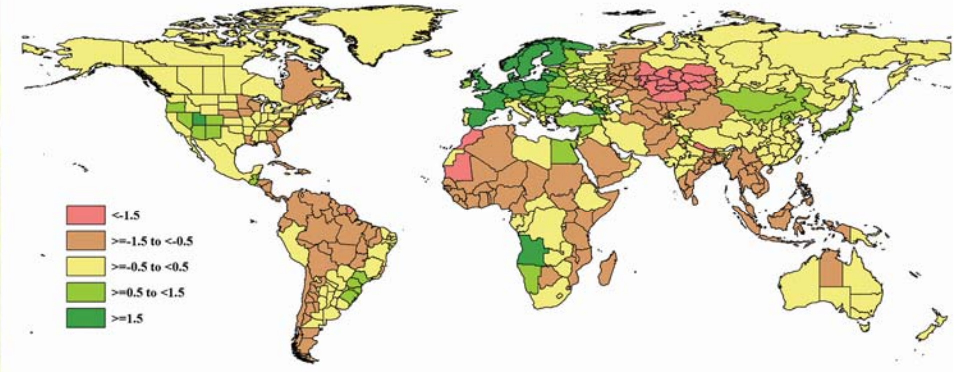

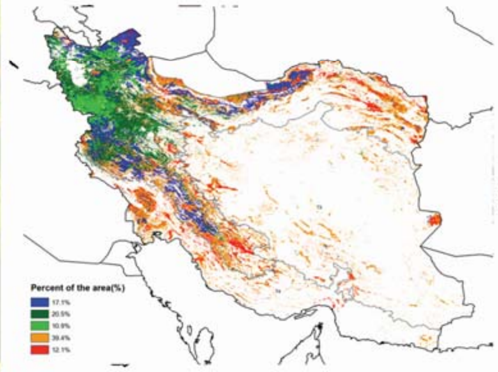

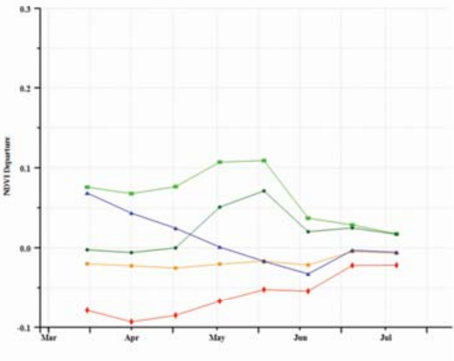

CropWatch bulletin

QUARTERLY REPORT ON GLOBAL CROP PRODUCTION

Monitoring Period: April - July 2018

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Chinese Academy of Sciences (CAS)

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CropWatch Online Resources: This bulletin along with additional resources is also available on the CropWatch Website at http://www.cropwatch.com.cn.

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Note: *Note:* CropWatch resources, background materials and additional data are available online at www.cropwatch.com.cn.

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Abbreviations

5YA	Five-year average, the average for the four-month period for April from 2013 to 2017 to July next year; one of the standard reference periods.
15YA	Fifteen-year average, the average for the four-month period from April from 2013 to 2017 to July next year; one of the standard reference periods and typically referred to as “average”.
AEZ	Agro-Ecological Zone
BIOMSS	CropWatch agroclimatic indicator for biomass production potential
BOM	Australian Bureau of Meteorology
CALF	Cropped Arable Land Fraction
CAS	Chinese Academy of Sciences
CWAI	CropWatch Agroclimatic Indicator
CWSU	CropWatch Spatial Units
DM	Dry matter
EC/JRC	European Commission Joint Research Centre
ENSO	El Niño Southern Oscillation
FAO	Food and Agriculture Organization of the United Nations
GAUL	Global Administrative Units Layer
GVG	GPS, Video, and GIS data
ha	hectare
kcal	kilocalorie
MPZ	Major Production Zone
MRU	Monitoring and Reporting Unit
NDVI	Normalized Difference Vegetation Index
OISST	Optimum Interpolation Sea Surface Temperature
PAR	Photosynthetically active radiation
PET	Potential Evapotranspiration
RADI	CAS Institute of Remote Sensing and Digital Earth
RADPAR	CropWatch PAR agroclimatic indicator
RAIN	CropWatch rainfall agroclimatic indicator
SOI	Southern Oscillation Index
TEMP	CropWatch air temperature agroclimatic indicator
Ton	Thousand kilograms
VCIx	CropWatch maximum Vegetation Condition Index
VHI	CropWatch Vegetation Health Index
VHIn	CropWatch minimum Vegetation Health Index
W/m^2	Watt per square meter

