



## JRC TECHNICAL REPORT

# Summary of climate variability and extremes and their main impacts on agricultural production in 2019

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## **Foreword**

Climate variability and extremes have been identified by the 2018 and 2019 Global Report on Food Crises (FSIN 2018) and by the 2018 report on State of Food Security and Nutrition in the World (FAO, IFAD, UNICEF, WFP and WHO, 2018) as one of the main factors triggering food crises and responsible for a renewed increase in global hunger. In particular, the second part of the 2018 State of Food Security and Nutrition in the World (SOFI) report provided a detailed analysis on how climate factors impact the different dimensions of food security. The preparation of this report has also evidenced the difficulties in retrieving reliable and comprehensive global data on climate extremes occurrence and on their impact on agricultural production as well as on other dimensions. In order to increase the availability and timeliness of such information to the drafting teams of the above mentioned reports, the Food and Nutrition Security Knowledge Centre of the JRC aims at providing annual overviews of the main climate extremes affecting agricultural production in countries with high risk of food insecurity. Consulted sources include mainly: the WMO State of the Climate report, the JRC's ASAP (Anomaly hotspots of Agricultural Production) early warning system, the GEOGLAM Crop Monitor for Early Warning and seasonal forecasts reviewed by the Climate Change group of JRC's Food Security Unit.

## **Abstract**

This yearly summary reviews the main climate extremes described by the WMO state of the climate preliminary report for 2019 that had an impact on agricultural production according to JRC's agricultural early warning system ASAP (Anomaly hotspots of Agricultural Production). Such a summary can be used as a starting point for more detailed analysis of agricultural production problems and their impact on food security as it is done for example by the multi-agency Global Report on Food Crises and the Food Security and Nutrition State in the World.

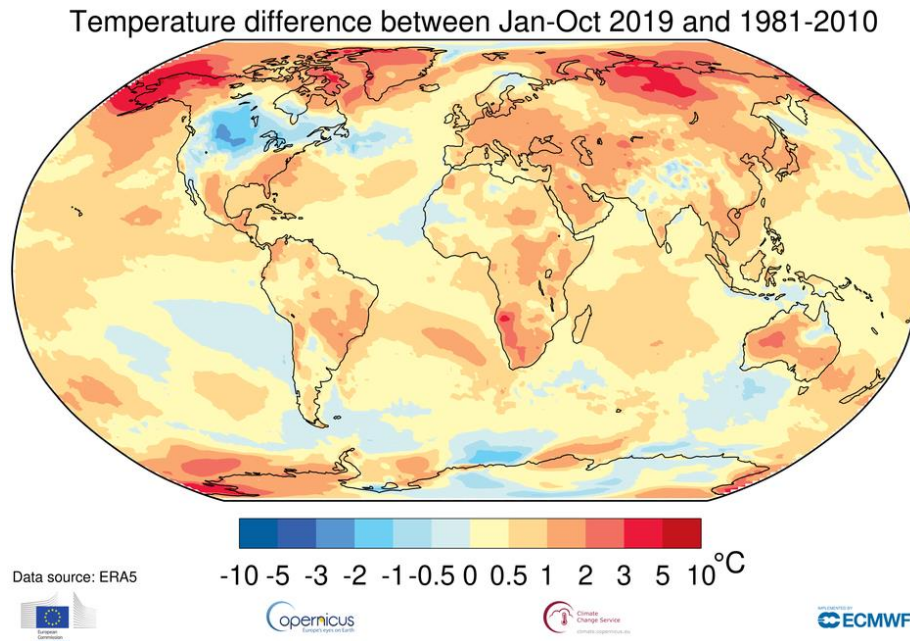
The year 2019 was warmer than 2018 (second warmest on record) and saw major heat waves in several parts of the world. Droughts affected crop and rangeland productivity mainly in Europe, Southern and Eastern Africa, South East Asia and in Australia. Tropical storms and cyclones caused fatalities and major damage to infrastructure and agriculture in the Bahamas and along East Africa's coast. High intensity rainfall led to floods in all continents.

The final part of the report includes an overview of climate extremes affecting crop seasons ongoing in early 2020 as well as a short summary of seasonal forecasts until April 2020.

## The general state of climate in 2019<sup>1</sup>

Average temperatures for the last five (2015–2019) and ten (2010–2019) years are the highest on record. Year 2019 was warmer than 2018 (fourth warmest year on record) and will be the second warmest year on records. With the exception of North America, there were limited areas of below-average temperature over land.

**Figure 1.** Surface-air temperature anomaly for January to October 2019 with respect to the 1981–2010 average. Source: ECMWF ERA5 data, Copernicus Climate Change Service.



Extreme events in 2019 included mainly heat and cold waves, droughts, and cyclones.

Two major heatwaves occurred in central and northern Europe in late June and late July. Australia had an exceptionally hot summer and heatwaves were recorded in Japan, South America and India. Heatwaves also occurred in continental southeast Asia (centre-north of Thailand, Cambodia) from Jan to May.

Unusually dry conditions were observed in Australia, Thailand, Western Indonesia and surrounding countries. Also, Southwest Africa, Central America and Southwest Europe received abnormally low precipitation amounts. In India, the delay of the Monsoon caused a precipitation deficit in June and precipitation excess in the following months.

Drought affected many parts of Southeast Asia and the southwest Pacific. Drought conditions which became established in the Greater Horn of Africa in late 2018 continued through the March-May rainy season in 2019, especially in Kenya, Somalia, Southeast Ethiopia and Uganda.

Floods were reported in India, China, Australia and parts of South America. The Islamic Republic of Iran was severely affected by flooding in late March and early April. Major flooding affected many previously drought-affected parts of East Africa (Somalia, Kenya, Tanzania, Ethiopia and South Sudan) in October and early November, after heavy rains associated with a positive Indian Ocean Dipole occurred.

Tropical cyclone Idai was the strongest cyclone to make landfall on the East coast of Africa with widespread destruction in coastal Mozambique, especially in the city of Beira. In March 2019, the cyclone caused 1300 deaths, the displacement of 180 000 people and contributed to the destruction of close to 780 000 ha of crops in Malawi, Mozambique, and Zimbabwe.

A very intense tropical cyclone made landfall in the Bahamas in late August leading to the near-total destructions on a number of islands.

<sup>(1)</sup> Section 1 includes a selection of findings from WMO (2019)

Among natural hazards, floods and storms have contributed the most to displacement recorded in 2019, followed by droughts. More than 2 million people were evacuated in Bangladesh due to Cyclone Bulbul in November, and more than 2 million in China due to Typhoon Lekima in August.

For many regions in the world (e.g. Africa, Australia, parts of Asia...) a significant driver of the climate variability in 2019 was the Indian Ocean Dipole (IOD), the positive phase being characterised by cooler than average sea-surface temperatures in the Eastern Indian Ocean and warmer than average sea-surface temperatures in the West). The IOD of 2019 was one of the strongest positive IOD events since reliable records began around 1960. The positive phase is linked to various observed regional patterns, such as drier and warmer conditions over Indonesia and surrounding countries (including parts of Australia), late Indian southwest monsoon withdrawal, and high rainfall in east Africa. El Nino was in a slightly positive phase in the first six months of the year, and in July entered a neutral phase.

## Climate anomalies and extremes impact on agriculture in 2019 based on ASAP assessments<sup>2</sup>

Exceptionally hot and dry weather conditions in south/eastern and southern Europe led to significant summer crop yield losses in many European countries (JRC MARS Bulletin Vol 27 No 9), while the 2018/2019 winter crop season was generally successful. In 2019 drought and high temperatures in spring and summer continued to be a problem for Australia (after the major drought in 2018) and caused low wheat yields mainly in Queensland and South Wales. Early season drought led to mixed maize production results in Canada and parts of the US.

In Africa, several extreme weather events have contributed in 2019 to reduce crop production at national and regional level increasing risks in already difficult food security situations such as for example in Zimbabwe, South Sudan and Somalia. Mozambique in particular was hit by one of the strongest cyclones experienced by Africa's East coast with massive destruction of livelihoods, including crop areas in Mozambique and in the Northeast of Zimbabwe. Both Eastern and Southern Africa had their main crop seasons affected by drought that reduced staple crop area and production for many countries. In Eastern Africa in particular, the first crop season output was reduced in Somalia, Ethiopia and Uganda, while the main producing regions in Kenya obtained close to average production thanks to late season rainfall. In Southern Africa, maize production at the regional level was ca. 10% below average due to drought and extreme weather events and regions depending mainly on pastoral production also experienced important losses. In East Africa, areas hit by drought during the first crop season, did also experience floods later in the year (e.g. Ethiopia, Somalia, Kenya and Uganda) and to some extent this happened also in Southern Africa (e.g. in Zimbabwe). This pattern of droughts followed at short intervals by floods is likely to become more frequent as a consequence of climate change.

In the Western part of the continent the 2019 season was generally positive for crop production, despite a late onset of the rainfall in parts of Mauritania and Senegal as well as in Gambia.

In Northern Africa the 2018/2019 was also characterized by above to significantly above cereal production, with the exception of Morocco, that experienced prolonged drought especially in the centre and eastern parts.

Prolonged dry spells, irregular rainfall distribution and high temperatures in the June-August period negatively affected the *primera* production in Central America's Dry Corridor, mostly among the subsistence farmers. Significant maize and bean losses were registered in southern Honduras, where national production was below average and declined by more than 50% in the main production areas, including El Paraíso, Choluteca and Francisco Morazán. In Nicaragua, national harvest was slightly below-average levels, with losses of about 30-40% of basic grains in Madriz, Segovia, Estelí, Jinotega, Chinandega and León. Production in El Salvador and Guatemala was close to average, despite localised production shortfalls. The *postrera* season onset was slightly delayed, due to initial below average rains, however crop conditions mostly recovered due to beneficial weather from mid-September, that eventually led to close to average production prospects.

The 2019 spring season in Haiti, which represents 60% of the national production, was below-average due to irregular and below-average rainfall at the beginning of the season, particularly in Northern and Southern regions.

In continental south-east Asia, mainly in central and northern Thailand but also in northern Laos, and Cambodia, the start of the main season rice (June-July) was affected by early drought and above average temperatures which resulted in crop failure and delayed rice planting. This drought followed a particularly dry spring that depleted water reservoirs and affected rainfed crops and pastures. In early September, flood due to tropical storms damaged rice crops in northeast Thailand and centre-south of Laos. As a result of these adverse weather conditions, the production of main season crops (rice and corn) is expected to be below average in Thailand, Laos, and Cambodia, although crops recovered from the drought in some regions.

In Indonesia the June-September dry season has been harsher than average (with rainfall deficit of 50 to 75% over June-October) in most islands and particularly Java and south Sumatra, resulting in poor biomass for rainfed crops, reduced irrigated rice area and clean water shortage for population. As regards the main season rice planting, which usually starts in October, it was delayed by 2 months due to the late onset of the rainy season. The impact of this delay on production is however difficult to predict at this stage.

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<sup>(2)</sup> This section largely builds on data and analysts' assessments provided by the JRC ASAP system (Anomaly hot Spots of Agricultural Production), an early warning decision support system for food security analysis (Rembold et al., 2019). In this system, automatic warnings about climate and biomass indicators anomalies are issued every ten days, while a detailed assessment of agricultural production hotspot countries is performed by JRC analysts at the end of each month.



In Timor-Leste, the dry season was much longer than usual with rainfall cessation in mid-May instead of the usual early July. Also a 1-month delay in the start of the rainy season in December caused water shortage for the population, crop failure and delay in main season rice planting.

In North Korea, the start of the main season was delayed until June in the rice bowl area, the main rice production area of the country, due to dry spells and insufficient irrigation water availability especially in the southern half of the rice bowl. Prospects are mixed as the crops have recovered well in the north of the rice bowl area while below average rice production is expected in the south of the rice bowl due to irregular rainfall in July and August. In early September, heavy rains brought by a tropical storm also damaged about 3% of the cultivated area according to the government.

In Yemen, rainfall was favourable from July to October but sorghum and wheat productions are expected to be 30% below average due to lack of farming input resulting from conflict.

Figure 2 provides a summary map showing the number of times a country has been classified as an agricultural production hotspot country by the ASAP early warning system in 2019.

**Figure 2.** Overview of ASAP hotspot countries in 2019. The colour coding refers to the number of times a given country has been classified as hotspot or major hotspot in the monthly assessment (maximum number of times is thus 12). Out of these, Angola, Zimbabwe, Namibia, Mozambique, South Sudan, Somalia, and Honduras, have been major hotspots for 1 month or longer in 2019 and Angola, Namibia, South Africa, Lesotho, Botswana, Zimbabwe, Mozambique, Zambia, South Sudan, Uganda, Kenya, Somalia have been classified as (major) hotspot for 5 months or more.

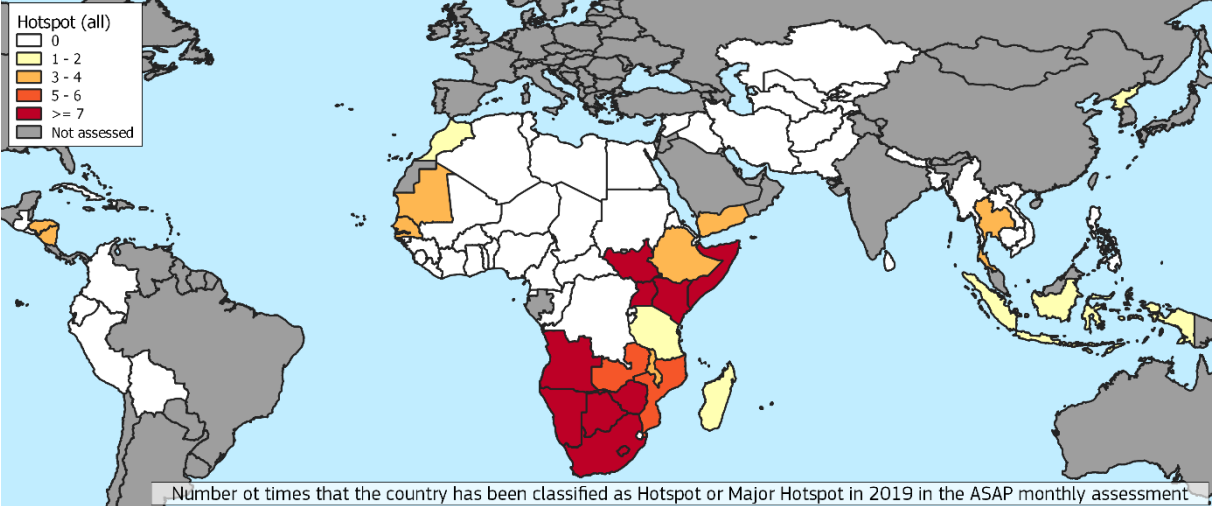
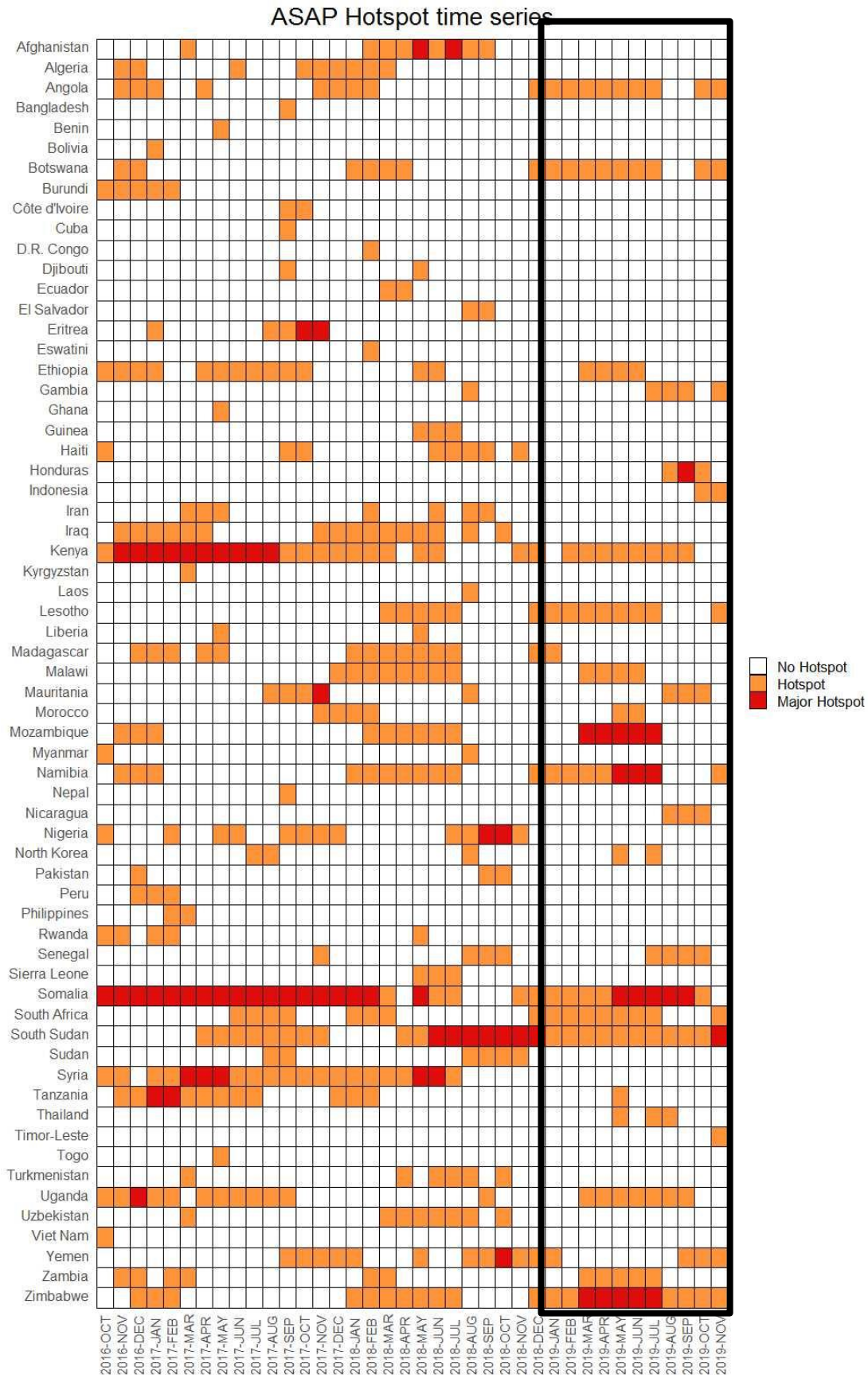


