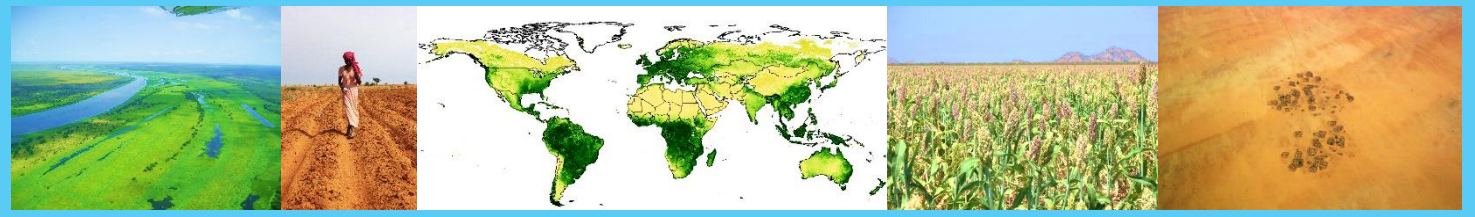

Southern Africa Growing Season 2015-2016:

A Season of Regional Drought

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HIGHLIGHTS

- **One of the strongest El Nino** events on record in 2015-16, has led to a **regional scale drought** comparable in extent and intensity with that of 1991-92.
- **Severe and widespread rainfall deficits** particularly pronounced in the first phase of the season (in many places the driest since at least 1981), continued until mid February: this resulted in **prolonged delays** in the start of the agricultural season and extremely **unfavourable conditions** for crop development.
- Recent **above average rainfall** from late February comes **too late** to be of significant benefit in most affected areas. The early season drought had already led to **irreversible losses** in planted area.
- Consequently, **regional crop production** is set for a **sharp decline for a second year in a row** – South Africa's maize crop is expected to fall by 27 percent compared to last year and 38 percent below the 5 year average.
- **Food prices** across the region have **risen sharply** and the number of **food insecure** people requiring humanitarian assistance is currently **estimated at 31.6 million**. These number will increase further, peaking in late 2016 to early 2017. **Major concerns** are **Zimbabwe**, **Mozambique**, **Lesotho** and **Malawi** but other countries are also affected.

Current Status and Near Future Perspectives

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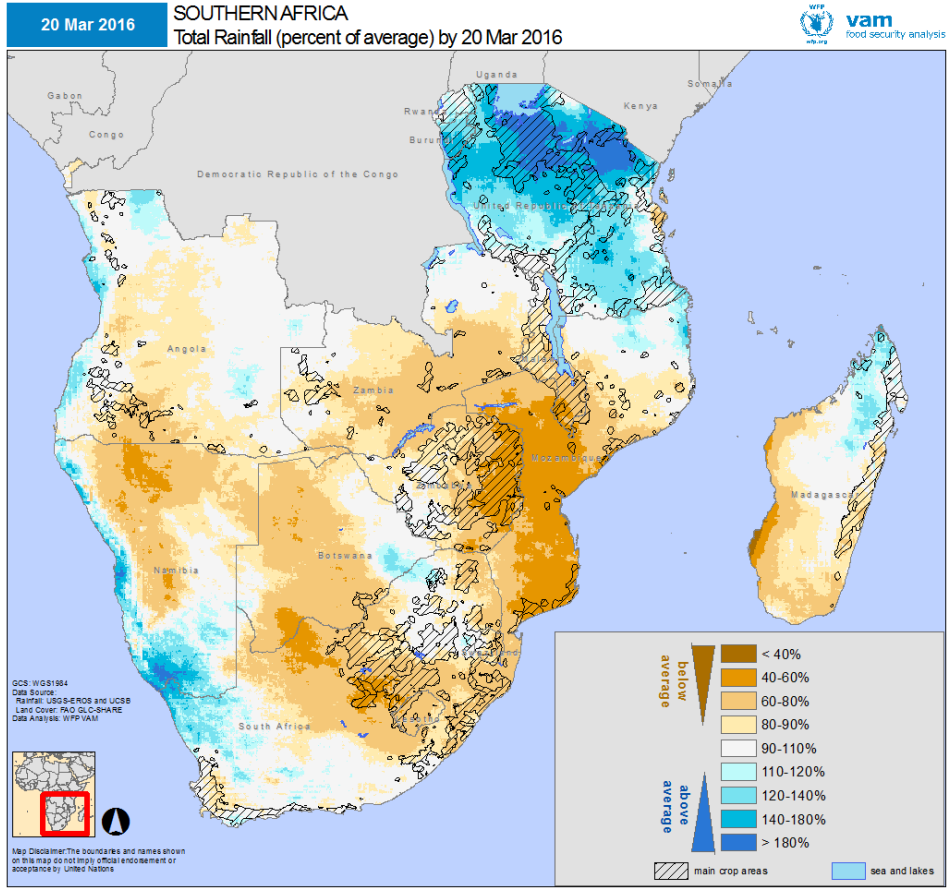
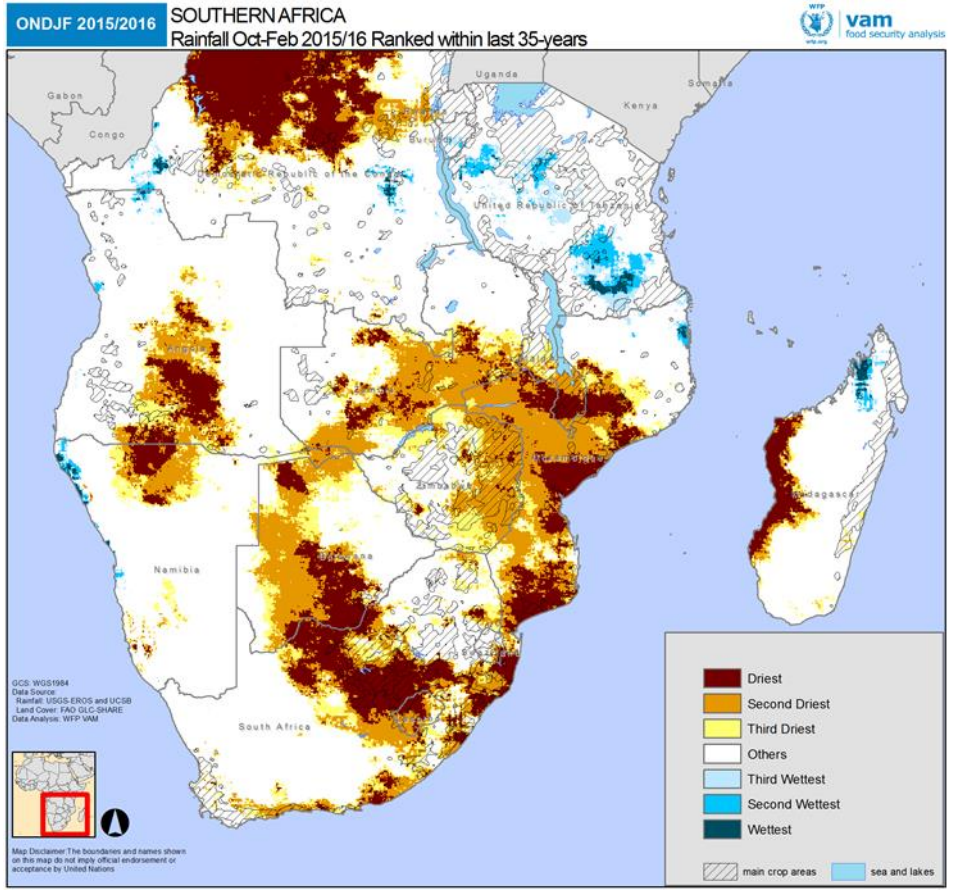
Current Rainfall Patterns: October 2015 – February 2016

Southern Africa: A Season of Regional Drought





Left: October 2015 -February 2016 , as a percentage of the 20-year average. Brown shades indicate below-average rainfall; blue shades indicate above-average seasonal rainfall.

Right: October 2015 -February 2016 rainfall, ranked within the 35 year rainfall estimate record.

Hashed pattern are main agricultural areas.