Bulletin overview and reporting period

This CropWatch bulletin presents a global overview of crop stage and condition between April and July 2018, a period referred to in this bulletin as the AMJJ (April, May, June and July) period or just the "reporting period." The bulletin is the 110th such publication issued by the CropWatch group at the Institute of Remote Sensing and Digital Earth (RADI) at the Chinese Academy of Sciences, Beijing.

CropWatch analyses and indicators

CropWatch analyses are based mostly on several standard as well as new ground-based and remote sensing indicators, following a hierarchical approach. The analyses cover large global zones; major producing countries of maize, rice, wheat, and soybean; and detailed assessments for Chinese regions, 41 major agricultural countries, and 197 Agro-Ecological Zones (AEZs). In parallel to an increasing spatial precision of the analyses, indicators become more focused on agriculture as the analyses zoom in to smaller spatial units.

CropWatch uses two sets of indicators: (i) agroclimatic indicators—RAIN, TEMP, and RADPAR, which describe weather factors; and (ii) agronomic indicators—BIOMSS, VHIn, CALF, and VCIx, describing crop condition and development. Importantly, the indicators RAIN, TEMP, RADPAR, and BIOMSS do not directly describe the weather variables rain, temperature, radiation, or biomass, but rather they are spatial averages over agricultural areas, which are weighted according to the local crop production potential. For each reporting period, the bulletin reports on the departures for all seven indicators, which (with the exception of TEMP) are expressed in relative terms as a percentage change compared to the average value for that indicator for the last five or fifteen years (depending on the indicator). For more details on the CropWatch indicators and spatial units used for the analysis, please see the quick reference guide in Annex C, as well as online resources and publications posted at www.cropwatch.com.cn.

This bulletin is organized as follows:

Chapter	Spatial coverage	Key indicators
Chapter 1	World, using Monitoring and Reporting Units (MRU), 65 large, agro-ecologically homogeneous units covering the globe	RAIN, TEMP, RADPAR, BIOMSS
Chapter 2	Major Production Zones (MPZ), six regions that contribute most to global food production	As above, plus CALF, VCIx, and VHIn
Chapter 3	41 key countries (main producers and exporters) and 190 AEZs	As above plus NDVI and GVG survey
Chapter 4	China and regions	As above plus high resolution images; information on pests and diseases; and food import/export outlook
Chapter 5	Production outlook, a focus on the perspectives in Mediterranean Agriculture, updates on disaster events and El Niño, and Pests and diseases for winter wheat in north Hemisphere.	

Regular updates and online resources

The bulletin is released quarterly in both English and Chinese. E-mail cropwatch@radi.ac.cn to sign up for the mailing list or visit CropWatch online at www.cropwatch.com.cn.

Executive summary

Introduction

The current CropWatch bulletin is based mainly on remote sensing tools and methods for both climatic and crop condition data. It focuses on crops that were growing or have been harvested between April and July 2018. The bulletin covers prevailing weather conditions, including extreme factors, at different spatial scales, starting with global patterns in Chapter 1. Chapter 2 focuses on agro-climatic and agronomic conditions in major production zones in all continents. Chapter 3 covers the major agricultural countries that, together, make up at least 80% of production and exports (the "top 41") while chapter 4 zooms into China. Detailed data and narratives about crops and environmental conditions are exposed in both chapters. Special attention is paid to the major producers of maize, rice, wheat, and soybean. The bulletin then presents a global production estimate for crops to be harvested throughout 2018 (Chapter 5.1), revised from our first estimate published in May 2018; 90% of the current estimates are based on remote sensing monitoring and 10% are based on statistical projections. Subsequent sections of Chapter 5 describe the global disasters that occurred from April to July 2018.
This bulletin is issued at a time when almost all winter crops in the northern hemisphere, including China, have been harvested and summer crops are in their late stages; in the southern hemisphere winter crops are growing and the planting of the summer season/monsoon season will start in a month or so.