Table 1 shows in detail which months of 2019 were affected and the severity of problem (ASAP analysts distinguish two hotspot levels, i.e. hotspot and major hotspot). Table 2 provides per country a short summary of the main climate anomalies and their impacts on agricultural production.

**Table 1.** ASAP hotspot warnings by month over the period October 2016 - November 2019 for all countries analysed in ASAP. The countries classified as hotspots for at least 1 month in 2019 appear with a red (major hotspot) or orange (hotspot) box in the black frame.



**Table 2.** Short description of agricultural hotspot warnings at country level with main impact of climate anomalies on crops and rangelands, and other factors with negative impact on food security (where known). NB: information about production, floods and storms data comes from several sources, full information for each country can be found at <https://mars.jrc.ec.europa.eu/asap/>.

Country	Months of 2019	Type of Climate anomaly	Impact on crop/rangelands	Other factors with possible negative impacts on food security
Angola	9	Limited rainfall throughout the season in the southern part	Well below-average crop and rangeland production in the southern part	Loss of livestock in the southern part of the country due to drought
Botswana	9	Late onset of rains, heatwaves and a prolonged dry spell between end of February and end of March. The 2018/2019 agricultural season was declared a drought year	Decreased planted areas, crop failure and poor rangeland conditions. Cereal production almost 90% below the 5-year average.	Low water and pasture availability resulting to livestock fatalities
Ethiopia	4	Irregular rainfall during Belg season in the central and southern parts. Localized floods and desert locusts outbreak towards the end of the Meher season.	Below average Belg production and negative impacts on pastoral production in the central and southern regions. Possible increase of postharvest losses due to late seasonal rainfall.	Desert locusts
Gambia	4	Late onset of the season and long dry spells at the beginning of the season.	Cereal production of the 2019 season is estimated to be about a 46% less than the 5-year average.	
Honduras	3	Severe rainfall deficits and high temperatures in the <i>primera</i> season.	<i>Primera</i> crop season production has declined for the second consecutive year, mainly in the most affected south-eastern areas that include Olancho, El Paraíso and Francisco Morazán departments.	
Indonesia	2	Drier than average June-September dry season  Delayed onset of rainy season	Poor biomass of rainfed crops and reduced irrigated dry season rice area, but slightly higher yields than in 2018, according to GEOGLAM.  2-month delay in the planting of main season rice (December vs October)	Shortage of clean water

Kenya	8	Late onset of the long rains season and insufficient rainfall in the marginal areas. Localized floods occurred during the short rains season.	Long rains production in the high potential production areas in western Kenya was finally close to average despite the late onset. However, production failed in coastal and central marginal areas. Rangelands in the North East experienced drought in the first part of the year, followed by floods later in the year.	Flood damages to infrastructure
Lesotho	8	Late onset of rains and a prolonged dry spell during planting time	Reduced planted areas and impeded crop growth. Cereal production decreased by 63% compared to the 5-year average	
Madagascar	1	Erratic and below average rains at the beginning of the 2018/19 season.  Abundant rainfall in January is associated with Cyclone Desmond in the southwest and Cyclone Ekestang in the Northeast. In March, heavy rains in the north are associated with Tropical Cyclone Idai.	Production of the maize 2018/19 season was below average, but vegetation partly recovered from initial dryness due to beneficial rains since January.  Heavy rains caused some crop losses in January and March.	
Malawi	4	Heavy rainfall linked to Cyclone Idai triggered floods in the Southern region and parts of the Central region	Localized production shortfalls in southern Malawi. National level cereal output was increased by 7% compared to the 5-year average	
Mauritania	3	Late onset of rains and dry spells until mid-August.	Total cereal production of 2019 is estimated to be about 23% above the 5-year average due to an increase in the rice and maize planted area. However, production of eastern rainfed crops declined 32% due to early dryness.  Dryness resulted in a poor pastoral situation in western areas (i.e Trarza, Brakna and Tagant).	Follows on similar drought in previous year
Morocco	2	Irregular rainfall in May and slightly delay of the 2019/2020 season	Low yields in the central and eastern parts of the country during the 2018-2019 season	

Mozambique	5	Cyclones Idai and Kenneth hit the central and northern provinces. Irregular rainfall distribution in the southern provinces	Cyclones caused substantial crop losses (loss of almost 1 million hectares of crops). Diminished cereal production reflecting the two tropical cyclones and the drought in the south	Widespread destruction of infrastructure, homes, loss of livestock, damages to fishing sector due to Cyclones. Conflict in Cabo Delgado
Namibia	8	Severe rainfall deficits throughout the 2018/2019 agricultural season combined with above-average temperatures. The country declared in May 2019 a state of emergency due to drought	Delayed onset of the cultivation activities and poor crop development. Cereal output decreased 45% below the 5-year average. Well below-average rangeland productivity	High livestock mortality rates due to poor grazing conditions
Nicaragua	3	Recurrent rainfall deficits and high temperatures from June to August.	Drought caused important losses (about 30-40%) of primera maize and bean crops, mainly in north-western Nicaragua (i.e. Chinandega, Estelí, León, Matriz).	
North Korea	2	Dry spells until June Irregular rainfall in July August in the southwest of the country Tropical storm in early September	Delayed start of the main season due to dry spells combined with insufficient irrigation water availability, especially in the southern half of the rice bowl area. Damage to crops (about 3% of the cultivated area) due to heavy rains in early September in the south of the rice bowl. Mixed prospect due to good production in the north that could compensate for the expected reduced cereals production in the south of the rice bowl area.	
<b>Senegal</b>	4	Delayed onset and poor distribution of rain at the beginning of the season, followed by average rains since mid-August, together with an extension of the season until early October.	No major impact on crop production due to average rains since mid-August and an extension of the season until early October. Decreased rangeland productivity mainly in north Senegal, i.e. Matam and Podor.	
<b>Somalia</b>	10	Major drought in the Gu season and excessive rainfall and high river levels in the Deyr season.	Extended crop failure in the Gu season and final production 50% below average. Major floods in the Deyr season.	Major floods in riverine areas.

<b>South Africa</b>	8	Poor rainfall amounts during the first part of the 2018/2019 agricultural season over main cereal producing provinces. Rainfall deficits and above-average temperatures in August 2019	Reduced planted areas for summer cereals and poor crop growth. Maize production declined by 10% compared to the 5-year average. Drop in winter wheat's production in West Cape. Below-average rangeland productivity in Eastern and Northern Cape	
<b>South Sudan</b>	12	Abundant rains since July triggered floods in several parts of the country, mainly in Jongeli, Upper Nile, Bahr El Ghazal and Central and Eastern Equatoria.	Despite overall favourable agro-climatic conditions throughout the 2019 season, production prospects remain below the pre-conflict levels due to conflict and crop losses caused by floods.	Widespread insecurity and protracted conflict hamper agricultural activities, hindering access to markets and farming inputs and reducing planting area
<b>Tanzania</b>	1	Irregular rainfall in Dodoma and central parts of Singida regions Heavy rains in the North/East in November	Generally good production year in 2018, pockets with low vegetation conditions in Dodoma and floods in November in the North/East and coastal regions.	
<b>Thailand</b>	3	Drought and high temperatures in spring and June-July (start of main season) in the centre-north  Tropical storms at end August and early September, floods in the northeast	Dry season: poor rainfed crops and reduced area of irrigated rice in the centre north.  Main (wet) season (June-December): despite the late onset of monsoon, some areas recovered and reached good biomass levels but overall, production is estimated to be below average as a result of drought and floods.	Outbreaks of fall armyworm reported by USDA FAS
<b>Timor Leste</b>	1	Delayed Monsoon rainfall	1-month delay in planting of main season crops (mainly maize and cassava, and possibly sowing of rice nurseries)	
<b>Uganda</b>	7	Delayed start of the season in most of the country	Late rainfall was not sufficient to compensate negative effects of early season drought and final production is 5-10% below average cereals production. Production in Karamoja is close to average.	
<b>Yemen</b>	7	Favourable rainfall from July to October	Despite good weather conditions, cereals production is expected to be reduced by 30% with respect to the 5-year average (according to GEOGLAM) due to lack of	Ongoing conflict

			input as a result of conflict and Fall Army Worm outbreaks	
<b>Zambia</b>	5	Delayed onset of rainfall and a prolonged dry spell since the end of February in the high producing southern part	Permanent wilting and crop failure in Southern province. Cereal output decreased by 30% compared to the 5-year average.	Fall armyworm. Low water levels in dams
<b>Zimbabwe</b>	11	Rainfall deficit in central and southern provinces. Cyclone Idai hit Manicaland and Masvingo provinces. The 2018/19 agricultural season was declared "a State of National Disaster"	Permanent wilting of crops and poor pastoral productivity. Crop and livestock losses due to Cyclone. Cereal production decreased by 5% compared to the 5-year average.	Volatile economic situation. Low water and pasture availability resulting to high livestock mortality rates

## Impact on crop seasons started in late 2019 and crop conditions in January 2020

In Southern Africa, the 2019–2020 main agricultural season started with parts of the region experiencing the late effects of the drought suffered in 2018/19 (e.g. Botswana, Zimbabwe, southern Angola). Furthermore, a late onset of rainfall was observed over central and eastern South Africa and Lesotho. Good rainfall amounts in December have improved crop and rangeland conditions in central South Africa, in eastern Botswana and southern Angola (with some localized flooding). Southern and western parts of Zambia, most of Zimbabwe and southern Mozambique however experienced significant rainfall deficits in December resulting to well-below average crop and rangeland conditions. Continuation of rainfall in the second part of the season (Jan–March) is necessary for supporting crop growth and late-planted crops, but also improving rangeland conditions and water reservoirs in the region.

In Eastern Africa bimodal crop areas have received abundant second season rainfall, which are generally beneficial for crops and pastures, with the exception of areas hit by floods, which is mainly the case in Somalia's riverine areas, in South Sudan and in parts of Eastern Kenya. A major Desert Locust outbreak has been reported by FAO in December in Somalia, Ethiopia and Eritrea, but possibly affecting also parts of Kenya and South Sudan.

In Indonesia and Timor Leste the onset of the rainy season is delayed by one month or more and rainfall monitoring in the coming weeks will be crucial.

Both in Southern Africa and in parts of South East Asia, latest seasonal forecasts point towards below average rainfall and high temperatures for the February to April period.

**Table 3.** Countries experiencing climate anomalies during an ongoing crop season in late 2019 / early 2020 according to ASAP.

Country	Agriculture info for the period late 2019/early 2020
<b>Ethiopia</b>	Regions depending on Belg season are suffering late impact of 2019 Belg failure. Desert locusts outbreak reported in late 2019/early 2020.
<b>Indonesia</b>	2-month delay in the planting of main season rice; impact on production will depend on the rainfall of the next months
<b>Kenya</b>	Heavy rainfall led to floods and landslides in late 2019. Otherwise abundant rainfall generally favourable to crop and rangeland production. Desert locusts reached the country in January 2020.
<b>Lesotho</b>	Late start of the 2019/2020 season and early season rainfall deficits
<b>Madagascar (southern)</b>	Late rainfall onset and below average amounts in parts of the South
<b>Morocco</b>	Slight delay of the winter crop cereal planting, especially in the South/West, while an improvement is visible in the central and eastern parts in December/January
<b>Namibia</b>	Rainfall deficit in November affecting mainly northern and north-eastern parts
<b>Mozambique</b>	Rainfall deficit in November/December affecting 2019 crop season in the south
<b>Somalia</b>	Severe flooding in late 2019, while generally positive conditions for rainfed agriculture. Locusts outbreak reported in late 2019/early 2020
<b>South Sudan</b>	Severe flooding in late 2019 impacted more than 1 Million people
<b>Timor Leste</b>	1-month delay in the planting of main season crops (maize); impact on production will depend on the rainfall of the coming months
<b>Zambia</b>	Rainfall deficits in southern, western and central parts in November/December
<b>Zimbabwe</b>	Rainfall deficit in December affecting most of the country



## Seasonal climate forecasts and potential impact on agriculture in 2020

Multi-Model Ensemble seasonal forecast for the next three months (February-March-April) shows warmer-than-usual conditions likely/very likely to occur in central and southern Africa, south-east Asia, Central America and the North/Western part of South America (Fig. 3). Warmer-than-usual conditions are also likely to occur in Northern Australia, the Mediterranean region, Eastern and Northern Europe, and Russia. Lower-than usual precipitation are forecast to likely occur in South-east Asia, in Central America and in the North/Eastern side of South America. Also in South Africa the occurrence of lower-than-usual precipitation is more likely than not (Fig. 4).

If the climatic conditions forecasted for Southern Africa materialise, the risk of below-average cereal production for 2020 will increase, since good rainfall and temperature conditions in the second part of the main agricultural season are crucial for the support of crop growth, especially maize that is a staple crop for the region. Furthermore, a negative climatic outlook increases the risk of livestock losses in Namibia and Zimbabwe that were already facing the lingering effects of the previous year drought, as well as rainfall deficits in the current season.

In East Africa, wet and warm conditions will continue to favour the ongoing desert locusts outbreak with major risks for the 2020 main crop season if the swarms reach major crop production areas in Kenya, Ethiopia, Sudan and Uganda.