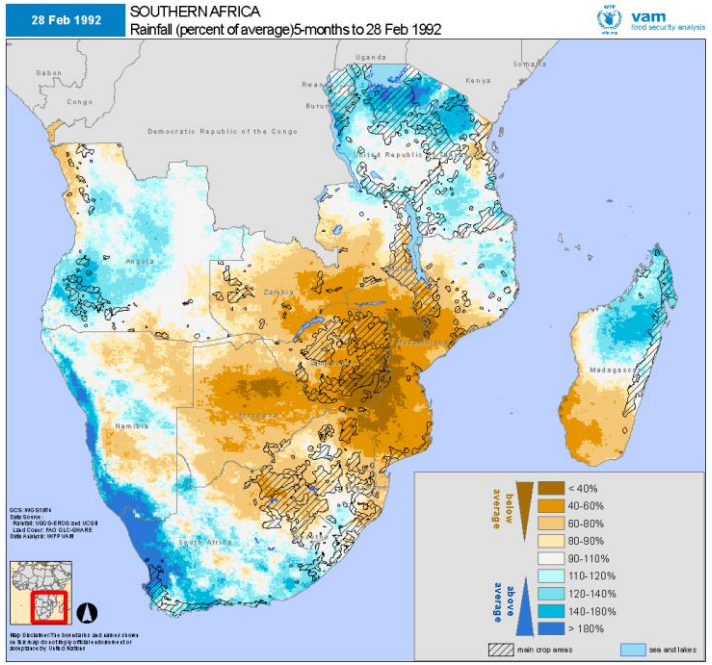
Recent improvements are too little, too late

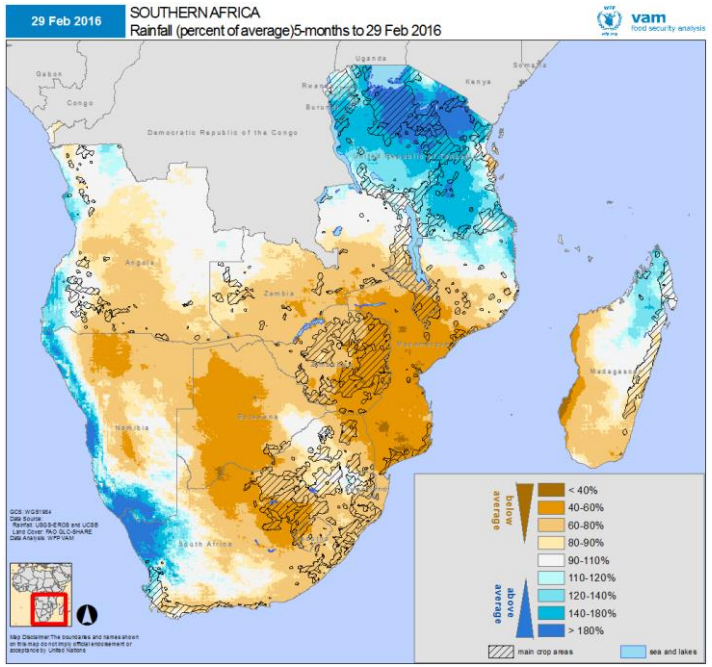
Much drier than average conditions continued to affect the region from early January until late February, worsening seasonal rainfall deficits and intensifying damage to crops and pasture. By mid February, extensive areas of South Africa, Botswana, Zimbabwe, Zambia and Malawi were under the driest conditions in at least 35 years.

Since the last week of February there has been plentiful and widespread rainfall across eastern Botswana, central and north Zimbabwe and most of Zambia. Shorter term forecasts indicate these favourable conditions to continue till end of March. Although this will increase ground moisture content, the crop production prospects may at best slightly improve. Other areas of the region remain under very dry conditions, in particular south and central Mozambique where February rainfall amounts were less than 40 percent of the average and southern Malawi which got only about half of the usual rainfall. Across wide areas of the region, this season remains among the driest on record.

Only Tanzania, northernmost Mozambique and some marginal areas of southern Namibia show sustained wetter than average conditions.

Comparison with Previous Events: 1991-1992





This season is similar to 1991-92

A comparison was undertaken between the current October-February rainfall amount with that of 1991-92, when a major food security crisis was triggers by what is still the most intense drought on record.

This comparison shows that the 2015-16 drought is more widespread, as it extends further into Angola, Namibia and South Africa. On the other hand, the 1991-92 drought was more intense over Mozambique, Zimbabwe, Zambia and Botswana.

When observing October-December and December-February periods separately shows:

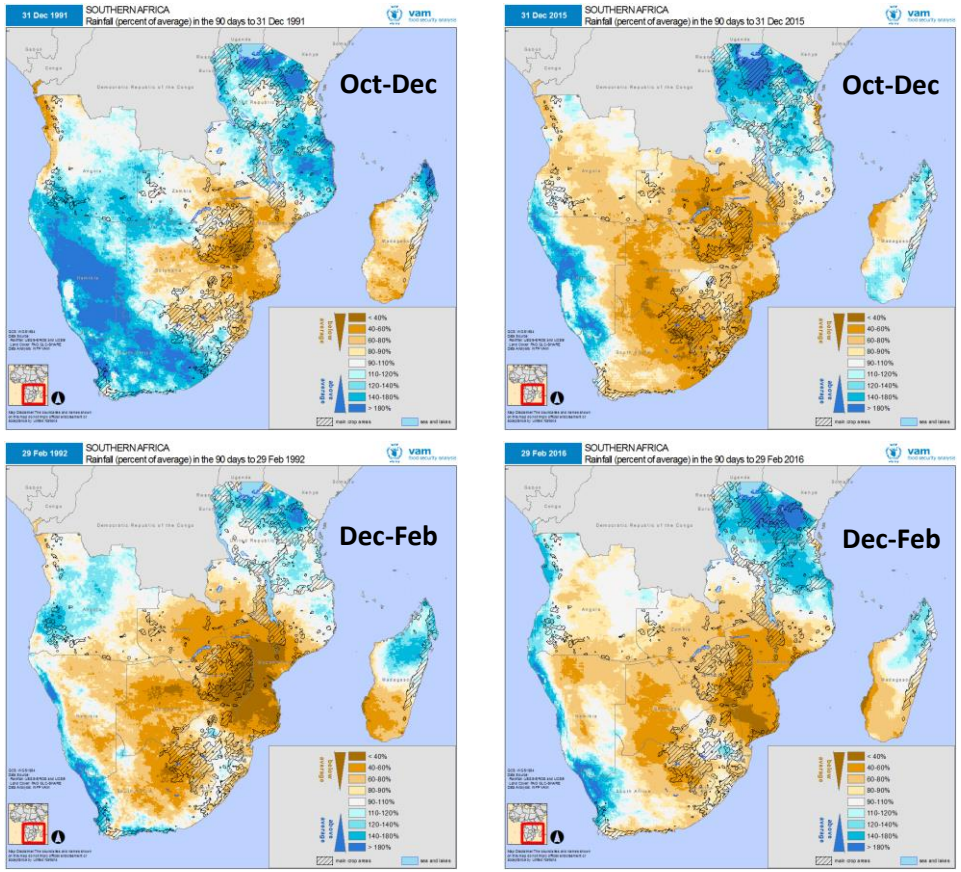
Drought conditions during the first period (Oct-Dec) were both more widespread and intense in 2015-16 than in 1991-92. South Africa and Zambia, in particular are much more affected now.

During the second period (Dec-Feb), although the extent of the drought was similar, it was much more intense in Mozambique, Zimbabwe and Zambia in 1991-92.

The 2015-16 drought may have a greater impact on regional crop production through losses in cultivated area in major producing regions due to extreme early season dryness. The 1991-92 drought had greater impact on specific regions such as Zimbabwe and Mozambique.

A similar comparison to 2002-03 shows the current drought far more widespread and intense at all spatial extents and timescales.