Global agroclimatic conditions

This bulletin confirms several large-scale anomalies (departures from average) that seem to have become permanent features of global climate. They are compatible with, and probably consequences of climate change and include, among others, (1) dry conditions in North-American western coastal areas, (2) significant warming in northern high latitude areas and (3) relatively wet conditions in the semi-arid area extending from northern Africa (Sahel) across the Arabian Peninsula to Mongolia and beyond. The last area also recorded below average sunshine, an anomaly that affects most of south-east Asia as well. For the current reporting period, 69% of CropWatch monitoring areas had below average sunshine, resulting in a global sunshine drop of 2% over all agricultural areas, and as much as 5% in Central Asia and 7% in East Asia. Extremes were recorded in China in Huanghuaihai (-15%), the Loess region (-14%), Gansu-Xinjiang (9%) and Inner Mongolia (-8%) Those are very significant values considering that sunshine is the main driver of photosynthesis and crop production.
In South-East Asia, low sunshine was paralleled by cold "winter" temperature in Cambodia, Bangladesh and Thailand (around -1.4°C below average) where late stages of the second rice crop may have been affected. The coldest area among the major agricultural countries was Kazakhstan at 1.6°C; the planting of summer crops may have been delayed.
Next to the predominantly wet conditions mentioned above, drought prevailed at high latitudes in both hemispheres; most severely affecting Oceania and Mediterranean southern Africa Above-average temperature relatively consistently affected the western north-American coast and the Rocky Mountains and Western Europe to the Caspian Sea. Several major cereal producers on all continents suffered from abnormally dry conditions over the reporting period, especially Australia (RAIN 45% below average). In Europe, the reporting period (which corresponds with late dormancy and early vegetative growth of winter crops) was particularly dry in Germany (-33%), Poland and some Nordic and Baltic areas. Heat wave conditions affected much of Europe, with values in excess of 1.6°C above average in the United Kingdom, France, Germany and Poland. All those areas as well as Ukraine experienced above average sunshine.
In South Africa (-19%) the period corresponds to the final stages of late maize harvesting. In Canada (-18%) crop development is comparable to the European situation, but mostly less advanced. Finally, in Brazil (-16%), AMJJ corresponds to mid to late stages of summer crops and pre-planting of winter crops in the south, which are thus less likely to have been negatively affected. Rainfall was abundant for winter

crops in Turkey (+37%) and locally excessive in Argentina (+79%, with poor sunshine conditions) for the harvest of summer crops and the planting of winter wheat.

Production outlook

CropWatch estimates the global 2018 production of the major commodities at 1011 million tons of maize, down 0.1% from 2017, 727 million for rice (up 1.7%), 702 million tons of wheat (with a 2.4% decrease below 2017 output) and 320 million tons of soybeans, down 1.0%. In August 2017 we noted a trend of many small producers of soybean to move away from the crop on all continents. The tendency is present in 2018 as well.

Large increases in **maize** production are listed for Hungary (+9.0%) and Romania (+15.8%), while neighboring Ukraine, where rainfall was less favorable, is foreseen to undergo a significant drop of 8.8%. Similarly, production estimates for Russia are at -18.3%. Low values are estimated as well for Pakistan (-10.1%), Argentina (-6.2%) and Canada (-4.2%). Countries with significant increases also include Kenya (+16.1%) and Thailand (+9.2%). Among the major exporters, the USA underwent a minor increase (+0.3%) while Brazil is put at +1.7%.

Rice, as an irrigated crop, is relatively less weather dependent than maize, wheat or soybean. Among the main producers China and Indonesia recorded a production drop compared with the previous season: -2.1%, equivalent to 4.2 million tons, and -2.5%, equivalent to 1.7 million tons, respectively. India increased production by 10.1 million tons (+6.2%). Among the top importers, production fell 5.7%, which is likely to increase their inputs.