In Indonesia, in the eastern part of the country, the lack of irrigation water has led to a delayed planting of rice and if the rainfall situation does not improve in the coming months, the main season rice area and therefore production will be reduced.

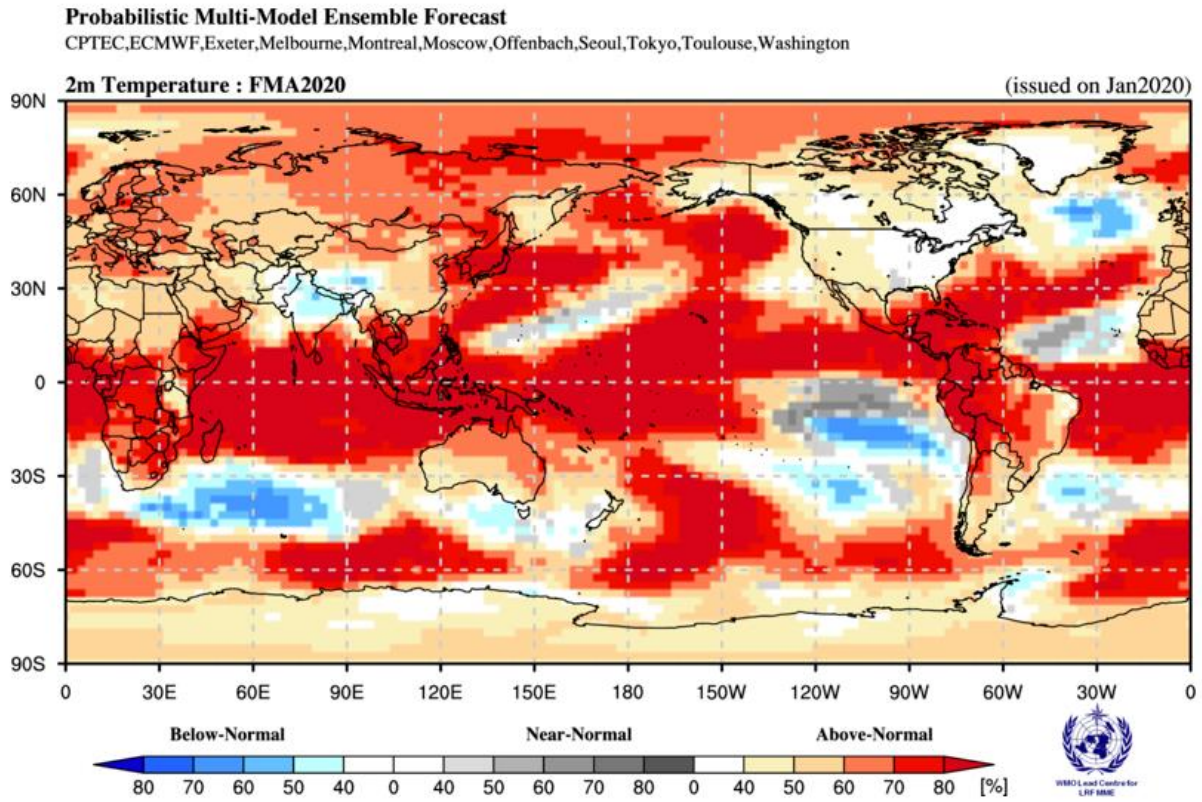
In Timor Leste, the delayed planting of the main season crops, especially rainfed maize, increases the risk of a poor harvest in case of dry spell or early cessation of rains when the crop is still at a critical stage (e.g. flowering).

According to NOAA's seasonal forecasts<sup>3</sup>, El Niño is expected to continue being in neutral phase for the coming boreal spring 2020 (~60% chance).

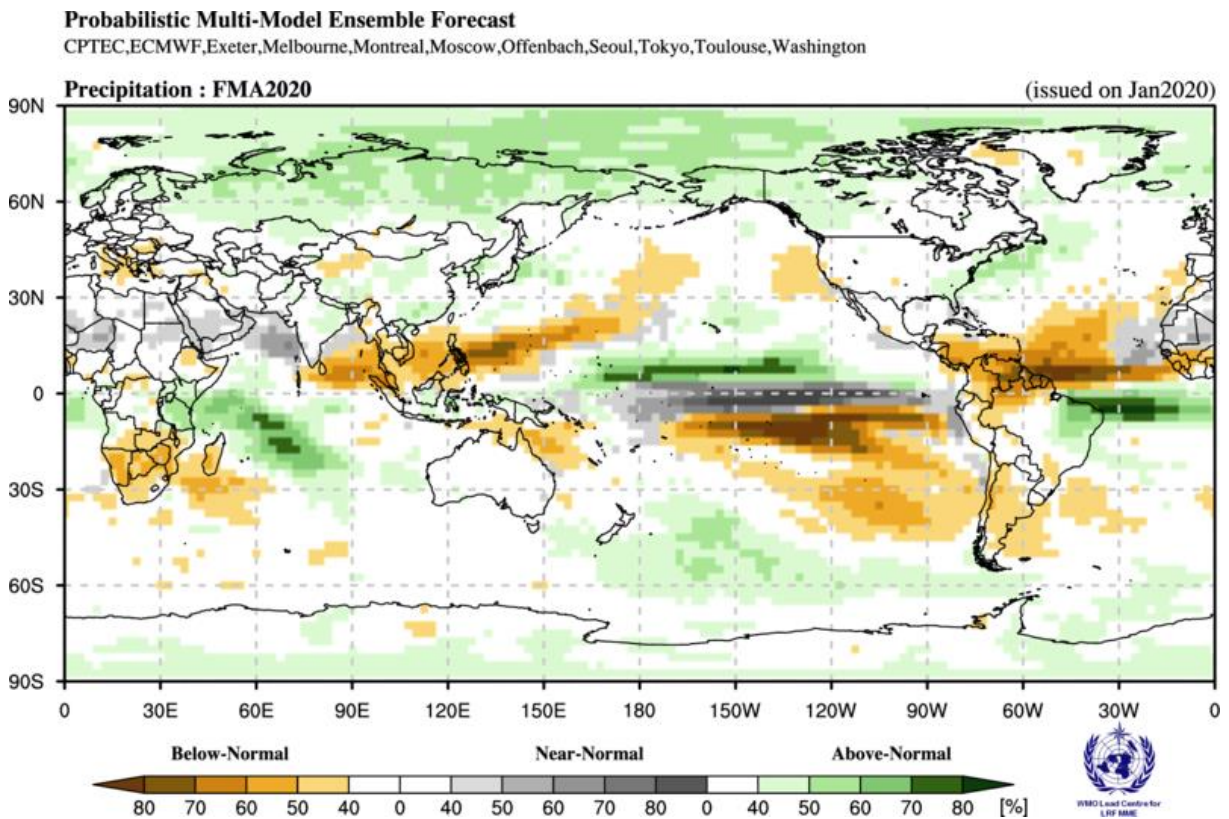
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(<sup>3</sup>) [http://www.cpc.ncep.noaa.gov/products/international/africa/cons\\_fcsts/Global\\_Forecasts\\_Discussion.pptx](http://www.cpc.ncep.noaa.gov/products/international/africa/cons_fcsts/Global_Forecasts_Discussion.pptx)

**Figure 3.** Multi model ensemble forecast for 2m air temperature (source: WMO Lead Centre for Long-Range Forecast Multi-Model Ensemble)



**Figure 4.** Multi model ensemble forecast for precipitation (source: WMO Lead Centre for Long-Range Forecast Multi-Model Ensemble)



## References

- FAO, IFAD, UNICEF, WFP and WHO, 2018. The State of Food Security and Nutrition in the World 2018. Building climate resilience for food security and nutrition. Rome, FAO. Licence: CC BY-NC-SA 3.0 IGO.
- FSIN, 2018 GLOBAL REPORT ON FOOD CRISES 2018. <http://www.fsincop.net/global-network/global-report/en/>
- MARS, 2019. JRC MARS Bulletin. Reduced yield outlook for maize and sunflowersCrop monitoring in Europe – September 2019. Available on-line at <https://ec.europa.eu/jrc/sites/jrcsh/files/jrc-mars-bulletin-vol27-no9.pdf>.
- Rembold, F., Meroni, M., Urbano, F., Csak, G., Kerdiles, H., Perez-hoyos, A., Lemoine, G., Leo, O., Negre, T., 2019. ASAP : A new global early warning system to detect anomaly hot spots of agricultural production for food security analysis. Agric. Syst. 168, 247–257. <https://doi.org/10.1016/j.agry.2018.07.002>
- WMO, 2019. WMO Provisional statement on the State of the Global Climate in 2019. Available on-line at <https://public.wmo.int/en/media/press-release/2019-concludes-decade-of-exceptional-global-heat-and-high-impact-weather>

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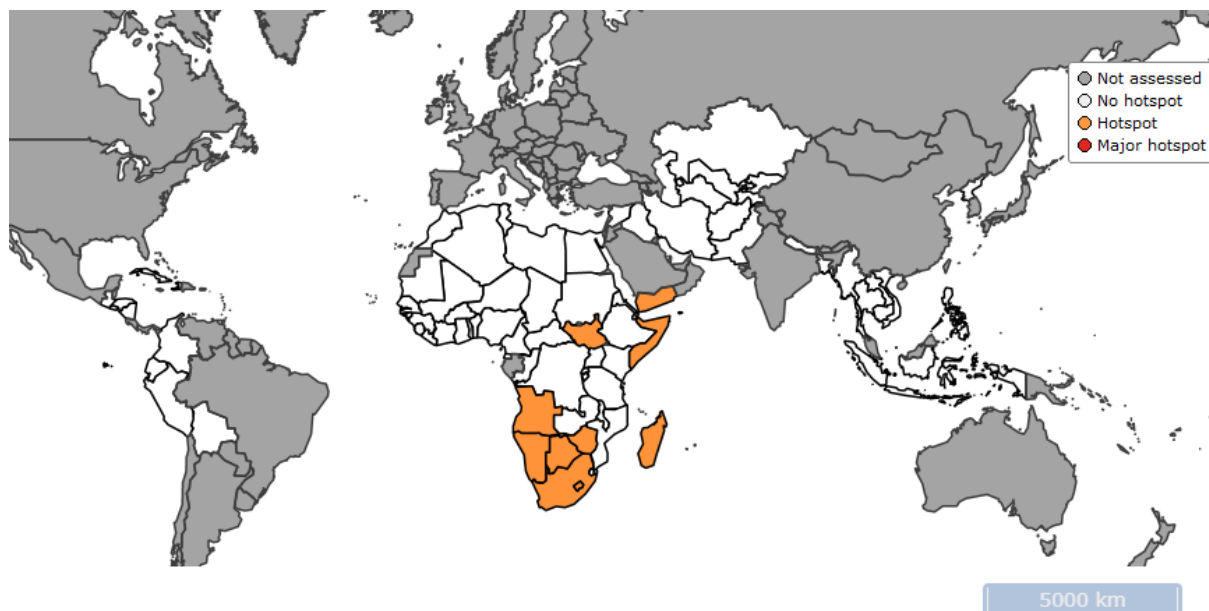
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## Annexes

### Annex 1. Monthly ASAP Global Overview of Agricultural Production hotspots for 2019

January 2019

Figure 1. ASAP hotspot assessment of January 2019



**East Africa:** Crop production of the second season is below-average in Somalia, marginal areas in Kenya and localized areas in Ethiopia, mainly due to irregular rainfall distribution between October and December 2018. Low short season rainfall followed by high temperatures in the dry season (December and January) is leading to rapid deterioration of pastoral vegetation productivity in southern Sudan, northern and eastern Somalia, semi-arid pastoral areas in Kenya and Karamoja (Uganda). Uni-seasonal production areas in Sudan and Ethiopia have generally experienced better agro-climatic conditions during the main season in 2018, but in Sudan production prospects are below-average due to high input prices and early season flood damage.

**Southern Africa:** Crop conditions reflect a mixed situation across the region with above-average rainfall in Malawi, northern Mozambique, northern and eastern Zambia and early-season dry conditions in South Africa, Namibia, and southern Angola. In January, rainfall deficits worsened, increasing their impact on croplands and pastures in southern Angola and south-western Zimbabwe. The irregular rainfall distribution hampers crop development in the main cereal-producing regions of the central part of South Africa, whereas rangelands conditions across the country are reported to be between average and poor. Below-average crop conditions can be observed also in the eastern part of Botswana and in the northern part of Namibia, while below-average rangeland conditions occurred in the western part of Botswana and across most regions in Namibia. Well above-average rainfall was received in Mozambique, Malawi, north-east Zimbabwe and north-east Zambia and has led to good crop and rangeland conditions in these areas. However, heavy rainfall has led to flooding in some parts of Mozambique and Malawi. According to seasonal rainfall outlook (NOOA, CPC, 10 January 2019), parts of the region (southern Angola, Namibia, western Botswana, southern Zambia, Mozambique), are forecasted to receive below-average rainfall until the end of March 2019.

**West and Central Africa:** The main 2018 season in the Sahel was generally positive thanks to abundant rainfall. Nigeria has achieved an above-average 2018 production, with concerns remaining for areas hit by flooding in September and because of internal displacement and impacts of the ongoing conflict in the North East.

**North Africa:** Rainfall amounts have increased again in January after a dry period in December and agro-climatic conditions are favourable in the whole area for winter crop development. Crop and rangeland vegetation conditions are generally above-average and there is no visible negative impact of the December rainfall deficit.

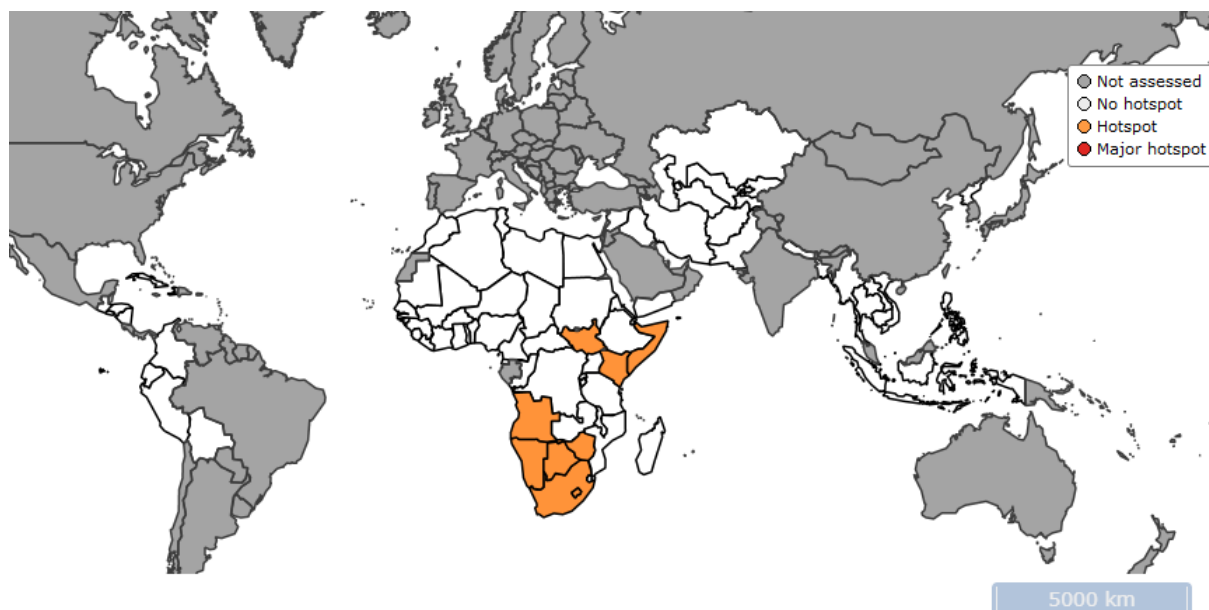
**Central and South Asia:** In Central and South Asia, crop conditions are generally favourable, in particular in Afghanistan with above-average temperatures since end of November and good rainfall since the start of January in the northern and western provinces, stricken by the 2018 drought. Similarly good conditions are observed in Pakistan, where even the southern provinces (Sindh and Balochistan), affected by drought in 2018, show good crop biomass levels.