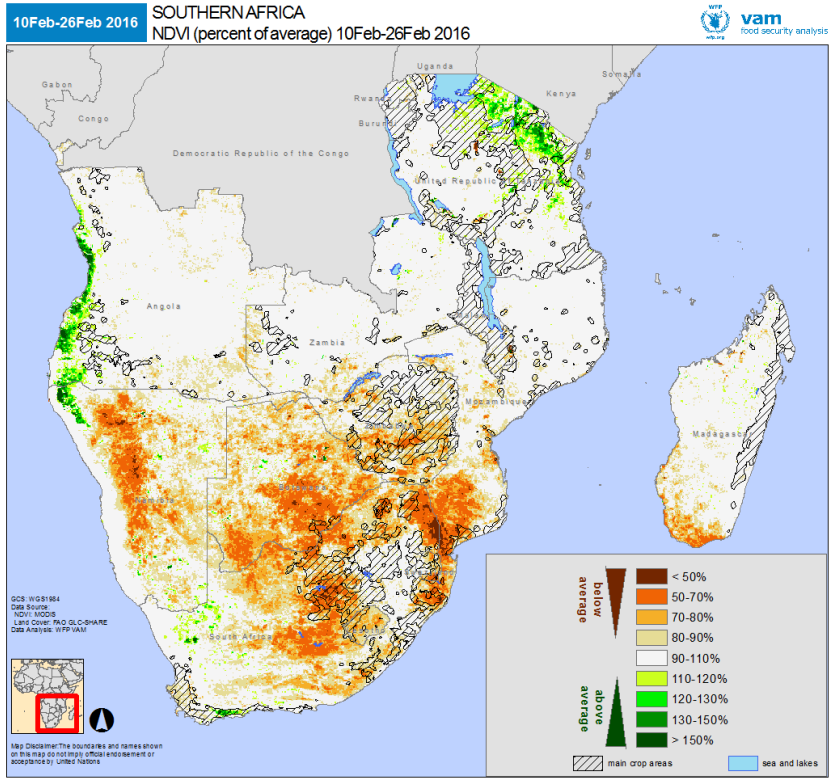
1991 - 1992 | **2015 - 2016**

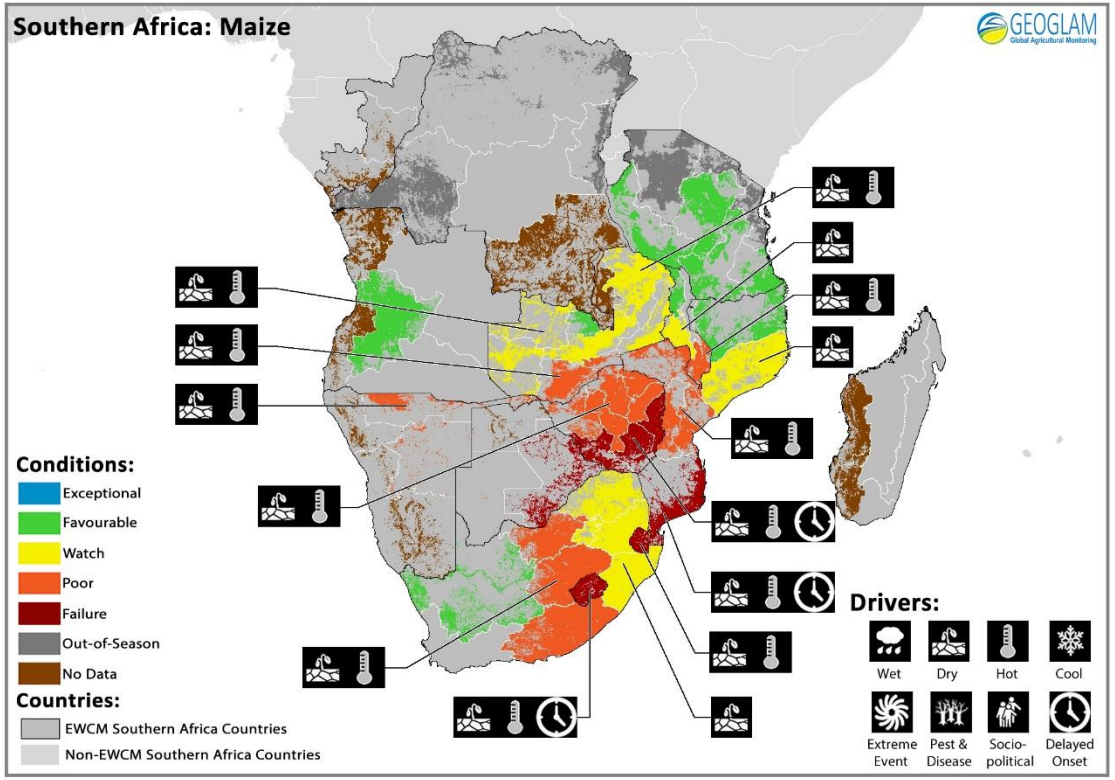


Above: October-December and December-February rainfall as a percentage of the average for 1991-92 (left) and 2015-16 (right).

Leftmost: October-February rainfall as a percentage of the average for 1991-92 season (above) and 2015-16 (below). Brown shades for below-average rainfall; blue shades for above-average seasonal rainfall.

Vegetation Status and Crop Production Perspectives





Left: NDVI in late February 2016, as a percentage of a 12-year average. Orange shades indicate below-average vegetation; green shades indicate above-average vegetation.
Right: Maize production perspectives from a multi-agency assessment (GEOGLAM)

Very low vegetation cover, severe impacts on crop production

Vegetation development is at record low levels across the region, confirming the impact of the widespread drought. A joint assessment of crop production perspectives carried out by international institutions involved in early warning and crop monitoring (WFP, FEWS-Net, JRC, FAO) confirms a very pessimistic picture across most of the region: the situation is particularly serious in Zimbabwe where southwestern districts have large scale crop failures and generally poor production in the rest of the country. Similar outcomes extend to the southern and central zones of Malawi, large areas of South Africa and western Madagascar. Mozambique can also expect crop failures in its southern regions. Only regions such as northern Mozambique, Tanzania, northeast Zambia, northern Malawi and parts of Angola face normal production scenarios, as they benefit from El Nino induced rainfall enhancements typical of East Africa.

South Africa's maize production estimates for this season have been revised downwards slightly in February, to about 7.2 million tons, 27 percent below last year's and 38 percent below the 5 year average. The USDA Foreign Agriculture Service is more pessimistic, estimating production at 6.5 million tons. Similar variations may be expected for Zimbabwe, possibly Mozambique and Malawi, with more moderate losses in Zambia.

Zambezi River Basin Situation

Southern Africa: A Season of Regional Drought

Zambezi River Basin: Some recovery after record dryness

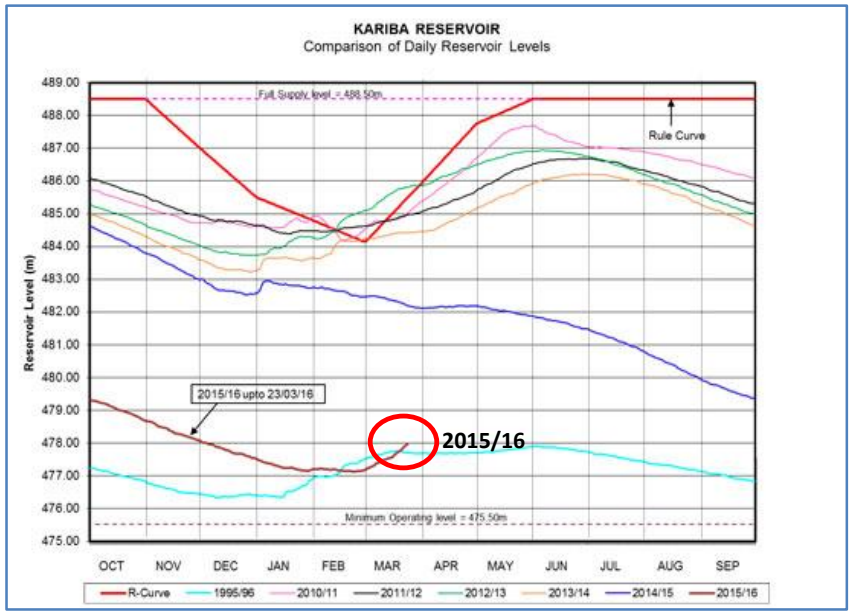
The current drought is also being felt across river basins of the region. To evaluate current conditions, cumulative rainfall over river basins is tracked over the current and previous seasons. The plots on the right show results for the catchments that feed into the Kariba Dam reservoir and the Kafue river basin that feeds into the Kafue Gorge Dam.

For both basins, throughout most of the current season, catchment rainfall was at a historical minimum, even lower than the 1994-95 levels. This has now improved due to above average rainfall over the westernmost basins of the Zambezi. Although the total catchment rainfall has improved from the historical minimum, it is still one of the driest on record.

The eastern catchments (Kafue, Luangwa, Shire) have not recovered are remain as one of the driest seasons on record. More sustained and abundant rainfall is required to provide significant and durable improvements across the Zambezi basin.

