [30]. Hunger risk was reported for Southern regions[31], despite the government reassuring about

[12] https://www.portaldeangola.com/2019/03/09/governo-e-unicef-mobilizam-fundos-para-ajudar-cidadaos-afectados-pela-seca/
[13] http://jornaldeangola.sapo.ao/provincias/cunene/toneladas-de-bens-para-vitimas-da-seca
[14] http://jornaldeangola.sapo.ao/politica/combate-a-seca-e-prioridade
[15] http://www.angop.ao/angola/en_us/noticias/sociedade/2019/0/3/Over-one-million-Angolans-affected-drought,638afdce-2c5a-4db9-81c7-c99056e8446c.html
[16] http://jornaldeangola.sapo.ao/politica/seca_afecta_milhares_de_pessoas
[17] https://neweralive.na/posts/drought-aid-schemes-get-stuck-as-funds-run-dry
[18] https://neweralive.na/posts/dare-to-care-fund-close-to-n2m-after-agra-donates-n500000
[19] https://www.nbc.na/news/kaap-agri-namibia-and-pupkewitz-megabuild-distribute-animal-feed-drought-hit-farmers.20721
[20] https://www.namibian.com.na/76633/read/Food-shortages-to-hit-some-households
[21] https://www.namibian.com.na/76175/read/Government-calls-for-international-aid-on-drought
[22] https://neweralive.na/posts/govt-considering-drought-emergency-declaration
[23] https://informante.web.na/2019/03/14/drought-leads-to-vandalism-of-water-canal/
[24] http://www.xinhuanet.com/english/2019-03/05/c_137871079.htm
[25] https://www.reuters.com/article/us-zimbabwe-united-nations-aid/u-n-seeks-234-million-in-aid-for-drought-hit-zimbabwe-idUSKCN1QH17C
[26] https://af.reuters.com/article/southAfricaNews/idAFL5N20K1GH
[27] https://www.zinwa.co.zw/dam-levels/
[28] https://www.reuters.com/article/us-zimbabwe-drought-powerstation/zimbabwes-main-hydro-power-dam-running-out-of-water-after-drought-idUSKCN0VS1GM
[29] https://zambiareports.com/2019/03/04/drought-hit-s-province-receives-relief-food/
[30] https://www.lifegate.com/people/news/drought-in-zambia-maize-output-fall
[31] http://www.times.co.zm/?p=105965

grain reserves and prompting the lift of a maize export ban[32] [33]. Zambia is exposed to electricity supply shortage, due to hydropower unreliability; the situation triggered mitigation attempts for alternative sources[34].

[32] https://diggers.news/business/2019/03/07/zambias-drought-conditions-may-prolong-maize-export-ban-gtaz/
[33] https://www.lusakatimes.com/2019/03/04/msoni-urges-government-to-reconsider-decision-to-lift-maize-export-ban/
[34] https://www.pulse.ng/bi/politics/zambia-has-just-commissioned-its-largest-solar-plant-expected-to-power-30000/nv0c6cg

Information sources

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

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

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