**South-East and Eastern Asia:** Conditions appear favourable for the start of the dry season rice on the continent and the main season rice for Indonesia.

**Middle-East:** In the Middle-East, winter cereals and pastures are in very good conditions following the heavy rains of end of November-December.

**Central America and Caribbean Islands:** January 2019: At the end of the postrera season in Central America, despite some crop losses as result of a delayed onset of the season and dry spells from mid-June to August, generally favourable outcomes are expected thanks to late season improvements since September. As a result, the 2018 aggregate cereal production in Central America and Caribbean is forecast at 44.2 million tons, lower than 2017 (-1.7%), but above the previous five-year average (43.4 million tons). According to FAO, Guatemala's production is estimated at an average level of 1.9 million tons, while the aggregate production in El Salvador is anticipated at 950000, slightly lower than the previous five-year average (1 000 000). Maize production in Nicaragua is forecasted at an average level of 420 000 tons, while in Honduras it is anticipated to decline by 2.5% compared with the average of the last five-years. In Haiti, the aggregate maize production is forecast at 185 000 tons, 13% lower than the last five-year average, due to drought (FAO, Crop prospects and Food Situation December 2018 <http://www.fao.org/3/CA2726EN/ca2726en.pdf>).

Figure 2. ASAP hotspot assessment of February 2019



**East Africa:** Low October-December rainfall, followed by abnormally high temperatures since January 2019, is continuing to cause rapid deterioration of pastoral resources in southern Sudan, northern and eastern Somalia, southern and eastern Ethiopia, semi-arid pastoral areas in Kenya and Karamoja (Uganda). This is driving food prices upwards across the region and further aggravating the severity of some of the most troubling ongoing food crises, such as the ones taking place in South Sudan and Somalia. Seasonal rainfall forecasts indicate above-average main season rainfall in 2019 for most of the region (Source: [http://www.icpac.net/wp-content/uploads/GHACOF51\\_Statement.pdf](http://www.icpac.net/wp-content/uploads/GHACOF51_Statement.pdf)), but the potential positive effects of the next crop season will not alleviate food security problems before mid-2019.

**Southern Africa:** The late onset of rainfall in the first part of the season, and the erratic spatial and temporal distribution in December to February, led to reductions in the planted area or poor crop development in many parts of the region, mainly in central South Africa, southern Angola, northern Namibia, central and southern Zimbabwe and Lesotho. In South Africa, the area planted is 10% less than the 10-year average; however improved rainfall since the beginning of February in the central provinces of North West and Free State may prevent further damage to crop development. Pastoral areas across Namibia, in western Botswana and in parts of South Africa continue to deteriorate due to moisture deficits. The main cereal-producing regions in Angola, and crop areas in Malawi, northern and central Mozambique and Swaziland, continue to receive beneficial rainfall and are progressing well. According to the Climate Prediction Center's Seasonal Rainfall Performance Probability (SPP) analysis for February-April, below-average rainfall is expected in southern Angola, most of Namibia, parts of western and eastern Botswana, southern Zambia and central Mozambique, whereas average rainfall is expected in central and eastern South Africa, Zambia, northern Mozambique and Malawi.

**West and Central Africa:** No relevant change since last month.

**North Africa:** Conditions for crop and rangeland vegetation continue to be generally above-average in the region, thanks to above-average rainfall and favourable temperature conditions. However, in localised areas of Morocco (Oriental and Marrakech regions), vegetation conditions have been adversely affected by high temperatures and low rainfall since January.

**Central and South Asia:** In Central Asia, conditions are favourable for (still dormant) winter cereals thanks to good precipitation over this winter. In Afghanistan, in Jawzjan (north of the country) alone, the growth of winter crops appears delayed with respect to the average. In Pakistan, moisture conditions in the southern provinces have also improved compared to the dry situation observed up to the end of 2018, and localised floods were even reported in Punjab and Balochistan in mid-February.

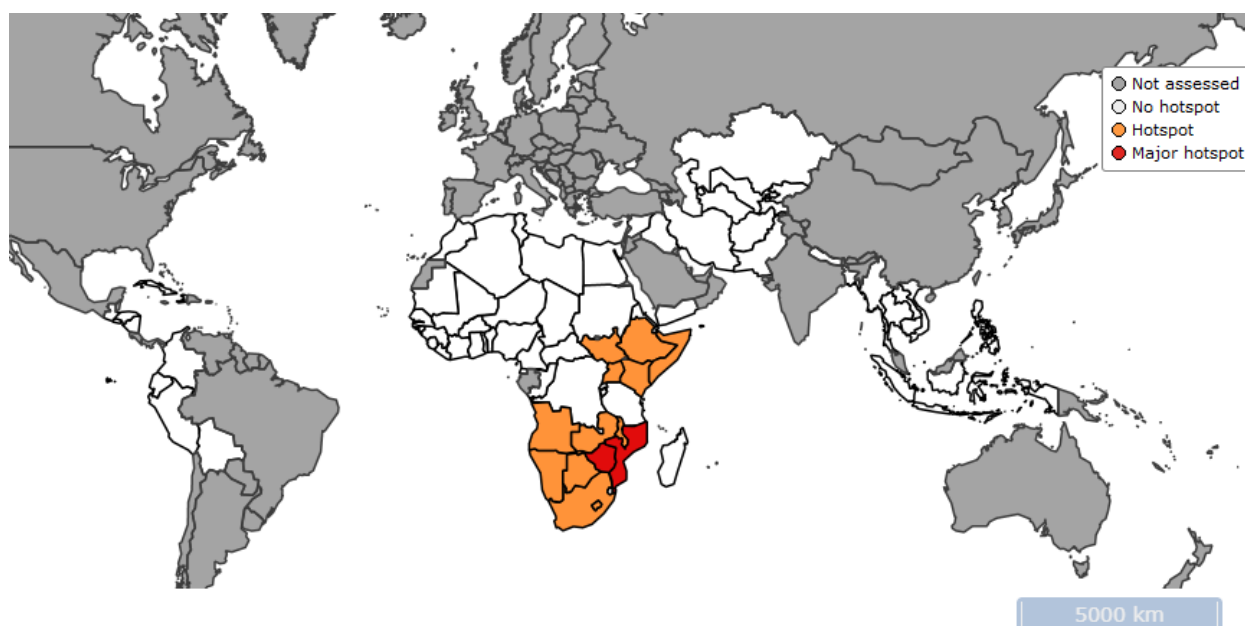


**South-East and Eastern Asia:** In continental South-East Asia, conditions are favourable for dry season rice, except in central Thailand where rainfall has been below-average since mid-January; this is also the case in northern Philippines at the start of the dry season rice.

**Middle-East:** Throughout the region, conditions are very favourable for the growth of winter cereals and pastures thanks to very good rainfall since October 2018, which has even caused local floods, for example in western Iran at the end of January.

**Central America and Caribbean Islands:** Dry conditions prevailed in February, with below-average rainfall observed across Central America, particularly along the Atlantic Basin. Nevertheless, the harvest of the Apante season is not expected to be seriously affected in Guatemala and Nicaragua, due to adequate rainfall early in the season. The rest of Central America is currently out of season.

Figure 3. ASAP hotspot assessment of March 2019



**East Africa:** Planting in the bi-modal areas of the region is generally delayed by rainfall deficits and high temperatures affecting parts of: Uganda, Kenya, Somalia, Ethiopia, South Sudan and Northern Tanzania. According to the updated GHACOF seasonal rainfall forecast, the cumulated seasonal rainfall will remain below-average for most of the region and tropical storms and cyclones in Southern Africa (such as Idai) are diverting atmospheric moisture southwards. In southern Ethiopia, Belg season areas show below-average crop conditions and pastoral areas are affected by prolonged drought. In Somalia insufficient rainfall will further aggravate the impact of low crop and pastures production of the 2018/2019 short rains. In Kenya early season rainfall deficit is causing delayed planting and low crop areas in the west and is also posing at risk marginal agricultural and pastoral activities in the south east and coastal parts of the country.

**Southern Africa:** March 2019: The central and western parts of the region are experiencing enduring rainfall deficits and drought conditions, whereas the eastern part was severely hit by heavy rains, floods and strong winds caused by Cyclone Idai. Major flooding in central Mozambique and southern Malawi has claimed human lives and caused damage to infrastructure and homes, whereas the storm damages extend beyond the flooded areas and include eastern Zimbabwe. The destruction of standing crops in the 3 countries will cause reduced food production and contribute to increased food insecurity and health risks. Significantly below-average and irregular rainfall since the start of the agricultural season have deteriorated crop conditions in southern Angola, northern Namibia, eastern Botswana, southern Zambia and Lesotho. Southern Zambia in particular is experiencing widespread crop failure due to a prolonged dry spell in February/March. The central key producing regions of South Africa received beneficial rainfall in March, preventing further damage to the crops. Poor pastoral conditions resulting from prolonged dry spells and high temperatures are observed across Namibia, in western Zimbabwe and western South Africa. More information and maps about the areas concerned by cyclone Idai and by the extreme drought in Zambia's southern region can be found in the [March 2019 Special Focus](#).

**West and Central Africa:** First season maize planting started in the bi-seasonal parts of the region under generally favourable agro-climatic conditions.

**North Africa:** Above-average mean temperatures and decreased rainfall starting in the last dekad of February and continuing through March are putting at risk the initially very favourable crop conditions in eastern and southern Morocco and to some extent also in western Algeria. Crop conditions remain favourable in eastern Algeria, Tunisia and Egypt.

**Central and South Asia:** In Central and South Asia, conditions have been favourable to winter cereals overall and despite below-average precipitation, in particular in March, in the eastern half of Uzbekistan and Kyrgyzstan. In Kazakhstan, sowing of spring cereals will start in April with favourable temperatures (about 2°C above-average) and moisture conditions, especially in the northern Oblasts. In Afghanistan and Pakistan, most

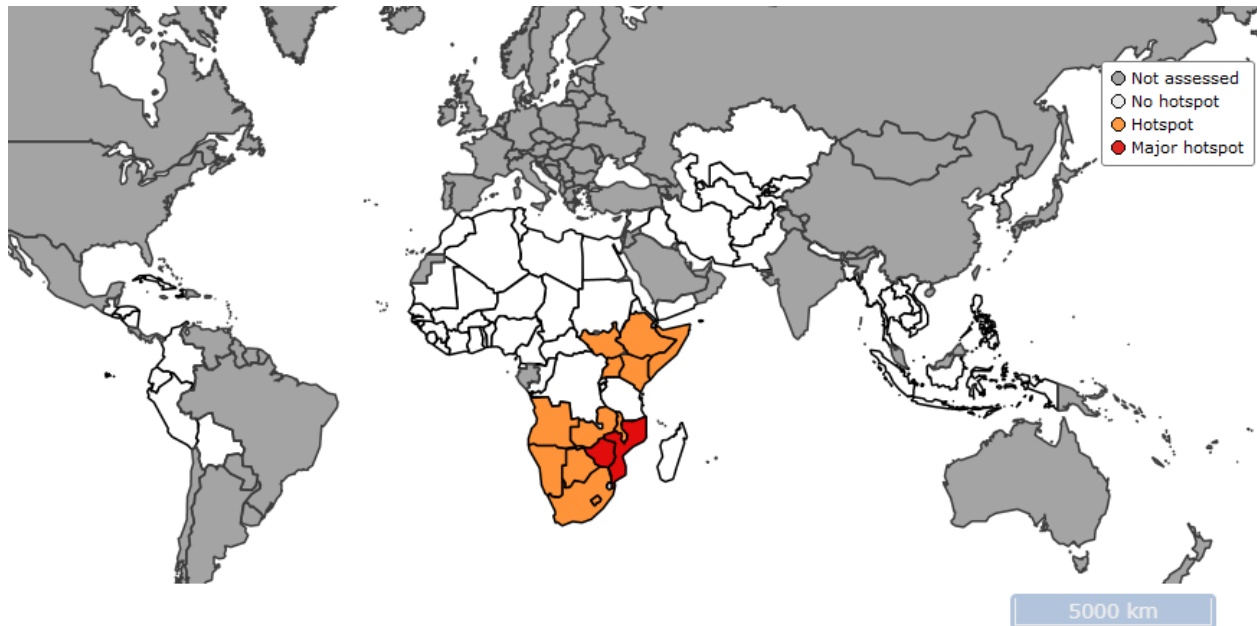
regions received above-average precipitations that will benefit winter and spring crops as well as pastures. In Afghanistan however, vegetation growth is delayed in a large area going from the centre (Ghor, Daykundi) to the east (Ghazni, Paktika, Paktya, Kabul) due to temperatures colder than average by 3°C to 8°C.

**South-East and Eastern Asia:** In South-East Asia, irrigated dry season rice, which is approaching harvest time, appears to be in good conditions in continental South-East Asia as well as in the northern Philippines. However below-average rainfall (as low as 50% of the average rainfall of the last 3 months) and 2°C-4°C above-average temperatures have affected natural vegetation and rain-fed crops in central and north-eastern Thailand as well as south Lao. In Indonesia, wet-season rice has been benefiting from abundant rainfall since October-November 2018.

**Middle-East:** In the Middle-East, conditions continue to be very favourable to the growth of winter cereals and pastures thanks to above-average rainfall since October 2018. Localized flash floods occurred in March in Iran, Iraq and northern Syria and caused life losses as well as damage to infrastructure, no information is available on crop damage.

**Central America and Caribbean Islands:** The Apante bean season is complete in Nicaragua and Guatemala with close to average prospects due to good rains received. In Haiti, planting of spring season maize and beans is underway with some concerns due to early season dryness in the north-west and central regions, where planting is delayed.

Figure 4. ASAP hotspot assessment of April 2019



**East Africa:** Drought conditions with little rainfall and high temperatures have continued and intensified in late March and April in Uganda, Kenya, Somalia, Ethiopia, South Sudan and northern Tanzania. This confirms the below-average seasonal forecast and is linked to major recent tropical storms and cyclones like Idai and Kenneth, diverting atmospheric moisture southwards. In southern Ethiopia (mainly in Oromia and SNNP states), Belg season areas show below-average crop conditions and pastoral areas are affected by prolonged drought. Southern Somalia has received practically no Gu rainfall (by 20th of April) increasing the risk of another failed crop season after the recent droughts in 2017 and failed 2018 short rains. In Kenya, early season rainfall deficit is causing delayed planting and low crop areas in the west and does already show a negative impact on crop and rangeland conditions in the center, southern and coastal areas. Most of Uganda, and in particular the northern part of the country, has received less than 80% of seasonal rainfall and experienced high temperatures in the last 2 months, increasing the risk of low crop production and low pastures availability. Although rainfall in the region has increased in late April, it is very likely that seasonal totals will remain significantly below-average.

**Southern Africa:** The main agricultural season is ending with the harvest of summer crops starting in April. The region experienced a delayed onset of rains, followed by irregular rainfall patterns and prolonged dry spells between mid-February and end of March. This resulted in reduced planted areas, poor germination and permanent wilting of crops in many parts of the region. Important maize suppliers of the region, such as South Africa and Zambia were affected by drought conditions and production prospects especially in southern Zambia are below-average. Already vulnerable and food insecure areas in southern Angola, northern Namibia and eastern Botswana experienced widespread rainfall deficits during most of the agricultural season, limiting crop production of 2018/2019. Poor rainfall conditions deteriorated pastoral conditions, leading to livestock deaths and further exacerbating food security, especially in Namibia, Zimbabwe and Botswana. Moreover, the eastern part of the region was hit by two major cyclones in 6 weeks, cyclone Idai and cyclone Kenneth, that brought torrential rains, strong winds and flooding, that resulted in widespread destruction of cropping areas, infrastructure and homes, reducing production prospects and increasing food insecurity.