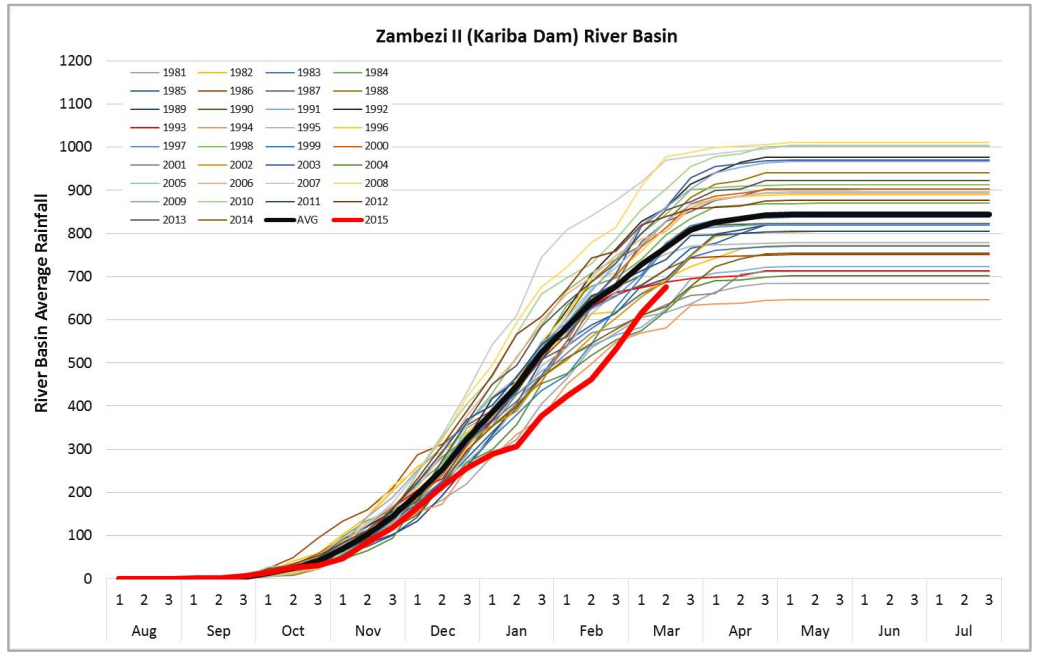
At this stage, the Kariba reservoir level has just come off the historical minimum and should increase further given recent favourable rainfall; however it should remain at historically very low levels.

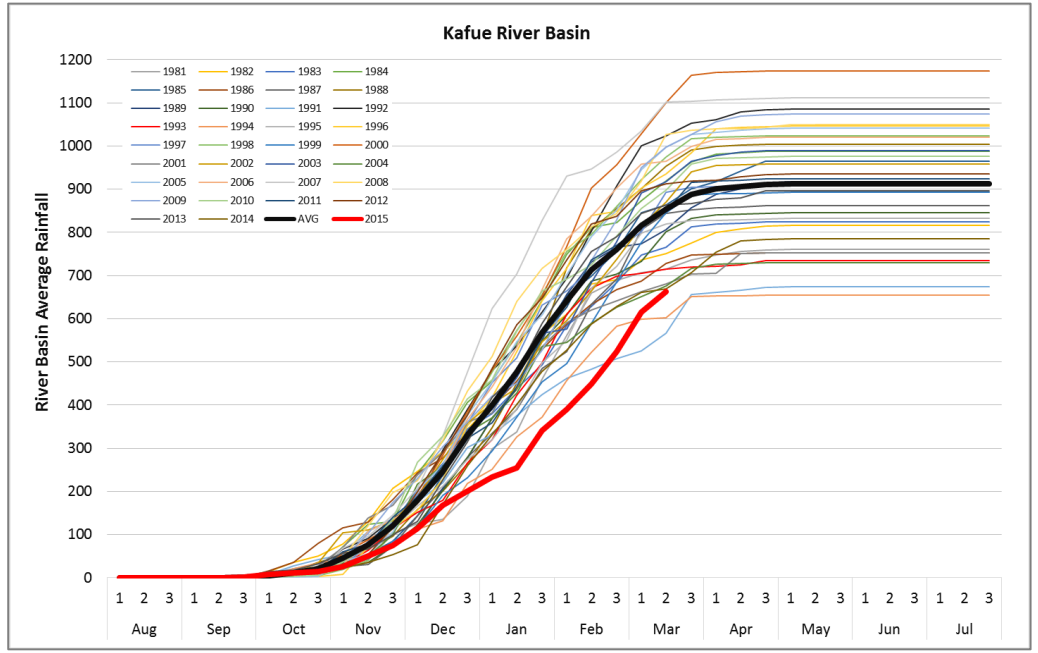
The period Oct 2014 to March 2016 will be the second driest two year period since 1981, just above 1994-95.



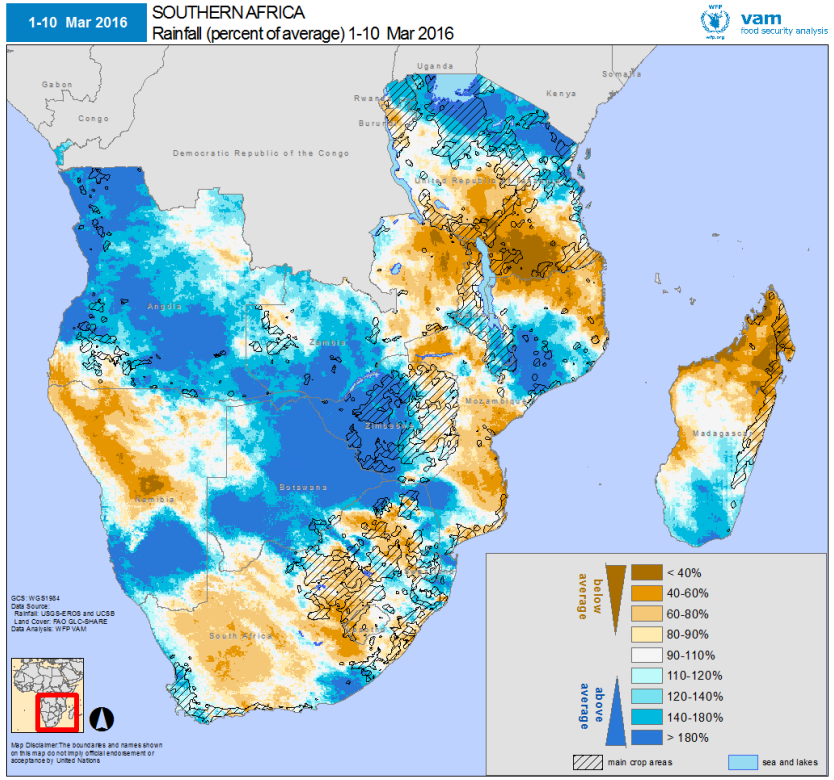
Left: Kariba Dam reservoir level variations across current and selected seasons.

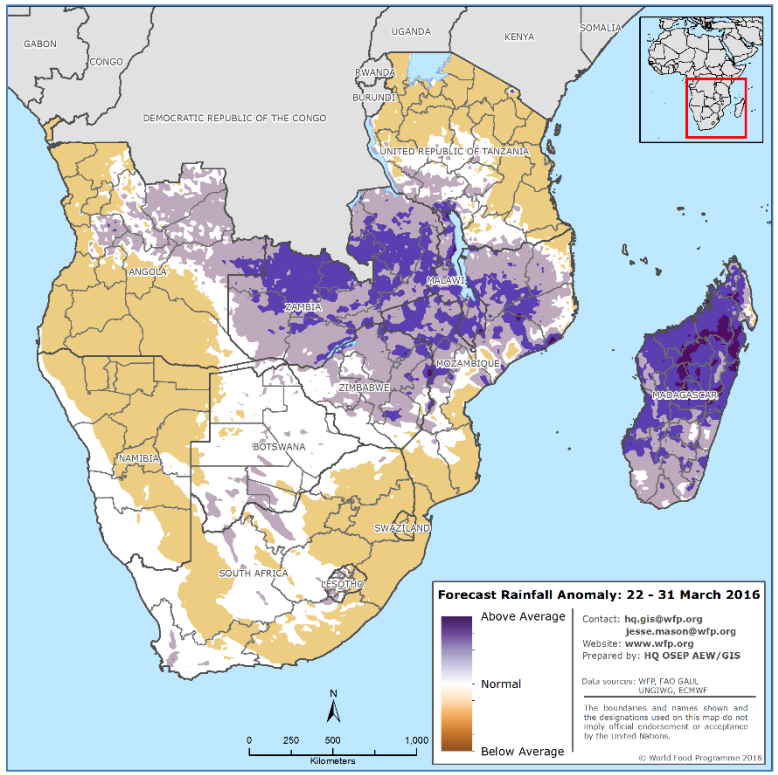
Right: Zambezi II (above) and Kafue (below) catchment rainfall accumulated for all seasons since 1981.