Australia's estimated production of **wheat** for 2018 is down by a very significant 12.8%, followed by Russia (-10.3%) and Ukraine (-7.1%). For the United States, CropWatch estimates winter wheat output to be down 3.9% below 2017, while production deficits of France and Germany, two major European producers reach 4.5% and 4.4%, respectively. A positive note is the good performance of Iran (+8.8%) after a series of unfavorable seasons. Al

With the exception of China, all the major **Soybean** producers undergo a drop compared to 2017, most notably Canada and India (both at 5.3%) but especially Argentina (7.6) due to unfavorable weather. China reversed the decade long negative production trend by adopting a new agricultural policy.

China

This bulletin covers the peak of the agricultural season for most of China. Winter crops production (of which wheat accounts for more than 91%) is revised at 126 million tons, the same level as 2016-2017. The production of summer crops (including maize, single rice, late rice, spring wheat, soybean, minor cereals, and tubers) is currently put by CropWatch at 417 million tons, a 0.4% drop from 2017 or 1748 thousand tons in production decrease. The total annual crop production is estimated at 577 million tons down 0.9% from 2017 (2460 thousand tons decrease).

CropWatch forecasted the overall maize production for China at 195.5 million tons with 1% above 2017, but rice production at 196.4 million tons, 2% below 2017 mainly due to the decrease of planted area. Wheat production is revised up to 121.5 million tons, equivalent to 2017's bumper production. The national soybean production reached 14.2 million tons (+3% from 2017), which has gone out of the haze of continuous production reduction and returned to the 2012 production level.

Chapter 1. Global agroclimatic patterns

Chapter 1 describes the CropWatch Agroclimatic Indicators (CWAIs) rainfall (RAIN), temperature (TEMP), and radiation (RADPAR), along with the agronomic indicator for potential biomass (BIOMSS) in sixty-five global Monitoring and Reporting Units (MRU). Rainfall, temperature, and radiation indicators are compared to their average value for the same period over the last fifteen years (called the "average"), while BIOMSS is compared to the indicator's average of the recent five years. Indicator values for all MRUs are included in Annex A table A.1. For more information about the MRUs and indicators, please see Annex C and online CropWatch resources at ***www.cropwatch.com.cn****.*

1.1 Correlations between CropWatch agroclimatic indicators (CWAIs)

CWAIs are averages of climatic variables over agricultural areas only (refer to Annex XXXX for definitions and to table A.1 for 2018 AMJJ numeric values). Although they are expressed in the same units as the corresponding climatological variables, they are spatial averages, weighted by the agricultural production potential. For instance, in the "Sahara to Afghan desert" area, only the Nile valley and other cropped areas are considered. "Sahara to Afghan desert" is one of the 65 CropWatch Mapping and Reporting Units (MRU), which are the largest monitoring units adopted to identify global climatic patterns.

Correlations between variables (RAIN, TEMP, and RADPAR) at MRU scale derive directly from climatology. For instance, the positive correlation between rainfall and temperature (R=0.469 for the current AMJJ 2018 period) results from high rainfall in equatorial, i.e. in warm areas. Therefore, departures from average variables, i.e. anomaly patterns characterize the current reporting period more meaningfully than the averages themselves.

RAIN was above average in about 52% of the MRUs, resulting in RAIN just 3% above the average value of the 15-year reference period (2003-2017) over agricultural areas. TEMP was slightly below average (-0.2°C) in most MRUs while RADPAR was below average in the majority of MRUs (45 out of 65, or 69%) resulting in a more significantly below the average value of -2%. Because MRUs are large areas, and because sunshine tends to be less variable than rainfall and temperature, the 2% departure for RADPAR is more significant than it would be for rain. Finally, the biomass production potential BIOMSS depends on rainfall and temperature. During the current reporting period, 75% of its variations can be ascribed to RAIN variations and about 7% only to TEMP. As a result, the global average is 2% above normal, but 0% if weighted by agricultural areas.

During the current AMJJ reporting period, rainfall anomalies tend to be negatively correlated with TEMP and with RADPAR departures, indicating the expected association between drought and high temperature and sunshine.