**West and Central Africa:** First season maize planting started in the bi-seasonal parts of the region under generally favourable agro-climatic conditions. A slight delay in the start of the main season in northern was caused by high temperatures and below-average rainfall in late March and April in northern Ghana, Togo and Benin.

**North Africa:** Rainfall has improved in Morocco in March and April and yield forecasts according to the MARS bulletin are below-average only for barley, due to prolonged drought conditions in the Oriental region. Crop

conditions remain overall favourable in eastern Algeria, Tunisia and Egypt. Parts of Tunisia experienced exceptional rainfall in March leading to water logging and potential localized crop damage.

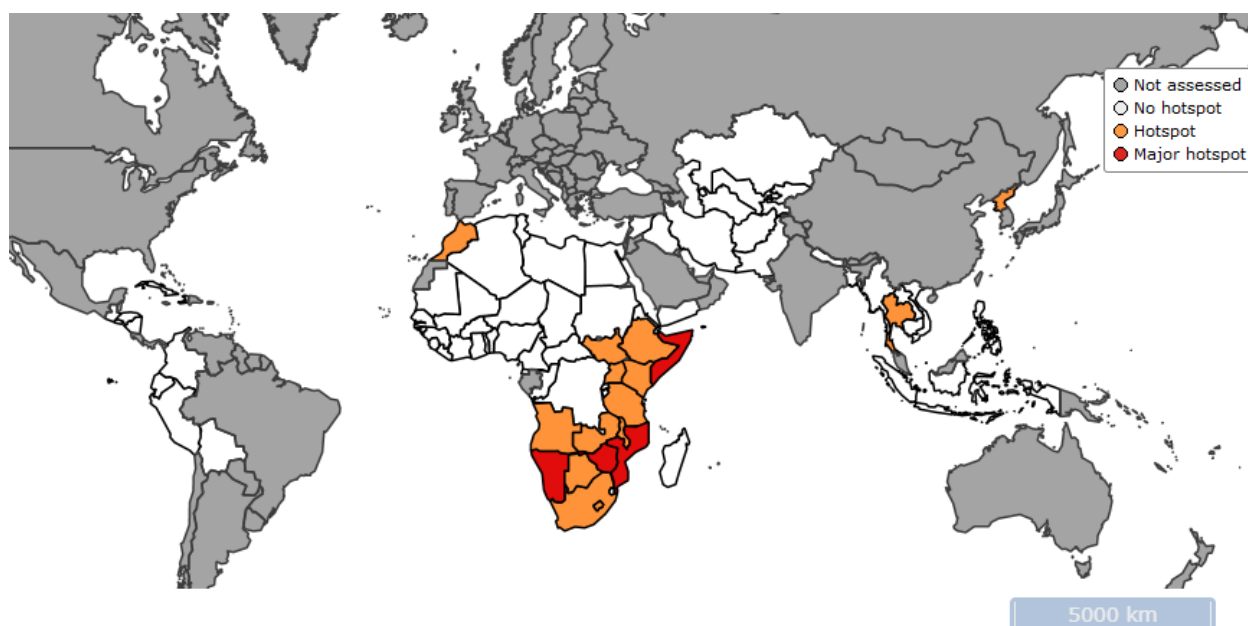
**Central and South Asia:** Prospects for winter cereals and pasture production are very favourable thanks to abundant rainfall over most regions. Only eastern Uzbekistan received lower than average rainfall but winter cereals appear to be in good conditions. South Asia (Pakistan and Afghanistan) also received abundant rainfall that will benefit winter cereals and pastures. However in the centre-east of Afghanistan (from Ghor to Kabul and from Bamyan to Paktika), winter cereals growth is delayed, probably because of the cold spell of February March over the region.

**South-East and Eastern Asia:** Dry season rice production is expected to be below-average as a result of reduction in the sown areas in central and north-eastern Thailand (Suphanburi, Lopburi, Nakhon R., Khon Kaen, Maha Sarakham) and north Cambodia (Battambang). In the whole region rainfall has been below-average and temperatures above-average by 1.5°C to 4°C since November 2018. In Thailand, at the national level, the secondary season production drop is however more than off-set by the favourable 2018 main season. The southern half of Lao has also suffered from these abnormally dry conditions.

**Middle-East:** From a climatic point of view prospects are favourable for winter cereals and pastures, thanks to above-average rainfall since October 2018. In Iran, it is too early to assess the impact of floods on crop production.

**Central America and Caribbean Islands:** Land preparation for the primera season, which will start next month, is underway, with slightly above-average temperatures and below-average rainfall across Central America. In the Caribbean, main season rice planting started in Cuba and conditions are favourable thanks to close to average rains. In Haiti, the spring season is ongoing and some concern remains in Centre, Nord and Nord Est regions, due to early season dryness and moisture deficits.

Figure 5. ASAP hotspot assessment of May 2019



**East Africa:** During May, the severe drought conditions that have caused delayed planting, low areas and below-average crop conditions across East Africa have persisted. In Ethiopia this is causing low Belg season production prospects in the southern part of the country, whereas seasonal forecasts for the main season (from June to September) also point to below-average rainfall, increasing the risk of food insecurity in the second half of 2019. Close to the end of the main rainy season, most of Somalia has received insufficient rains for normal crop growth and crop production is expected to be 40-50% below-average due to limited areas planted and crop failure in the main producing areas in Bay (sorghum), Lower Shabelle (Maize) and in the North West. Pastoral areas are subject to rapid vegetation degradation and low water availability for livestock. Marginal agricultural crop areas in Kenya experienced crop failure, while crop growth is negatively affected by dry conditions also in the high potential areas in the West and in the Rift Valley and drought is hampering pastures productivity in the semi-arid northern and eastern parts of the country. Most of Uganda, and in particular the north/eastern part of the country, including Karamoja, has received insufficient rainfall and experienced abnormally high temperatures in the last 3 months, increasing the risk of low crop production and low pastures availability. According to seasonal rainfall forecasts just released by the 52nd GHACOF, the rainfall situation is likely to improve for the main season in western Kenya, Sudan and parts of Uganda. But the drought conditions experienced so far will in any case deteriorate food security conditions and increase the number of people in IPC phase 3 or higher, across vulnerable areas in Somalia, South Sudan and parts of Kenya, Uganda and Ethiopia.

**Southern Africa:** At harvest time, the region is suffering the consequences of prolonged drought in crop and rangeland areas and of extreme weather events. Crop production prospects in most countries are hampered by the impacts of the delayed rainfall onset and by the prolonged dry spells that followed. Even the most important maize suppliers of the region, including South Africa and Zambia, are expecting a crop production decline of more than 10% as compared to last year. The export ban on maize and maize meal put in place by Zambia is a symptom for a possibly challenging regional maize supply situation in late 2019/early 2020. Namibia has declared a state of emergency due to the drought that has affected the 2018/2019 season since the beginning, causing failure of rain-fed crops and increased livestock mortality. Poor pastoral conditions are reducing food security coping strategies in Zimbabwe and threatening pastoral livelihoods in Botswana. In Mozambique, the agricultural sector was severely damaged by the two tropical cyclones that hit the country within 6 weeks in March/April, and the diminished production prospects and labor opportunities are adding further pressure to food security in the area. In contrast, Malawi is expecting an increase in the maize production compared with last year, despite localized areas of low production and increased risk of food insecurity in the south, due to floods caused by Cyclone Idai.

**West and Central Africa:** First season maize crop conditions are generally favourable in the bi-modal parts of the region. However, a slight rainfall deficit in April/May is showing first impacts on vegetation and possible

delays in planting in southern Chad, parts of Nigeria (Niger, Kwara, Kaduna regions), northern parts of: Ghana, Benin, Togo and Cameroon.

**North Africa:** Close to the end of the main cereal season in Morocco, the impact of high temperatures and prolonged drought appears more severe and spatially extended than previously reported. According to the MARS yield forecast issued on the 20th May, average national yields are 22% below the 5-year average for wheat and 30% for barley. Crop conditions remain overall favourable in eastern Algeria, Tunisia and Egypt. Parts of Tunisia experienced exceptional rainfall in March leading to water logging and potential localized crop damage.

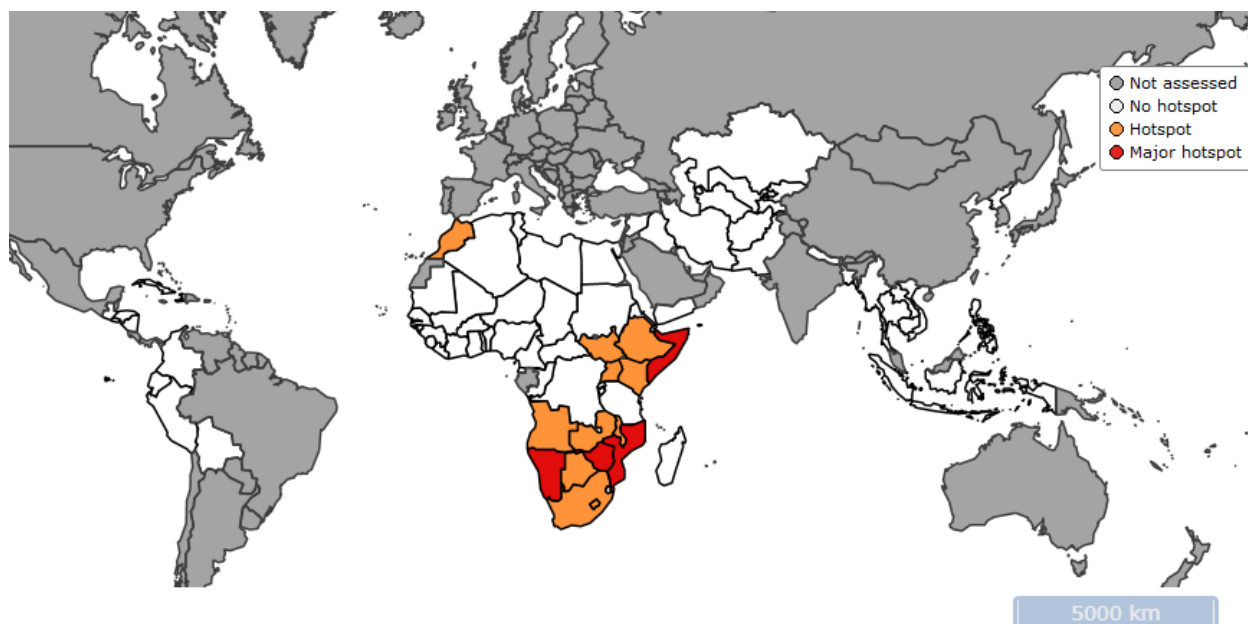
**Central and South Asia:** In Central Asia rainfall was also abundant over most regions and winter cereals and pastures production is expected to be very good. In eastern Uzbekistan (Namagan, Andijan and Fergana), winter cereals are also in good conditions despite below-average rainfall over the last three months. In South Asia, the harvest of rabi crops (winter cereals) in Pakistan is about to finish with good production levels. In Afghanistan, weather conditions have been favourable in most regions, except Jawzjan in the north where biomass levels are below-average. In the centre-east of the country (from Ghor to Kabul & Paktya), winter cereals and pastures, whose growth has been slowed down by snow cover and low temperatures in February and March, have recovered and prospects are now favourable.

**South-East and Eastern Asia:** In South-East Asia, drier than average conditions (linked to El Niño according to the Thai Meteorological Department) and high temperatures, have affected a region centered on Thailand and extending to Myanmar, Cambodia and Lao. The late arrival of summer rains is delaying the planting of main season rice while dry season rice production is expected to be lower than in 2018 in Thailand as a result of a reduced area of irrigated rice (following second season-rice plantation quota set by the Thai government to preserve water reservoirs). In the Philippines, the start of the main season rice is delayed in the centre of the country as farmers wait for the start of the rain season.

**Middle-East:** In the Middle-East (Syria, Iraq and Iran), prospects continue to be favourable for winter cereals and pastures thanks to abundant rainfall since October 2018.

**Central America and Caribbean Islands:** Planting of the primera season is underway in Central America with a slight delay of the season, mainly in the Gulf of Fonseca area. Uneven rainfall distribution and some dry spells in April coupled with high temperatures, had reduced moisture of soils at very early stages of the season. The situation has recovered due to positive rains received in May. In Haiti, spring season is ongoing with some remaining concerns in north-eastern and central regions as a consequence of the poor early season rainfall performance.

Figure 6. ASAP hotspot assessment of June 2019



**East Africa:** The main crop season has started in time and with enough rainfall in the northern part of the region including Sudan and the central and northern parts of Ethiopia and Eritrea. The southern part of the region has an April-June crop season, but despite improved late rainfall in May and June, the crop and rangeland production outlooks remain poor due to the late onset of rainfall and the cumulative rainfall deficits at the end of the season. This is the case for southern Somalia, the southern Belg season areas in Ethiopia, south/east and coastal Kenya, northern and eastern Uganda, and northern and eastern Tanzania. The improvement in May/June rainfall in Kenya has compensated for early season dryness in the central highlands and in the western crop areas with their potential high yields. Similar dynamics can be seen in southern and western Uganda whereas decreased cereal production can be expected in the north and east. Crop conditions in Somalia have improved in the north and west and off-season cropping is taking place in southern riverine areas where river water levels have increased thanks to good rainfall in the Ethiopian highlands. However, national level crop production is expected to be significantly below-average. The improved availability of water in June has favoured temporary rangeland recovery in most pastoral areas of the region, but due to the shortened rainy season, many of those areas are at risk of early vegetation depletion (e.g., north-eastern and central Kenya, southern and central Somalia, and south-eastern Ethiopia). Rainfall in South Sudan has also improved since mid-May, but part of the centre and north still shows negative vegetation anomalies.

**Southern Africa:** Preliminary reports at the end of the harvesting period indicate a decrease in cereal production and particularly maize, the most important staple crop in the region, due to the extreme weather shocks experienced during the 2018/19 agricultural season. The most seriously affected country is Mozambique, which experienced the combined effects of two cyclones in the central and northern parts in March/April and drought in the southern semiarid areas. Both the agricultural and the fishing sectors have been damaged, leaving households facing a food security emergency. Croplands and rangelands in Namibia received little to no rain during the 2018/19 season and the country declared a state of emergency in May. The fiscal challenges in Zimbabwe coupled with the drought in the central and southern part of the country and the destruction that cyclone Idai brought to croplands in two districts are hampering food security. Even the most important maize suppliers of the region, including South Africa and Zambia, are expecting a decrease in crop production of more than 10% compared to last year. A positive national level cereal outlook is expected in Malawi despite localized production shortfalls in the south of the country. According to FEWSNET, in most markets of the region “maize grain is circulating from surplus to deficit areas and prices are currently stable in most markets although above the five-year average and last year’s prices”.

**West and Central Africa:** Crop conditions are generally favourable in the bi-modal parts of the region. A slight rainfall deficit in April/May caused initial seasonal delay in central Nigeria and southern Chad but conditions are



improving. Early season dryness is also visible in the Gambia, southern Senegal, and in the coastal areas of the Guineas, but it is still very early in the season to detect any impact on vegetation.

**North Africa:** The crop season was generally very good or good in the central and eastern parts of the region, whereas production in Morocco was hampered by drought in several parts of the country. According to the latest MARS bulletin in June, average national yields in Morocco are 23% below the 5-year average for wheat and 28% for barley. The western part of Algeria also experienced drought conditions but this was well compensated for by above-average production in the centre and east. Cereal production in Tunisia is above-average, especially for wheat (the wheat yield is 20% above the 5-year average).