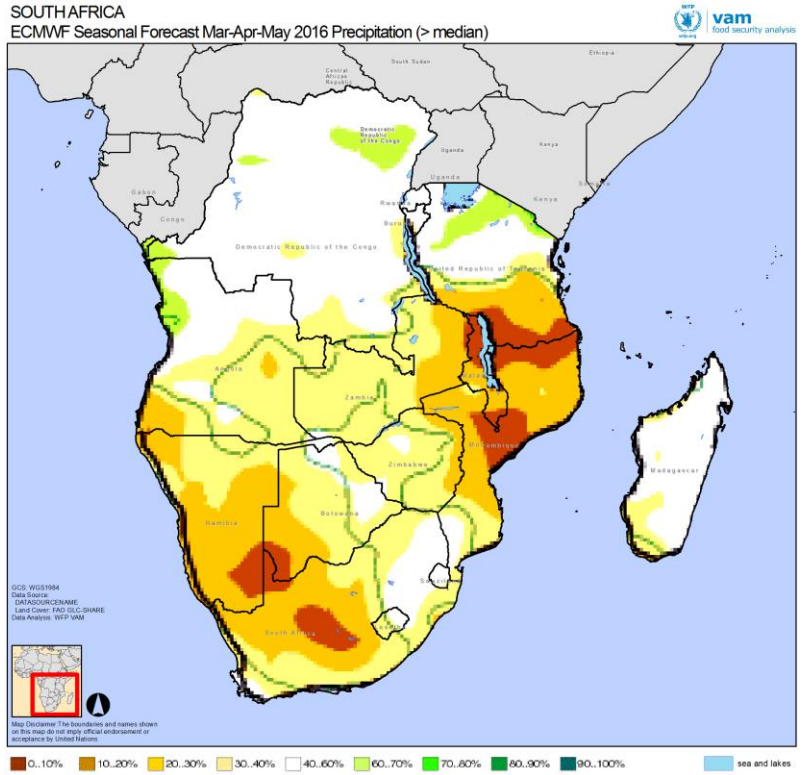




Near Term and End of Season Perspectives







Left: Rainfall for the first 10 days of March as a percent of average; brown shades for below-average rainfall; blue shades for above-average seasonal rainfall
Middle: Forecast for 22-31 March 2016 rainfall as a percent of average (purple = wetter than average, brown drier than average). From WFP-AEW
Right: ECMWF ranfall forecast, March-May 2016. Green shades = wetter than average conditions more likely; orange shades = drier than average conditions more likely. Darker shades imply higher likelihood.

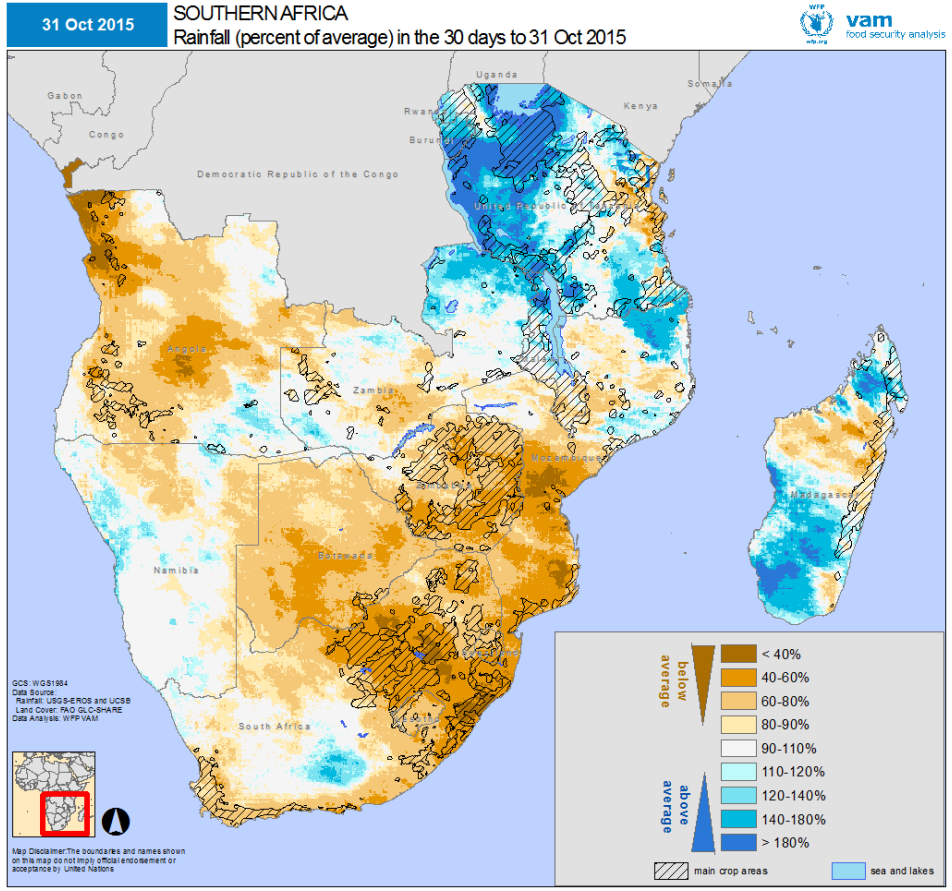
A generalized improvement in conditions

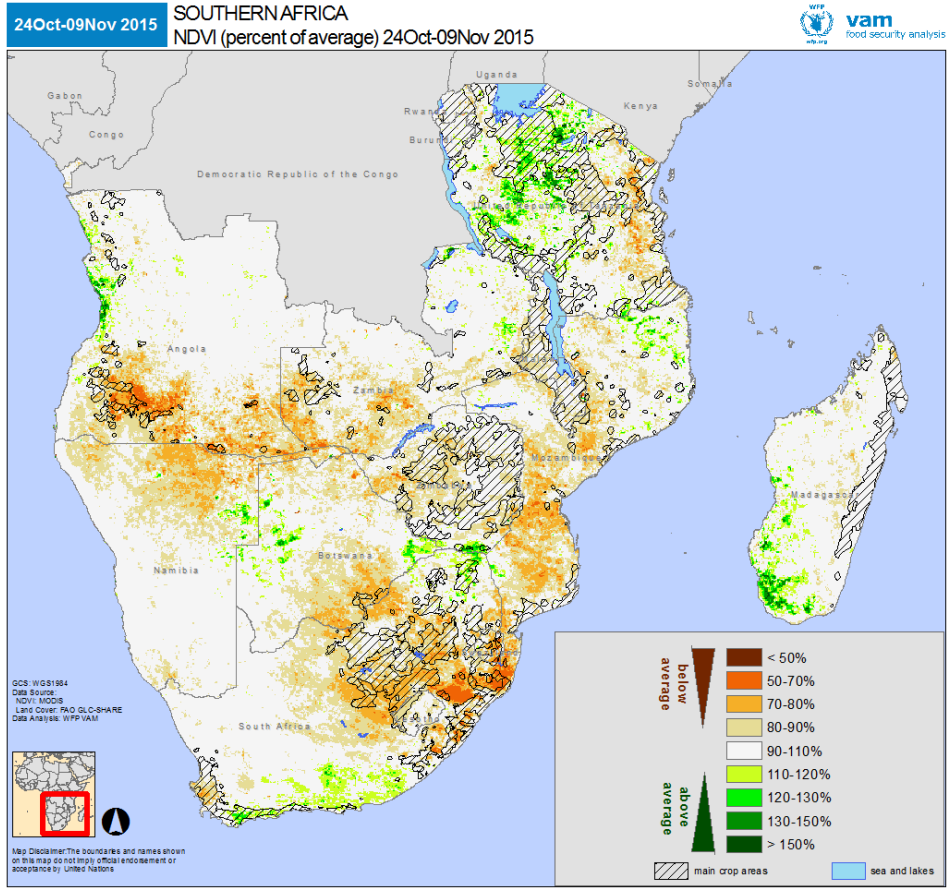
The first 10 days of March (left map above) were characterized by heavy rainfall across Botswana, Zimbabwe, western Zambia, Angola and some areas of north Mozambique. Many areas received upwards of 100mm of rainfall, almost double the usual amounts. Short range forecasts (middle map above) until end of March, show above average rainfall in Zambia, most of Zimbabwe, Malawi and Mozambique, and on or below average rainfall elsewhere. The three month rainfall forecast for March to May still points to moderately drier than average conditions across most of the region, but less intense than earlier in the season.

Although these late rainfalls will improve ground moisture content, they will not result in a significant improvement in the expected seasonal crop production across the region. The very intense drought during the entire planting period led to irreversible losses in planted area and severe damage to early crop development. However, pasture conditions will benefit and current scenarios for hydropower supply may undergo moderate improvement.

The Season: Month by Month

October 2015





October 2015 rainfall as a percentage of the 20-year average (left).

Brown shades for drier than average, blue shades for wetter than average conditions.

Early November 2015 vegetation index as a percentage of the 12-year average (right).