Above average RAIN and lower than average RADPAR are the continuation of a pattern that started in 2017 (Table 1.1) and which is bound to have agricultural consequences as sunshine is the major driver of photosynthesis. It remains to be seen if the increased precipitation can compensate reduced sunshine, especially in semi-arid areas, which include most rangelands.

Table 1.1. Departure from recent 15 year average of the RAIN, TEMP and RADPAR indicators over the last year (average of 65 MRUs)

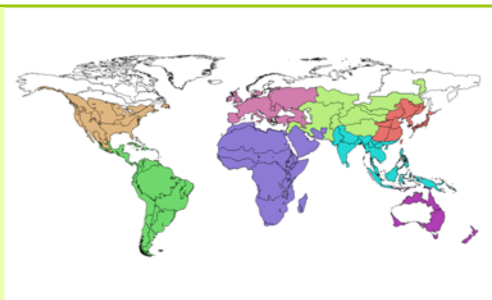
Reporting period	year	CropWatch Indicator		
		RAIN	**TEMP**	**RADPAR**
JFMA	2017	+13%	-0.2°C	-2%

AMJJ	2017	+9%	-0.1°C	-2%
JASO	2017	+6%	+0.1°C	-3%
ONFJ	2017-2018	+8%	-0.1°C	-4%
JFMA	2018	+8%	-0.1°C	-5%
AMJJ	2018	+5%	-0.2°C	-3%

Most of the semi-arid areas in Africa and Asia continued the now pluri-annual trend of above-average precipitation. In fact, the largest positive rainfall departures occurred in Africa, central Asia, and South Asia while the largest deficit affects Oceania which recorded about half the amounts that fell over the recent 15 years (Table X2). Above-average temperature prevailed mostly over Europe while cool weather affected central and southern Asia. Below average sunshine seems to have become an Asian phenomenon, especially eastern Asian (i.e. mostly Chinese) with a very significant 7% drop compared to the long-term average. The largest biomass potential drops occur in (1) south and central America (-10%) as a result of low rainfall and cool weather and in (2) Oceania (-37%) where the precipitation deficit was severe, as mentioned.

Table 1.2: Departures from the recent 15-year average of CropWatch agroclimatic indicators over regional MRU groups. Within each group, averages are weighted by the agricultural area of individual MRUs. "Others" include five non-agricultural areas shown in white in the right map.

	RAIN %	TEMP °C	RADPAR %	BIOMSS %
Africa	19	−0.5	−4	11
America S + C	−8	−0.5	1	−10
America N	−2	−0.1	−2	−1
Asia centre	13	−0.8	−5	8
Asia East	1	0.2	−7	2
Asia South	9	−0.6	−4	3
Europe	−1	0.9	2	−4
Oceania	−46	0.1	3	−37
Others	4	0.9	−2	−2
World	3	−0.2	−2	0



1.2 Rainfall and BIOMSS anomalies

In the MRUs listed below, BIOMSS departure patterns closely follow those of RAIN, take or give some percent. Some areas, however, that have atypical behaviors are specifically mentioned.

A. Drought

With few exceptions, dry conditions prevailed at high latitudes in both hemispheres, including some areas of limited agricultural relevance such as sub-boreal America (MRU-15), boreal Eurasia (MRU-57), eastern Siberia (MRU-51) and MRU-63, the Australian desert with deficits between 13% and 24%. The most severe deficits affected Australia and Mediterranean southern Africa which all recorded less than half of the average amounts which are in the range of 160 mm to 250 mm: MRU-10, Western Cape in South Africa (average: 157 mm); MRU-53, Northern Australia (average: 242 mm) and MRU-54 , Queensland to Victoria (average: 168 mm). Somewhat less severe, but significant deficits between -20% and -40% occurred in MRU-56, New Zealand (average: 307 mm) and MRU-55, Nullarbor to Darling (average: 213 mm).

Parts of China (MRU-42, Taiwan), Korea and Japan (MRU-43, East Asia) normally record precipitation in excess of 500 mm but this season rainfall was so far short by -28% and -24%, respectively. In the Caucasus (MRU-29) where the precipitation average is usually 229 mm, -14% less was recorded.