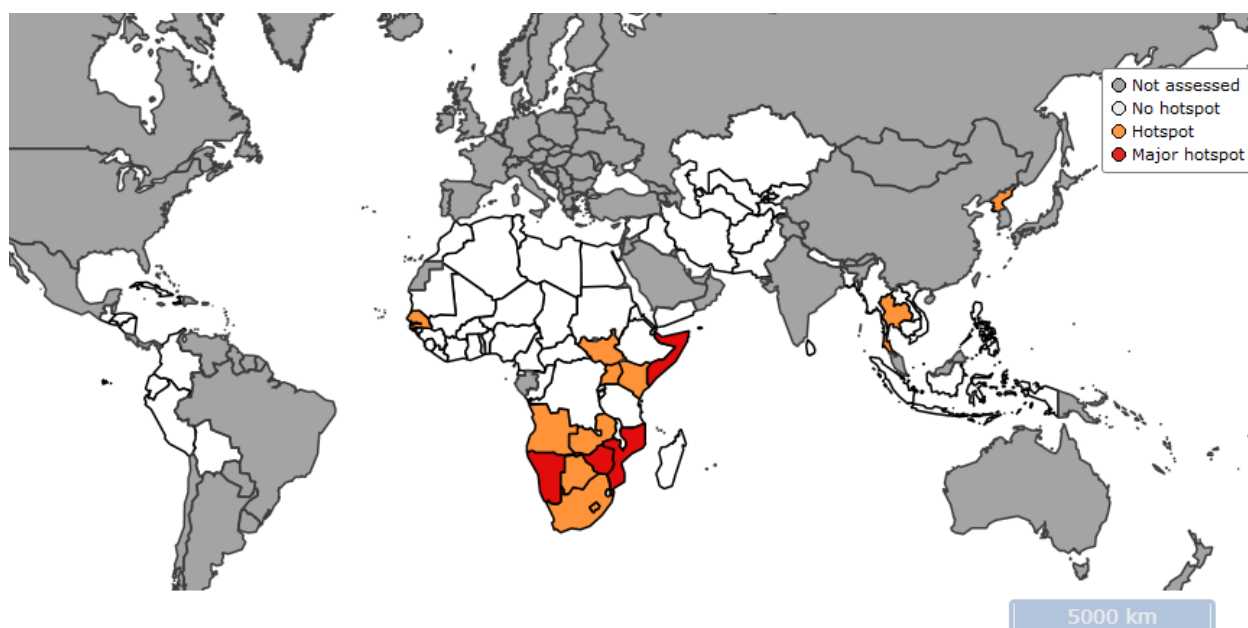
**Central and South Asia:** Thanks to good rainfall over most regions in Central Asia, winter cereal and pasture production is expected to be very good. Eastern Uzbekistan (especially Fergana) has received below-average rainfall over the last three months, but winter cereals are in good condition. In Kazakhstan, spring cereals are also growing under favourable conditions except in the northwest of the country (Aktyubinskaya, Kustanayskaya) where the biomass of cereals is below-average as a result of erratic rainfall since early May. In South Asia, the growth of kharif crops in Pakistan (irrigated summer crops) has started under normal conditions. The harvesting of winter cereals is finishing in Afghanistan and the prospects are favourable in the whole country.

**South-East and Eastern Asia:** In South-East Asia, after a dry and hot spring (January-April period) in Thailand, Cambodia, Laos, and Myanmar, seasonal rainfall arrived at the end of May-June and planting of wet season rice has started late compared to 2018. The dry season rice production is expected to be lower than in Thailand in 2018 (centre and north) and Cambodia as a result of a reduced area of irrigated rice due to low water in the reservoirs. The situation in North Korea improved thanks to the good rains of June over the rice bowl area and the flooded rice areas are now similar to those of 2018. While crop conditions are good in the north (Pyongan Bukto and Pyongan Namdo) thanks to abundant rainfall in June, the southern provinces of the rice bowl (Hwanghae Bukto and Hwanghae Namdo) show a delayed growth of rice, mostly the result of late planting (compared to 2018) caused by low water levels in reservoirs. The monsoon rains expected for July should refill these reservoirs.

**Middle-East:** In the Middle-East (Syria, Iraq, and Iran), the harvest of winter cereals has started, and prospects are good thanks to abundant rainfall since October 2018. Above-average rainfall in Yemen in June caused flash floods which affected more than 70,000 people in 10 governorates from Hajjah in the northwest to the southern coastal regions of Taizz, Lahj, and Hadramaut (cf. <https://reliefweb.int/disaster/ff-2019-000054-yem>). Despite this rain, crop biomass (sorghum) probably remains below-average in Taizz due to the combined effect of the April-May dry spell and conflict.

**Central America and Caribbean Islands:** Planting of the primera season is underway in Central America and performance is mixed at this early stage due to dry spells in April and a slight delay of the onset of rain followed by heavy rainfall at the end of May that caused localized flooding in Honduras, El Salvador, and Guatemala. Despite a clear improvement of conditions due to positive rains in May, some areas in the Dry Corridor experienced more than five days without rain and high temperatures in June could negatively affect cropland development and decrease soil moisture. Rainfall monitoring in the coming weeks will be crucial to the primera season getting well established. The 2019 spring maize and bean season harvest is underway in Haiti and production forecasts are lower due to the impact of early season dryness and irregular rainfall in Haiti's Nord Est and Centre regions whereas harvest forecasts are better for the irrigated plains. Conditions have deteriorated in the south since last month due to dryness. In Cuba, the harvest of the minor season has been completed in the main producing Granma region and prospects are about average.

Figure 7. ASAP hotspot assessment of July 2019



**East Africa:** In the northern part of the region, including Sudan, central and northern Ethiopia and Eritrea, the crop season is generally progressing well and with adequate water supply. In the southern part of the region, cereal production results for the April/June season are mixed, due to delayed onset of the rainy season. The most severely affected is Somalia, with expected cereal production of only 50% of the 5-year average (FSNAU). In Kenya, the rainfall improvements in May/June were able to compensate for early season dryness in the central highlands and in the high-potential western crop areas, but production was poor in the eastern and coastal parts of the country, and maize prices have been increasing markedly since April. Uganda received torrential rainfall in June, but crop production was in any case negatively affected by the early season drought and is estimated to be 12% below the 5-year average (FAO GIEWS). The improved water availability in June/July has favored temporary recovery of rangeland in most pastoral areas of the region, but due to the shortened rainy season, many of those areas are at risk of early vegetation depletion (e.g. north-eastern and central Kenya, southern and central Somalia, southern and eastern Ethiopia). In South Sudan, rainfall has also improved since mid-May, but planted areas remain low due to the negative impact of the conflict on agricultural activities.

**Southern Africa:** As the harvest is finalizing across the region, the extreme weather events experienced during the 2018/19 agricultural season have caused significant shortfalls in agricultural production. The central and western part of the region experienced the driest rainy season since 1981, while the east coast was devastated by two cyclones within six weeks close to harvest time. The combination of severe drought and the destruction brought by cyclones decreased the regional cereal production by 9% compared to the 5-year average output. Even the most important maize suppliers in the region, including South Africa and Zambia, experienced diminished maize production driven by unfavourable weather. In Mozambique, the agricultural, livestock and fishing sectors were all significantly affected by the two consecutive cyclones, and currently the conflict in the north is further exacerbating people's access to food. Botswana, Lesotho and Namibia, all cereal import-dependent countries, experienced a sharp decline in cereal output in 2018/19, while rangelands were also negatively impacted by drought. In Zimbabwe, the volatile economic situation coupled with the reduced cereal harvest resulted in large spikes in the prices of staple food commodities, such as wheat flour and bread, further aggravating the already difficult food security situation. Winter wheat conditions in the Western Cape of South Africa are close to average, with an increase in the area planted leading to optimistic production prospects for the harvest that will start in October.

**West and Central Africa:** Early season drought continues in Senegal, the Gambia and part of Guinea Bissau, increasing the risk of reduced planted areas. The onset of rainfall is also slightly delayed in southern Mauritania. In the rest of the region, crop conditions are generally favourable. Crop conditions are improving in central Nigeria and southern Chad, after a slight early season rainfall deficit in June.

**North Africa:** The region is generally out of season. The 2018/19 winter crop achieved good or very good production levels in the central and eastern parts of the region, whereas production in Morocco was hampered by drought in several parts of the country.

**Central and South Asia:** In Central Asia, prospects for spring cereals are favourable thanks to good weather conditions, except in the north-western part of Kazakhstan (e.g. Kustanayskaya), where a dry spell and above-average temperatures may affect spring cereals. In South Asia, below-average rainfall was received in Sindh (Pakistan), however with no visible impact on irrigated summer crops (kharif crops). In Afghanistan, the winter cereal harvest is expected to be good.

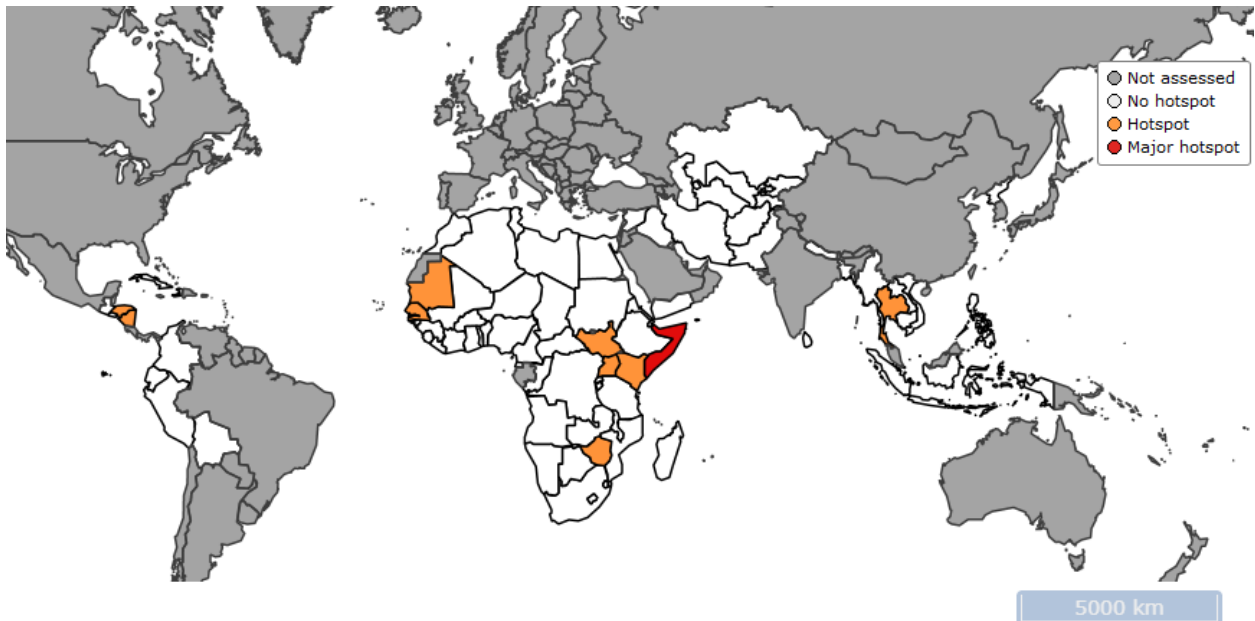
**South-East and Eastern Asia:** In South-East Asia, a region including Myanmar, parts of Thailand, north-western Lao and northern Cambodia has been affected by drought since June, with above-average temperatures. Northern and north-eastern Thailand are the main regions affected, with below-average biomass levels for rainfed crops and pastures, and a reduced area (or delayed planting) of main season irrigated rice. Water levels in reservoirs are low and the government has asked farmers to delay main season rice planting or opt for less water intensive crops and requested neighbouring countries to release water from upstream reservoirs. This drought is considered by the Thai meteorological department to be the worst for the last 10 years.

In North Korea, crop conditions look good in the north of the rice bowl area (Pyongan Bukto and Pyongan Namdo) despite below-average rainfall for the past month, whereas the southern provinces of the rice bowl (Hwanghae Bukto and Hwanghae Namdo) show below-average biomass levels for rainfed crops (maize), delayed rice growth and low water levels in the reservoirs, as a result of poor rainfall since 20th June. This situation is worrying if monsoon rainfall does not come soon.

**Middle-East:** In the Middle-East (Syria, Iraq and Iran), the winter cereal harvest is finishing and prospects are good thanks to abundant rainfall over the season.

**Central America and Caribbean Islands:** Planting of maize and bean primera crops is ongoing under mixed conditions in Central America and the Caribbean. Concern remains in the Dry Corridor areas and southern Haiti, due to below-average and irregularly distributed rainfall, coupled with above-average temperatures since the beginning of the season. No negative impact on vegetation conditions is yet visible and, if rains in the following weeks improve, vegetation should be able to recover from the initial dryness. Otherwise, there is a risk of production losses for the primera season.

Figure 8. ASAP hotspot assessment of August 2019



**East Africa:** In Sudan, Ethiopia and Eritrea, the main crop season is generally progressing well and with adequate water supply, except for localised rainfall deficits in July in northern Ethiopia and localised flooding in Sudan. In the southern part of the region, the April/June cereal production results are mixed, due to a delayed onset of rainfall. Most severely affected is Somalia, with expected cereal production of only 50% of the 5-year average (FSNAU), while pastoral vegetation benefited from late rainfall. In Kenya, the May/June rainfall improvements were able to compensate for early season dryness in the central highlands and in the high-potential western crop areas, but production was poor in the eastern and coastal parts of the country and maize prices have been increasing markedly since April. Uganda has received abundant rainfall since June, which was late for the Central region and part of the Northern, while in Karamoja crop conditions recovered after late planting. The improved water availability since June has favoured rangeland recovery in most pastoral areas of the region, but due to the shortened rainy season, many of those areas are at risk of early vegetation depletion (e.g. north-eastern and central Kenya, southern and central Somalia). In South Sudan, agro-climatic conditions have been generally favourable since mid-May, but planted areas are low (as compared to pre-conflict levels) due to the negative impact of the conflict on agricultural activities.

**Southern Africa:** The main agricultural season has ended in Southern Africa, with total regional cereal production decreased by 9% compared to last year's close-to-average output. Good vegetation conditions are observed for the winter wheat in South Africa, and positive production prospects are reported. Zimbabwe, which experienced very low main season production earlier this year, is now facing challenges with water availability for winter crop irrigation.

**West and Central Africa:** Dry conditions are hampering agricultural production in large parts of Senegal, Gambia and southern Mauritania, despite an improvement in rainfall from mid-August. The late onset of the rainy season is expected to have reduced areas planted and to lead to a shortened crop season with below-average yields. In pastoral areas, the water deficit is also causing abnormal dryness and low pasture availability. In the northern part of Burkina Faso, insecurity and displacement are reducing agricultural activities and limiting pastoral movements, according to a recent FEWS NET report. In the rest of the region, crop conditions are generally favourable and the first season maize harvest in the Gulf of Guinea is expected to be close-to-average. Crop conditions have recovered in central Nigeria and southern Chad, after a slight early season rainfall deficit in June.

**North Africa:** The region is generally out of season. The 2018/2019 winter crop achieved good or very good production levels in the central and eastern parts of the region, whereas production in Morocco was hampered by drought in several parts of the country. Summer crops in Egypt show close-to-average crop conditions.