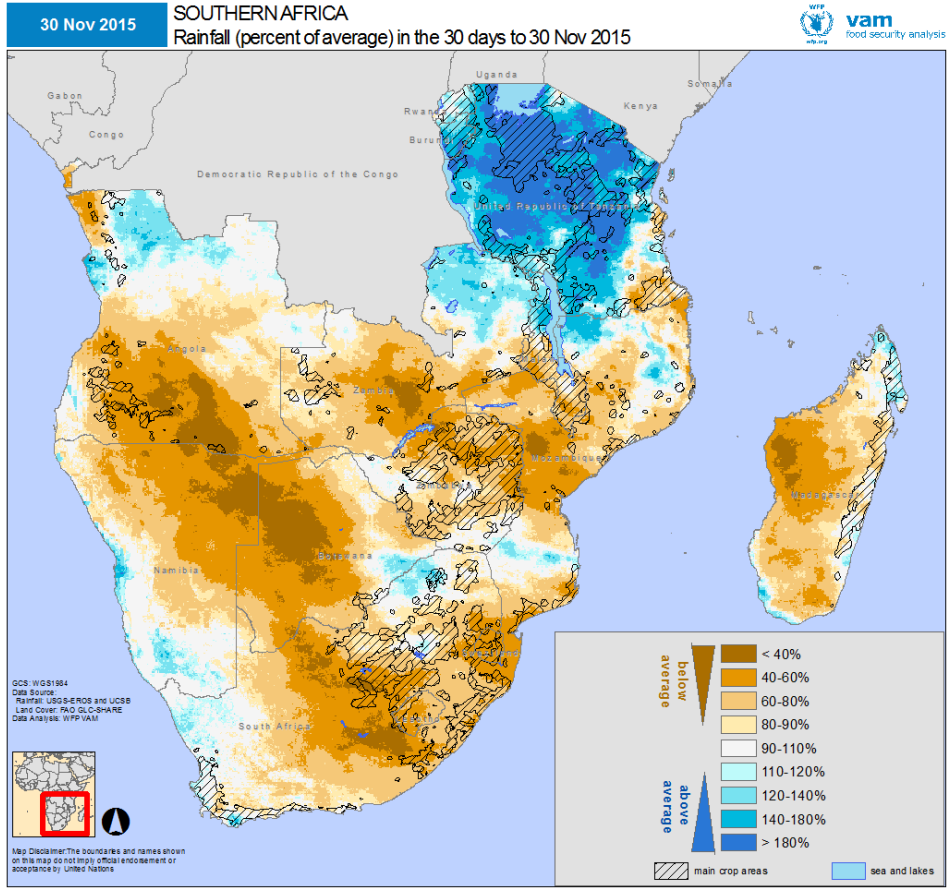
Orange shades for below-average, green shades for above-average vegetation.

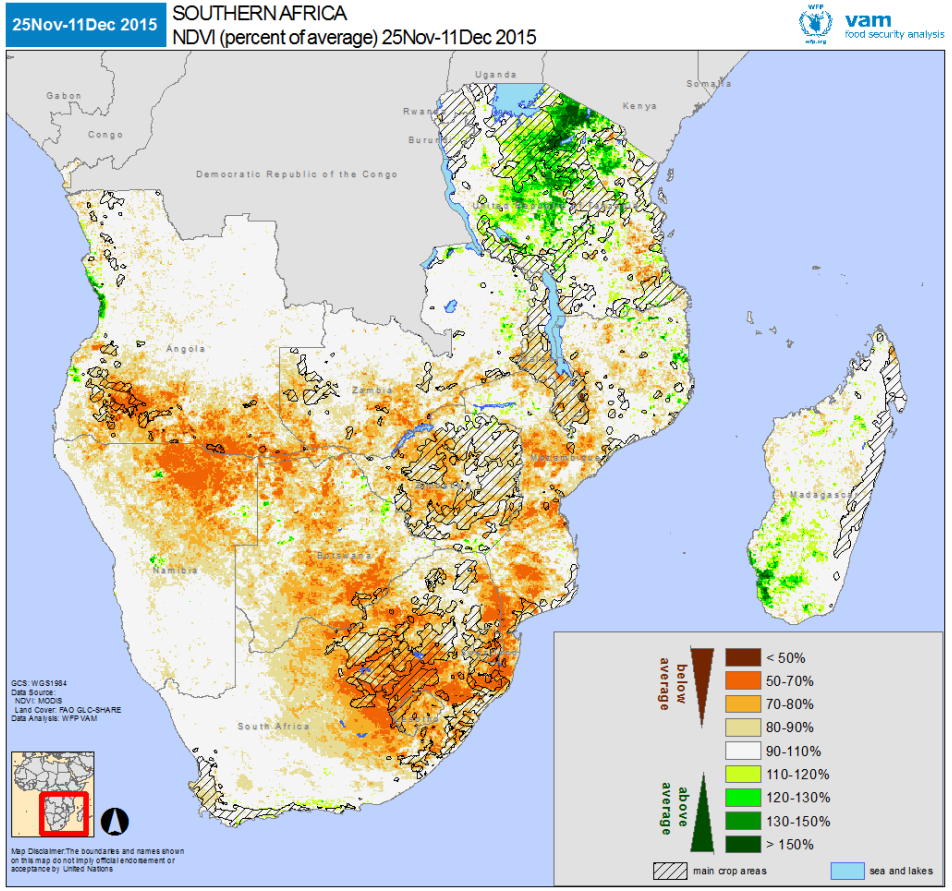
Hashed pattern indicates main agricultural areas.

October marks the beginning of the growing season across Southern Africa – the earliest starts are usually in eastern South Africa and then progress towards north and west. Drier than average conditions were already developing from early October.

Vegetation cover at this stage is usually close to dry season average levels. Across the region, incipient patterns of below average vegetation are largely due to last season's poor rainfall. In eastern South Africa however, they signal the first delays in the onset of the growing season. In Tanzania, however, a good performance of the first season in northern bimodal areas was observed. Elsewhere the sporadic above average vegetation is largely due to localized early rainfall events of little significance.

November 2015





November 2015 rainfall as a percentage of the 20-year average (left).

Brown shades for drier than average, blue shades for wetter than average conditions.

Early December 2015 vegetation index as a percentage of the 12-year average (right).

Orange shades for below-average, green shades for above-average vegetation.

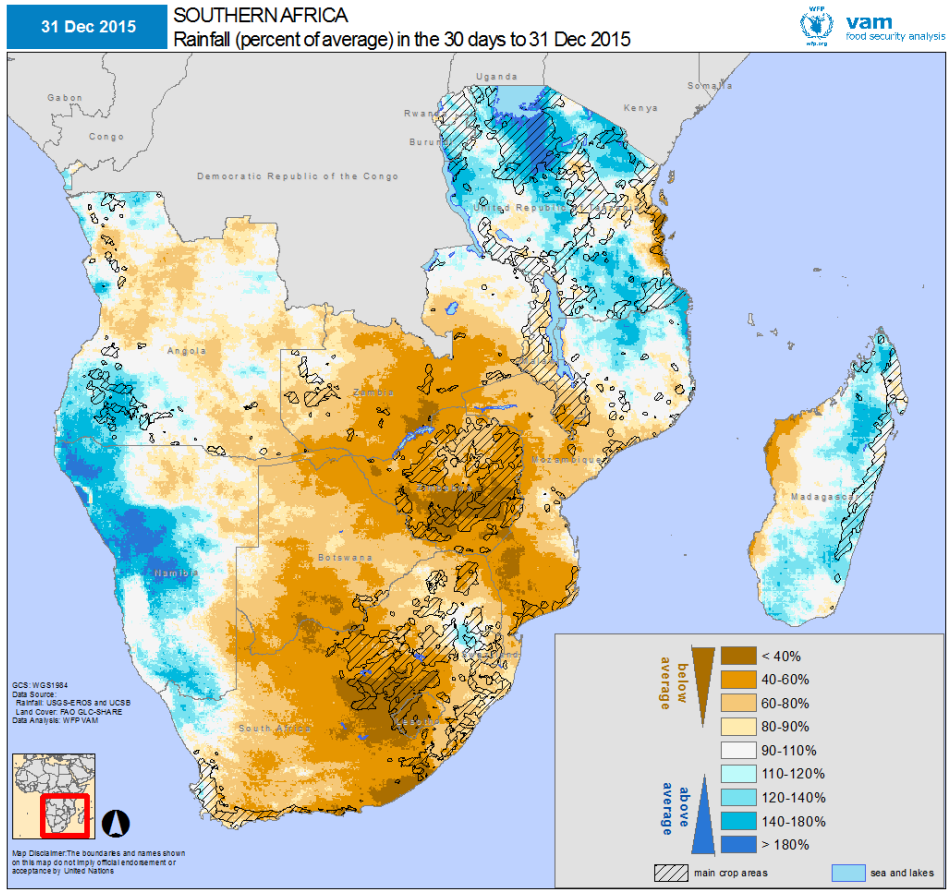
Hashed pattern indicates main agricultural areas.

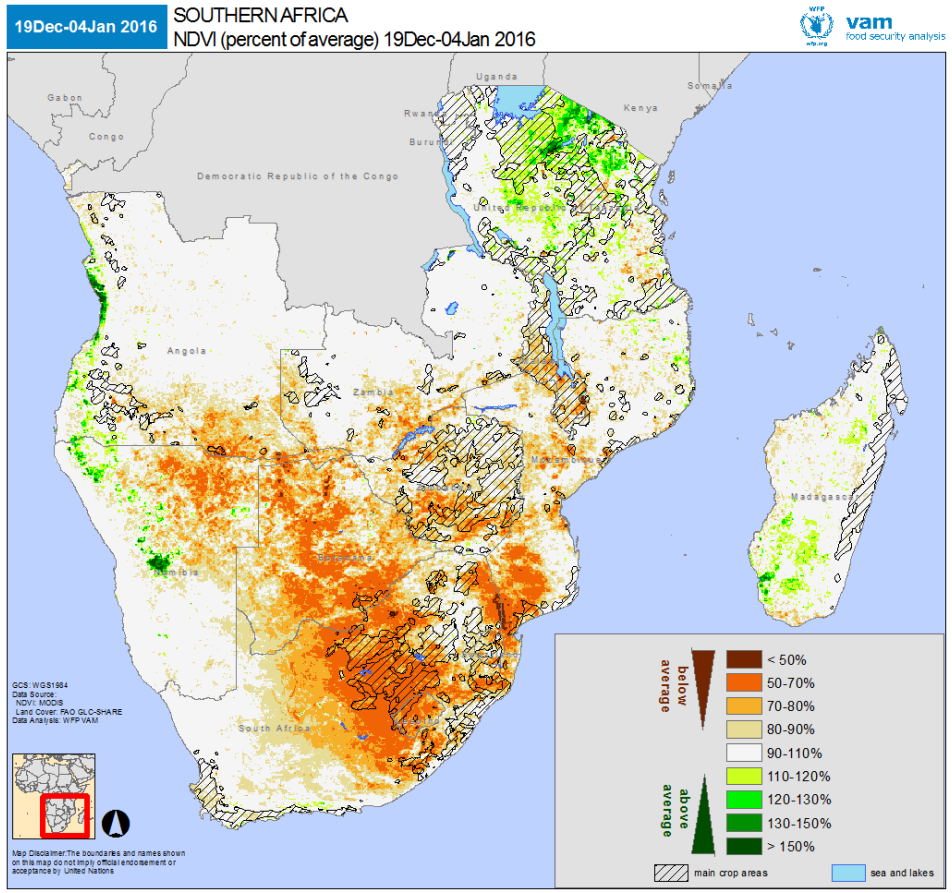
In November, planting activities usually start across the region. In a continuation of the October patterns, drier than average conditions remained in place across most of the region, except for Tanzania, which is mostly influenced by El Nino related rainfall enhancements common to East Africa. As a result, delays in the start of the growing season became well defined – at this stage these posed little worry, since they were within the normal inter annual variability in areas with a relatively long season.

The vegetation cover deficits of October became more pronounced as a result of the drier than average conditions and confirm the late arrival of significant rainfall. Again Tanzania departs from this general trend given the differences in seasonality (November being the peak of the first season in bimodal areas) and the opposite influence of El Nino on rainfall in this area.

December 2015

Southern Africa: A Season of Regional Drought





December 2015 rainfall as a percentage of the 20-year average (left).

Brown shades for drier than average, blue shades for wetter than average conditions.

Early January 2016 vegetation index as a percentage of the 12-year average (right).

Orange shades for below-average, green shades for above-average vegetation.

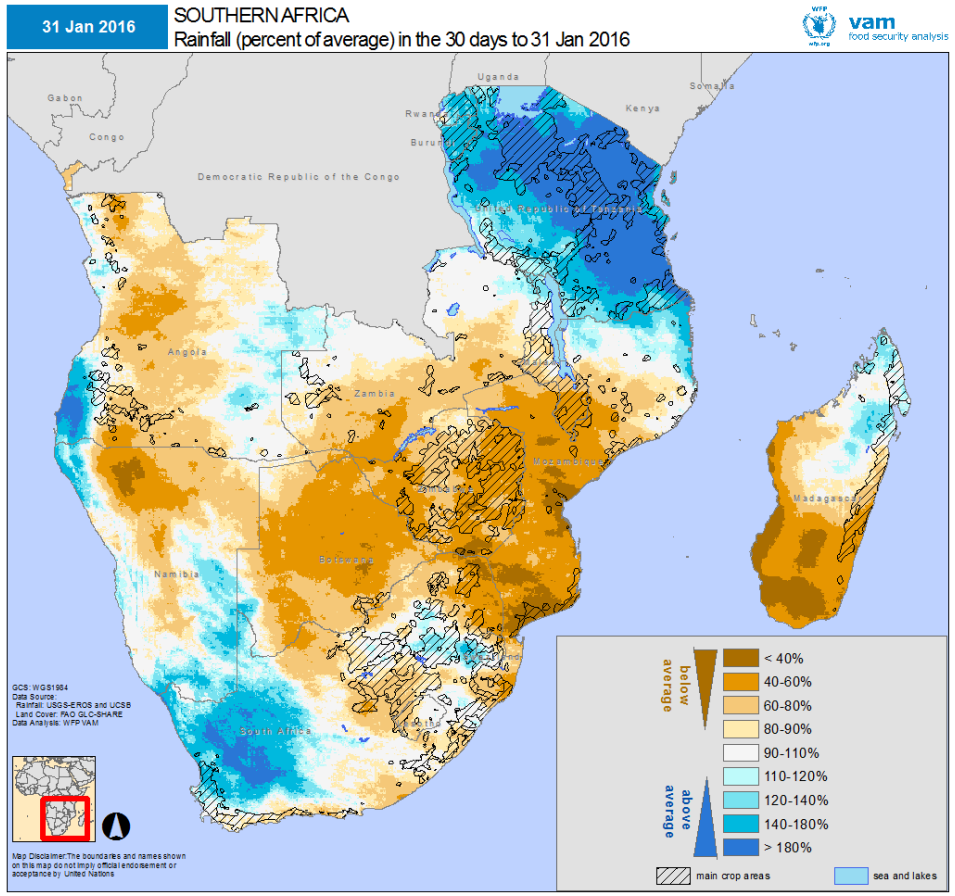
Hashed pattern indicates main agricultural areas.

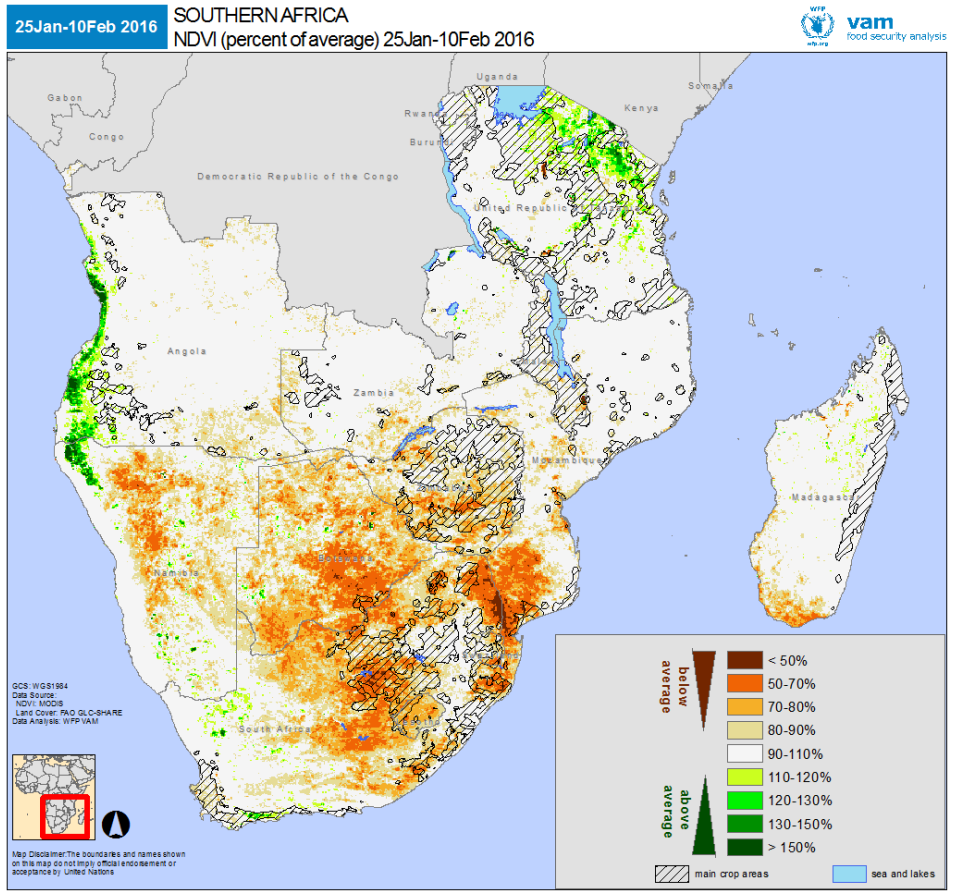
In December, severely drier than average conditions continued, bringing early season cumulative rainfall to historically low levels. This resulted in delayed start of agricultural activities and therefore early crop development was at the very least problematic. The only regions spared these extreme conditions were Madagascar and northern Mozambique as well westernmost Namibia and SE Angola. Tanzania continued to benefit from the opposite El Nino influence leading to wetter than average conditions.