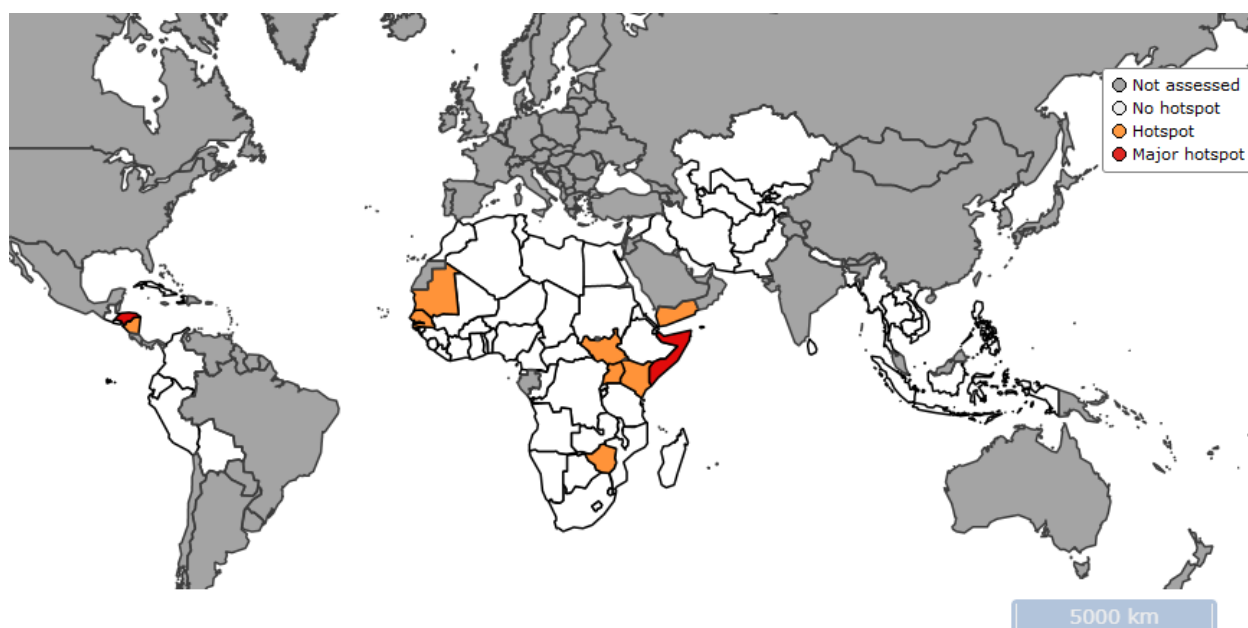
**Central and South Asia:** In Central Asia, prospects for spring cereals are favourable, except in the north-western part of Kazakhstan (in particular Kustanayskaya), where spring cereal production is expected to be reduced due to erratic rainfall since March. In South Asia, kharif crops in Pakistan have benefited from good monsoon rainfall since the end of July/start of August, which also resulted in floods and landslides in various parts of the country.

**South-East and Eastern Asia:** In South-East Asia, especially in central and north-east Thailand and north-west Cambodia, the production of rainfed crops and in some parts of irrigated rice is expected to be reduced as a result of the drought that has affected the region since the start of the year. The impact of this drought on total production is however difficult to assess, as rainy season rice is still being planted. In central Thailand, reservoirs still have much lower water levels than in 2018. In North Korea, the situation appears to be mixed: whereas rice and maize crops are in good condition in the northern part of the rice bowl area (Pyongan Bukto and Namdo), the southern part (Hwanghae Namdo and Bukto and Pyongyang Si) shows below-average crop biomass levels and some delay in rice growth. Overall, the production limitations do not appear critical, although water reservoirs did not refill to the level of 2018.

**Middle-East:** In the Middle East (Syria, Iraq and Iran), winter cereals have been harvested and production is estimated to be significantly higher than in 2018 thanks to abundant rainfall throughout the season.

**Central America and Caribbean Islands:** Harvesting of the primera season is ongoing and final yields are expected to be average to below-average in the Dry Corridor. Maize and bean production will be below-average in most countries of the region due to prolonged dry spells, irregular rainfall distribution and above-average temperatures since the beginning of the season. Continued dry conditions in July have negatively impacted crops at early stages of development causing yield reductions, mainly for subsistence farmers. A significant reduction in production has been reported by government sources for southern Honduras (El Paraíso, Choluteca, Valle and Morazán) and central and northern Nicaragua (Chinandega, Estelí, León and Madriz). Production prospects in El Salvador and Guatemala are average for the moment, despite localised production shortfalls. Poor production of the main maize and bean season in Haiti was caused by below-average rains. Dry conditions have persisted in drought-prone areas during August, particularly in the southern Haitian Peninsula (Nippes and Sud), with negative impacts on summer crop development. Meanwhile, the main season rice harvest is ongoing and prospects are favourable in the key rice-producing region of Artibonite.

Figure 9. ASAP hotspot assessment of September 2019



**East Africa:** In Sudan, Ethiopia and Eritrea, the main crop season is generally progressing well and with adequate water supply, except for localised rainfall deficits in July in north-eastern Ethiopia, and flooding in eastern Sudan causing crop losses mainly in White Nile, Sennar and Kassala (see the [ASAP September special focus for more info](#)). In the southern part of the region, April/June cereal production results are mixed, due to a delayed onset of rainfall. Most severely affected is Somalia, with expected cereal production of only 50 % of the 5-year average (FSNAU). In Kenya, the improvements to rainfall in May/June were able to compensate for early season dryness in the central highlands and the high-potential western crop areas, but production was poor in eastern and coastal parts of the country, and maize prices have been increasing markedly since April. Uganda has received abundant rainfall since June, leading to recovery of crop conditions, but due to low planted area and irregular rainfall distribution, final national production is expected to be below average (by 30 % in the Karamoja region according to FAO GIEWS). The improved water availability since June has favoured rangeland recovery in most pastoral areas of the region, but due to the shortened rainy season, many of those areas are at risk of early vegetation depletion (e.g. north-eastern and central Kenya, southern and central Somalia). Prospects for 2019 production in South Sudan are forecast slightly above 2018 levels, due to favourable agro-climatic conditions. Nevertheless, persistent widespread insecurity and conflict incidents continue to hamper agricultural activities, and prospects for 2019 remain below pre-conflict levels. The statement from the 53rd Greater Horn of Africa Climate Outlook Forum (GHACOF 53) predicts generally above-average rainfall for the second rainy season starting in October, but close monitoring remains crucial for regions that experienced multiple droughts in the last three years.

**Southern Africa:** The main agricultural season has ended in Southern Africa, with total regional cereal production 9% lower than last year's close-to-average output. Towards the end of the winter cropping season, wheat and barley production prospects are above the 5-year average in South Africa, while Zimbabwe and Zambia are expecting a drop in wheat output. In October, the region will start preparations for the 2019/20 summer crop planting, and the Southern Africa Regional Climate Outlook Forum (SARCOF) forecast points to adequate rainfall during the first half of the season for parts of Southern Africa ([SARDC](#)).

**West and Central Africa:** Dry conditions are hampering agricultural production in large parts of Senegal, Gambia and southern Mauritania, despite an improvement in rainfall from mid-August. The late onset of the rainy season is expected to have reduced areas planted and to lead to a shortened crop season, with below-average yields. In pastoral areas, the water deficit is also causing abnormal dryness and low pasture availability. In the northern part of Burkina Faso, insecurity and displacement are reducing agricultural activities and limiting pastoral movements, according to the Food Crisis Prevention and Management (PREGEC) meeting held in Accra in September 2019. In the rest of the region, crop conditions are generally favourable and the first season maize harvest in the Gulf of Guinea is expected to be close-to-average. Heavy rains in late August caused

overflow of the Niger River and triggered floods, causing damage to standing crops and loss of livelihoods in areas of Niger, Nigeria, Mali and Chad.

**North Africa:** The region is generally out of season. The 2018/2019 winter crop achieved good or very good production levels in the central and eastern parts of the region, whereas production in Morocco was hampered by drought in several parts of the country. Summer crops in Egypt show close-to-average crop conditions despite above-average temperatures.

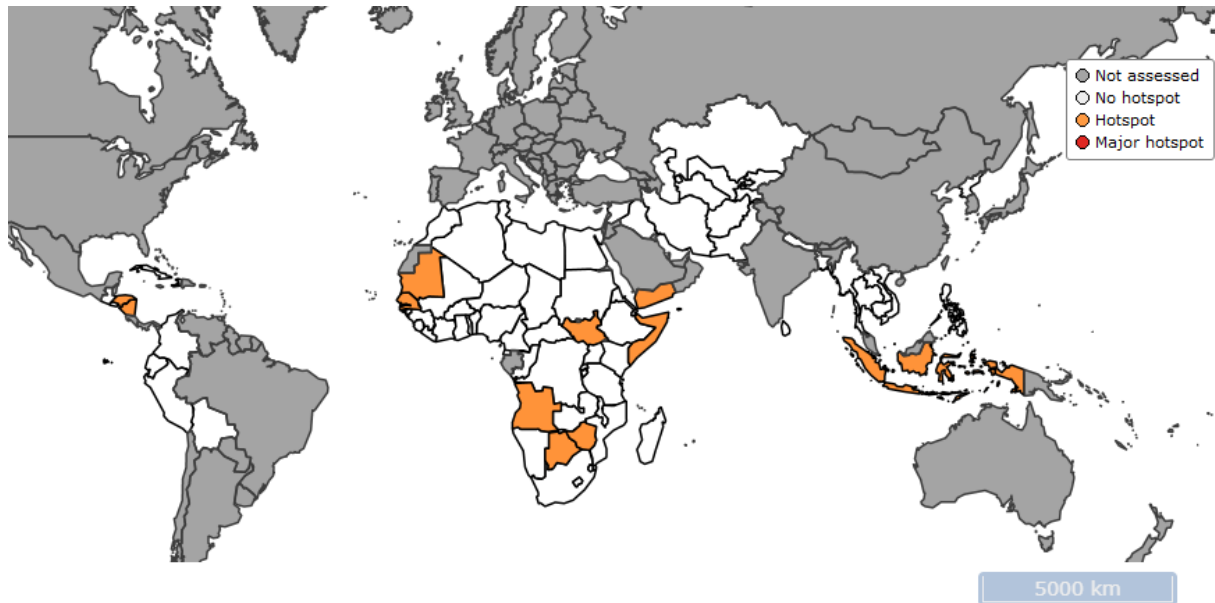
**Central and South Asia:** In Central Asia, spring cereals are being harvested and production prospects are favourable, except for the north-western part of Kazakhstan (Kustanayskaya) where spring cereal production is expected to be below-average as a result of dry conditions. In south Asia, more specifically Pakistan, conditions have been favourable for wet season rice.

**South-East and Eastern Asia:** In South-East Asia, after a delayed start to the season, especially in north-east Thailand and north-west Cambodia due to drought since early spring, the tropical storms Podul and Kajiki brought beneficial rain at the end of August/start of September. These storms also caused localised flooding in north-east Thailand, southern Lao, Cambodia along the Mekong and Tonle Sap rivers, and in central Vietnam. Despite this rainfall, some drought-dependent reduction is expected in the production of rainfed crops and irrigated rice in Thailand and Cambodia. In North Korea, crop biomass is now also above-average in the southern half of the rice bowl area. Field observations are however needed to check whether the delayed start to rice and maize growth has had a negative impact on production. In addition to drier-than-average conditions until July, in early September the southern provinces were hit by Typhoon Lingling, which caused damage to 46 000 ha of farmland according to the government.

**Middle-East:** In the Middle East, water reservoirs have been refilled and land is being prepared for the sowing of winter cereals. In Yemen, despite favourable weather in the last three months, production of sorghum and wheat is expected to be clearly below pre conflict levels, as a result of conflict and reported fall armyworm infestation.

**Central America and Caribbean Islands:** The primera season harvest is now complete and poor production has been reported in many areas across the Dry Corridor. Despite timely onset of the season, the prolonged dry spells during key growth stages resulted in crop losses for maize and beans and in some cases complete crop failure, mainly for subsistence farmers. Main concerns are localised in southern Honduras and north-western Nicaragua, where losses up to over 40 % of national production have been reported. Significant yield reduction also resulted in central Guatemala and eastern El Salvador, although the latter is expected to reach average national production levels. Sowing of postrera crops, which will be important for food security due to the poor primera season, is delayed due to rainfall deficits, mainly in Nicaragua and El Salvador. Dry conditions in the last month caused deterioration in crop conditions in Centre and Ouest Haiti. Meanwhile, rice harvesting in the main rice-production region of Artibonite is ongoing under favourable conditions.

Figure 10. ASAP hotspot assessment of October 2019



**East Africa:** Most of the region has received abundant rainfall, with more than twice the monthly average for October in southern Ethiopia, north-eastern Kenya, parts of Somalia and South Sudan. The volume and intensity of rainfall has led to localised floods across South Sudan, Somalia, Ethiopia and Kenya, causing displacement and damage to houses and infrastructure. Second season crops that have been planted early, thanks to the timely start to the season, have in part been damaged by the excessive rainfall and floods. In rangeland areas, while above-average rainfall is generally favourable for pastoral vegetation growth, there is also risk of loss of livestock through diseases. Significant livestock loss has been reported in northern Kenya, South Sudan and Somalia. In many of these areas, the food security situation is still suffering the impact of the previous season's drought, and the strong rainfall may further delay food production in the next crop season. Main season crops in Ethiopia and Eritrea, as well as second season crops in Uganda and northern Tanzania, are generally in good condition. Crop conditions in Sudan are slightly above average, while floods experienced in September and macroeconomic problems are limiting factors for crop production.

**Southern Africa:** Planting and early vegetative stages of summer crops are ongoing across the region under close-to-average weather conditions. A water deficit is concentrated in central and eastern parts of South Africa, in Lesotho and Swaziland, causing delayed planting. Parts of the region, such as southern Angola, Botswana and Zimbabwe, are experiencing the late effects of the 2018/19 agricultural season drought. In combination with above-average temperatures for most of the dry period, this led to low water availability and depleted rangelands, affecting livelihoods and livestock conditions, as well as wildlife. Decreased winter wheat production compared to last year is expected in the Western Cape region of South Africa (at harvesting time), due to below-average rainfall and high temperatures from August to October. A drop in winter wheat output is also expected in Zimbabwe and Zambia.

**West and Central Africa:** Harvesting of the 2019 season is ongoing in the Sahel. Production prospects are generally positive due to average rains during the season, except in the Gambia and south-western Mauritania where below-average rains during the key stages of crop development have negatively affected agro-pastoral conditions, despite rain improvements in September and October. Pastoral production in central and northern parts of Senegal has also been affected by early dryness, although the impact on cropland is reported to be minimal due to a farmer support programme implemented by the government. Renewed conflict in northern Burkina Faso has increased population displacement, and insecurity remains a limitation for agricultural production in the Lake Chad Basin area. Crop and rangeland conditions are favourable in the Gulf of Guinea, thanks to abundant rainfall received throughout the agricultural season. For the aggregated cereal output of



2019, production prospects are above the 5-year average for Nigeria and Cameroon, while for Benin the forecast is close to the 5-year average. However, there are food insecure pockets in north-eastern Nigeria and in Extrême-Nord in Cameroon, due to conflict and insecurity.

**North Africa:** Winter season rainfall is slightly later than usual in Morocco and western Algeria, but still within the normal window. In Egypt, a slight delay in the winter crop season can be observed, due to a longer 2019 summer crop cycle.