Correspondingly, vegetation cover also remained at historically low levels, reflecting the very poor ground conditions across most of the region.

January 2016

Southern Africa: A Season of Regional Drought





January 2015 rainfall as a percentage of the 20-year average (left).

Brown shades for drier than average, blue shades for wetter than average conditions.

Late January 2016 vegetation index as a percentage of the 12-year average (right).

Orange shades for below-average, green shades for above-average vegetation.

Hashed pattern indicates main agricultural areas.

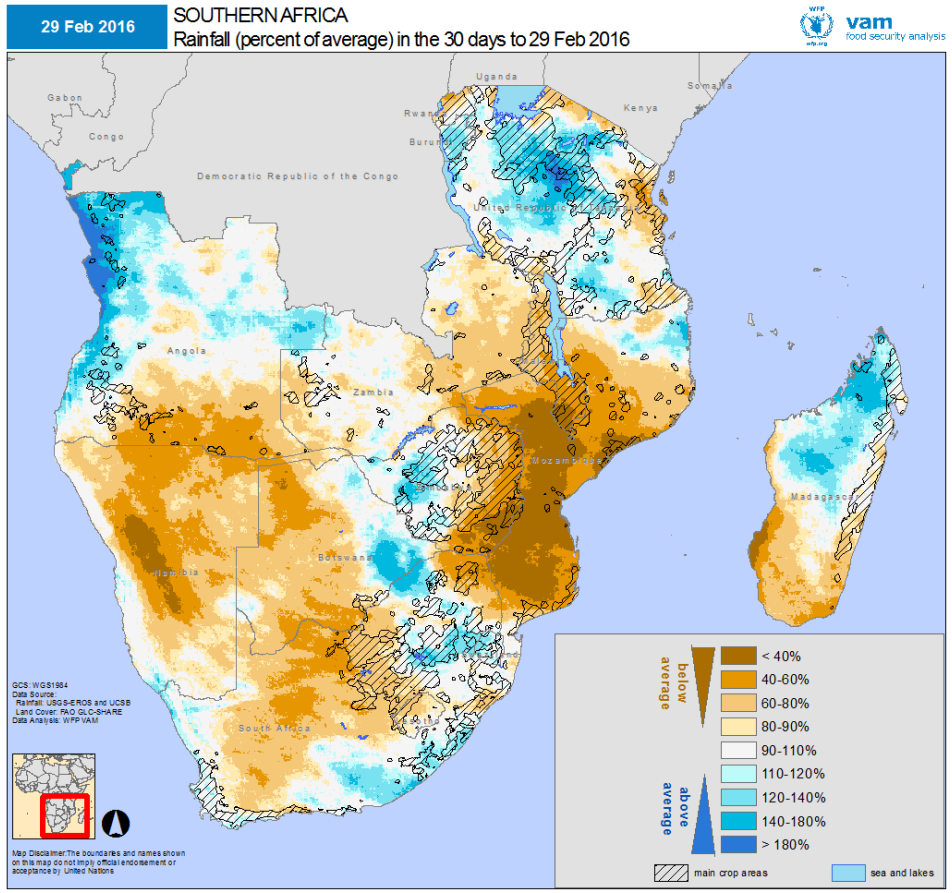
In January, apart from some minor improvement in some areas of NE South Africa, drier than average conditions continued, keeping early season cumulative rainfall to historically low levels. In fact, severe dryness extended into southern Madagascar which had been so far spared some of the worst impacts. On the other hand, Tanzania experienced much wetter than average conditions; southwestern South Africa also benefitted from improved rainfall.

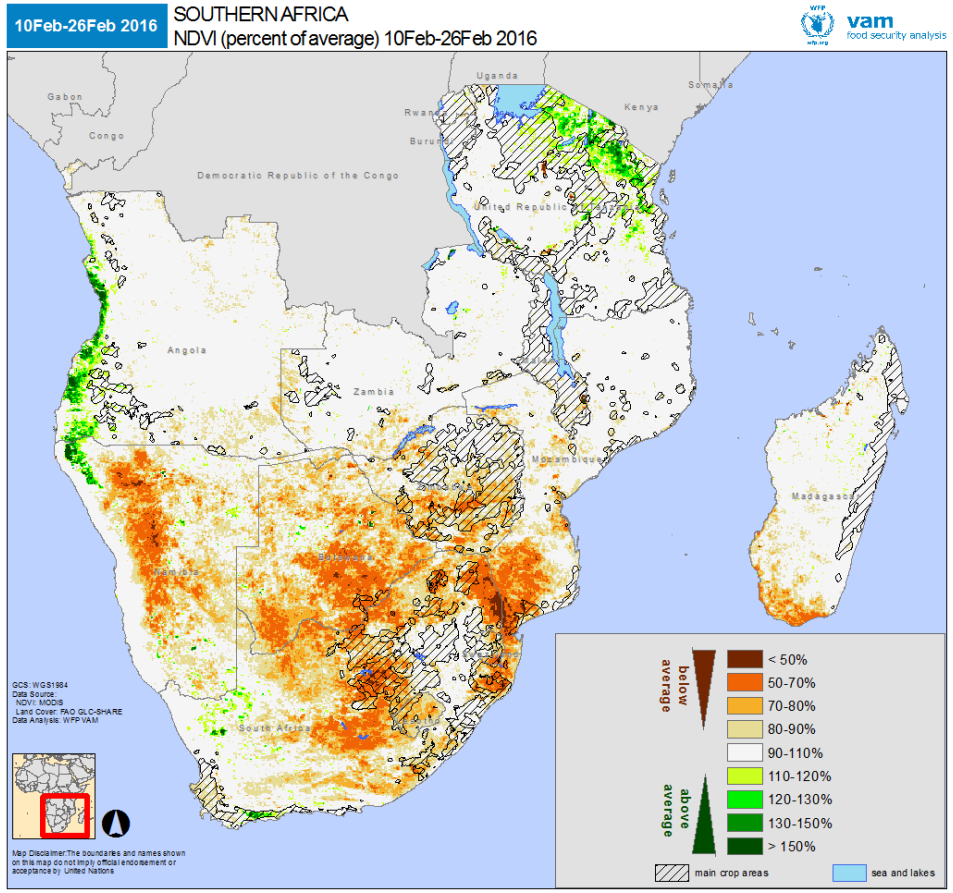
By late January, the planting window closes, meaning that after this time, any crops that are planted have little chance of successfully concluding their development. Areas where planting had not yet been undertaken or where re-planting would be required due to early crop failures, have now little to now chance of yielding a minimally performing crop.

Vegetation cover remained at historically low levels, reflecting the very poor ground conditions across most of the region. Crop production perspectives are now pointing to considerable crop production deficits.

February 2016

Southern Africa: A Season of Regional Drought





February 2015 rainfall as a percentage of the 20-year average (left).

Brown shades for drier than average, blue shades for wetter than average conditions.

Late February 2016 vegetation index as a percentage of the 12-year average (right).

Orange shades for below-average, green shades for above-average vegetation.

Hashed pattern indicates main agricultural areas.

In February, drier than average conditions were still dominant, in particular across Mozambique, easternmost Zimbabwe and eastern Zambia to a lesser degree – in some of these areas, monthly rainfall was about of third of the usual amounts. On the other hand, improved (wetter than average) conditions are noticeable in NE South Africa (again), and in a region extending from eastern Botswana across western Zimbabwe and into western Zambia. These improvements came almost exclusively in the last week of the month, being preceded by the very dry conditions that have been the norm across most of the region during this season.

The better rainfall will improve ground moisture conditions – although this may benefit pasture conditions, it will be too late to provide significant recovery in crop production perspectives.

Vegetation cover remains extremely depressed – where conditions have been wetter than average, vegetation conditions should improve somewhat, but the widespread below average levels provide strong evidence of the poor crop and pasture conditions.

Data Sources:

Rainfall: CHIRPS, Climate Hazards Group, UCSB

Vegetation: MODIS NDVI, EOSDIS-NASA

Land Cover: FAO GLC-Share

Processing:

VAM software components, ArcGIS

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