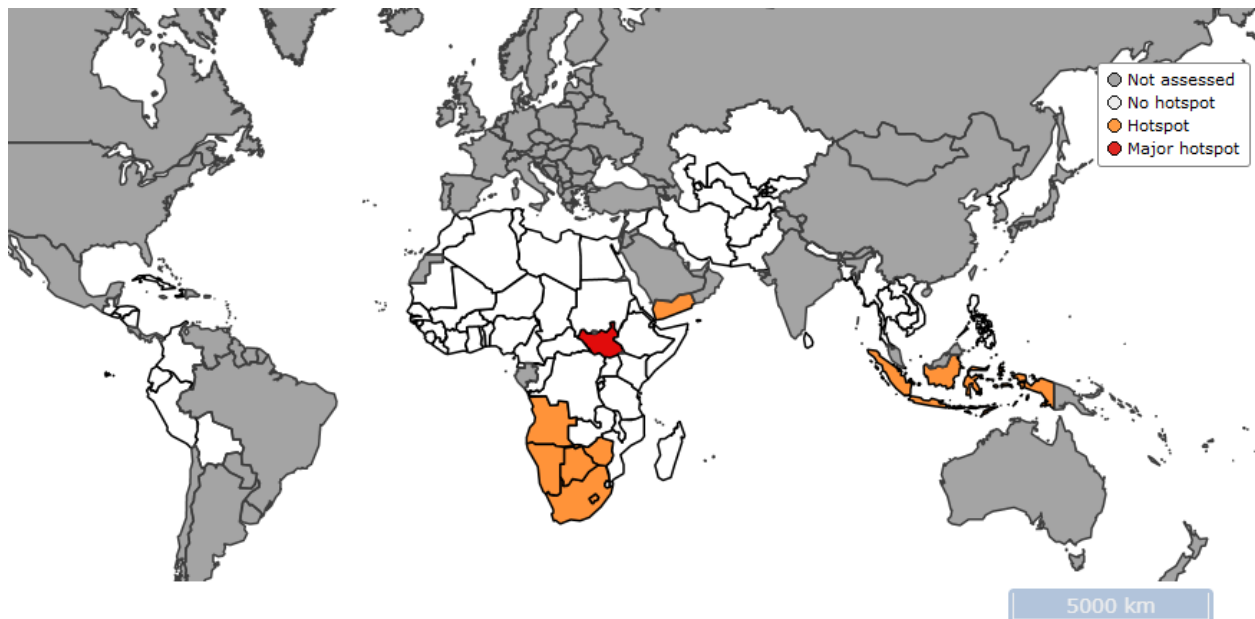
**Central and South Asia:** In Central Asia, the harvest of spring cereals is nearly complete; production is expected to be close to average, except for the north-western part of Kazakhstan (Kustanayskaya) where spring cereals suffered from dry and hot conditions. In south Asia, conditions have been favourable for wet season rice and maize in Pakistan, as well as for winter cereal sowings in Afghanistan and Pakistan.

**South-East and Eastern Asia:** In South-East Asia, Indonesia (mainly Java and southern Sumatra) has had a particularly harsh dry season, with less than half of average rainfall over the last three months. As a result, the irrigated rice area has been reduced, and the production of rainfed crops is expected to be below average. Main season rice planting, which should start in October, is also delayed by the late onset of the rainy season. In the northern part of the region (Thailand, Cambodia, Laos) overall, production is expected to be slightly below average. This is due to the drought at the start of the wet season, which resulted in a reduced sown area (or failed sowings) in a few regions (mainly in the centre of Thailand), and to the floods at the end of August and start of September. Many areas, however, show biomass levels close to or above average. In North Korea, crop conditions are mixed, with good prospects in the north of the rice bowl area and South Hamgyong, and below-average production expected in the south of the rice bowl area (North and South Hwanghae, Pyongyang), due to irregular rainfall from the start of the main season until July and delayed growth of cereals.

**Middle-East:** In the Middle East, weather conditions are favourable for winter cereal sowing that takes place in October and November, and there are good water reserves for irrigation. Conflict in northern Syria may however impact agricultural activities in the main production area of this country. In Yemen, sorghum and wheat have been harvested. Despite favourable weather in the last three months, their production is reported to be below pre-conflict levels, due to conflict and lack of inputs, as well as fall armyworm.

**Central America and Caribbean Islands:** After a poor primera season in many areas of the Dry Corridor (southern Honduras, north-western Nicaragua, central Guatemala and eastern El Salvador), weather conditions have substantially improved in the last weeks. The favourable weather conditions have benefited planting of the postrera season crops in Central America, including El Salvador and Nicaragua which had experienced an initial delay in rainfall onset. Average to above-average rains have benefited crops that are in vegetative to reproductive stage, despite some localised flooding in coastal areas of El Salvador, parts of western Honduras and western Nicaragua.

Figure 11. ASAP hotspot assessment of November 2019



**East Africa:** After the exceptional rains (>200% of average) received in October over most of the region, rainfall was close to average in November. Significant floods in Somalia, Ethiopia, South Sudan and Kenya have caused displacement of several hundreds of thousands of people, damage to houses and infrastructure, and livestock losses. The impact of floods on population displacement and loss of livelihoods assets was particularly severe in the Upper Nile region of South Sudan. The humidity and abundant vegetation in dry areas have also favoured the development of desert locusts, which are causing crop and pasture losses, mainly in central and southern Ethiopia. Flood effects will have a negative short-term impact on the food security situation, which in many countries in the region is still suffering negative impacts from drought during first season cereal production. In the medium term, however, the abundant rains are expected to favour crop production in areas with an ongoing unimodal growing season (Sudan, Ethiopia, southern/central Tanzania) or an ongoing second season (northern Tanzania, parts of Kenya, etc.).

**Southern Africa:** In Southern Africa, most agricultural areas are in early vegetative development stages for summer crops, and positive rainfall amounts have been registered in central and eastern areas of South Africa, central Angola, and eastern Botswana during November. However, the late onset of rainfall in central and eastern South Africa, Lesotho and eSwatini, is expected to have reduced the area planted. Mixed weather conditions are observed in northern cropping areas of Namibia and southern Angola. Below-average rangeland conditions and poor livestock conditions are reported in western Botswana, and southern Zimbabwe. In Zimbabwe continuing hyperinflation is exacerbating food security problems due to low agricultural production and chronic vulnerability. Below-average December to February rainfall is forecast across the southern half of the region ([GEOGLAM-Special Report Southern Africa](#)). If this forecast materialises and a new drought follows on from a poor summer crop and below-average winter wheat production, further stress will be added to food security conditions in the region. Average to above-average rainfall in the coming weeks will be crucial to ensure normal development of vegetation; continuous monitoring is recommended.

**West and Central Africa:** Harvest in the Sahel is complete and production prospects are generally average to above-average, with the exception of Gambia where a delay in onset and erratic distribution of rainfall at the beginning of the season affected crop production. Early dryness in the western Sahel has also affected pastoral vegetation conditions, which remain below-average in southern Mauritania and northern Senegal (Matam and Podor), despite an improvement in rains since mid-August. Production in the mono-seasonal part of the Gulf of Guinea is favourable overall. However, flooding events in October and November, coupled with insecurity and conflict, have affected parts of Nigeria and Cameroon and are limiting agro-pastoral activities in these areas. The second maize season is progressing well in the Gulf of Guinea thanks to abundant and well-distributed rainfall.

**North Africa:** Winter crop season rainfall has increased in November in north-eastern Morocco, while the onset of the rainy season is delayed in the central and southern parts of the country. Improved rainfall in December will be crucial for planting. Agro-climatic conditions in the rest of the region are generally favourable for winter cereal planting.

**Central and South Asia:** In Central Asia, spring cereal production is expected to be close to average, except for the north-western part of Kazakhstan (Kustanayskaya) where spring cereals suffered from dry and hot conditions. In South Asia, conditions have been favourable for wet season rice and maize in Pakistan, as well as for winter cereal sowings in Afghanistan and Pakistan.

**South-East and Eastern Asia:** In South-East Asia, Indonesia (mainly Java and south Sumatra) experienced below-average production of rain-fed crops. Main season rice planting, which normally starts in October, is also delayed due to dry conditions since October. Similar dry conditions are also observed in Timor Leste. In the northern part of the region (Thailand, Cambodia, Laos) overall, production is expected to be slightly below-average, due to the drought at the start of the wet season which resulted in a reduced sown area (or failed sowings) in a few regions (mainly in the central Thailand), and to the floods at the end of August and start of September.

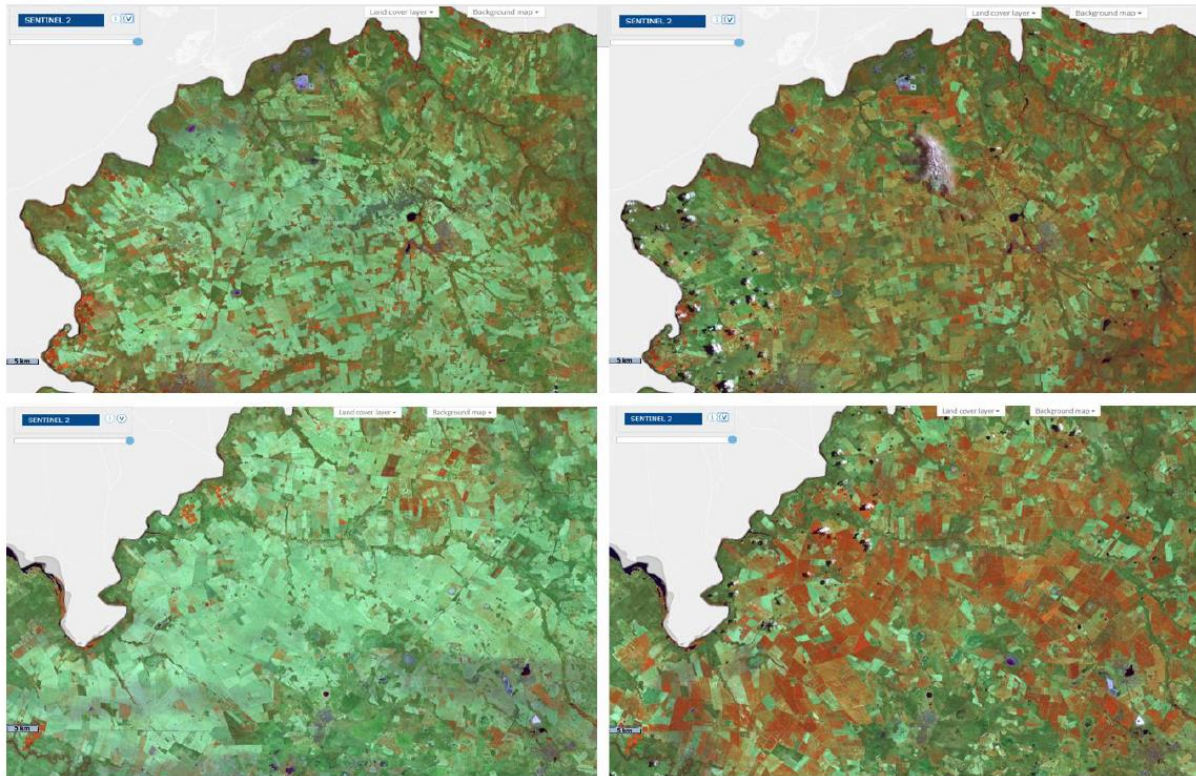
**Middle-East:** In the Middle-East, weather conditions are favourable for winter cereal sowing that takes place in October and November, and there are good water reserves for irrigation. A minor delay is observed in seasonal rainfall onset is visible in northern Syria and parts of Iraq. Conflict in northern Syria may further impact agricultural activities in the main production area of this country. In Yemen, increased conflict in November continues to restrict livelihood activities, and cereal production reportedly 30% below the 5-year average (FEWSNET), together with high food prices, is further limiting food access.

**Central America and Caribbean Islands:** Close to the postrera harvest and following a primera characterised by significant losses in Honduras, Nicaragua and Guatemala, vegetation has mostly recovered due to beneficial weather conditions since mid-September in Central America, apart from localised concerns in northern and central Honduras (Olancho, Colón and Morazán) where dryness in recent weeks has still resulted in visibly below-average biomass. In the Caribbean, the harvest of main season maize and rice is nearing completion under favourable conditions due to good weather conditions. In Haiti, however, the second season is ongoing and production is not expected to fully recover from the below-average levels of the 2019 spring season, due to dry spells throughout the season coupled with social unrest and the political crisis which have negatively affected agricultural activities.

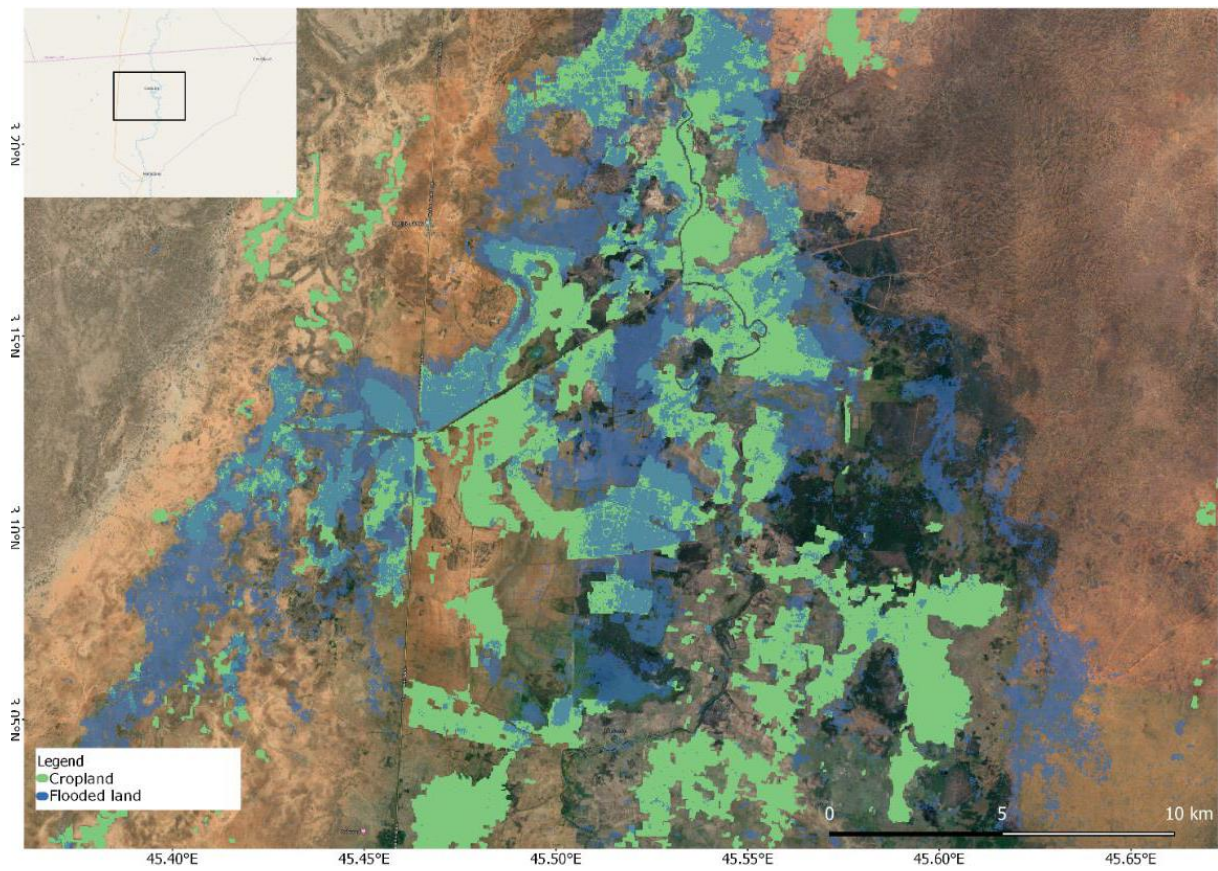
## Annex 2. ASAP special focus reports providing details of extreme weather events based on Sentinel imagery

In 2019 six so called “special focus” reports have been made available on the ASAP web platform with detailed information about the impact on crop areas of extreme weather events such as floods and droughts. Below are some examples of the information provided by these reports. Fig. 12 shows a situation of low area planted due to drought in South Africa in early 2019. Fig. 13 provides an example of flooded land and crop land inundated in Somalia during Shabelle River floods in November 2019.

**Figure 12.** Sentinel-2 Imagery showing crop areas in Free State, close to Viljoenskroon, in 2019 (left) and in 2018 (right).  
Bottom: Sentinel-2 Imagery showing crop areas in Free State, close to Wesselsbron, in 2019 (left) and in 2018 (right).



**Figure 13.** Thematic map depicting the flood extent and cropland close to Duduble in Middle Shabelle region during floods in November 2019. Flooded land: 12,951 ha, flooded cropland: 4,524 ha. Background layer: Google Satellite.



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