In South America, the tropical areas of Brazil were the most affected with MRU-23 (Central eastern Brazil) recording 177 mm instead of the average of 249 mm, down 29% and the semi-arid Nordeste (MRU-22) being down 22% (164 mm instead of 210 mm). Finally, in MRU-27 (Western Patagonia), which is a major supplier of sheep products in Chile and Argentina precipitation was down 27% below the average of 452 mm. BIOMSS, however, remained about average (-2%) as a result of below average temperature (-1.1°C).

In North America, MRU-16, the deficit on the US West coast was 23%, while it reached about 10% in MRU-17 (Sierra Madre) and MRU-13, the Corn Belt.

B. Wet conditions

Wet conditions prevailed over the area which was highlighted starting in 2016, i.e. the semi-arid areas from Africa to Central Asia, this time including MRU-07 (North African Mediterranean, +30%), MRU-09 (Southern Africa, +36%), MRU-04, the Horn of Africa (+51%), MRU-64 (Sahara to Afghan deserts, +63%), MRU-32 (Gansu-Xinjiang, +43%), MRU-47 (Southern Mongolia, +84%) as well as adjacent areas to the north (European Mediterranean, MRU-59) and east (e.g. Inner Mongolia, MRU-35) where departures were lower. Some of the listed areas are mentioned under "floods" in the section on disasters (Chapter 5.X). In Southern Mongolia, the BIOMSS departure reaches just 38%, less than half of the precipitation deficit.

Southern Asia also recorded seasonally abundant rainfall from Punjab to Gujarat (MRU-48, +26%) to Hainan island in southern China (MRU-33, +53%) across India (MRU-45, Southern Asia, +36%) and continental South-East Asia (MRU-50, +15%) and local floods were reported. In Hainan, a tropical island, a temperature deficit of 1.3°C resulted in a BIOMSS increase of just 17%.

Finally, two areas in South America deserve the semi-arid Southern Cone (MRU-28 where the average of 72 mm was exceeded by 38% and especially MRU-25 (Central-north Argentina) where the excess reached 71% (199 mm instead of the average of 116 mm). In the latter MRU, however, the BIOMSS departure did not exceed +28%.

Figure 1.1. Global map of April - July 2018 rainfall anomaly (as indicated by the RAIN indicator) by MRU, departure from 15YA (percentage)

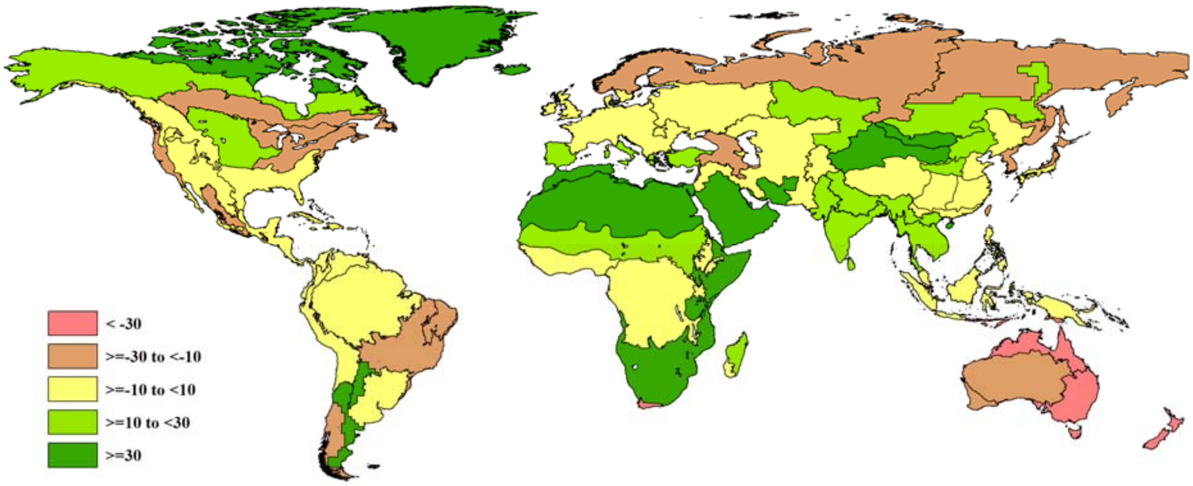
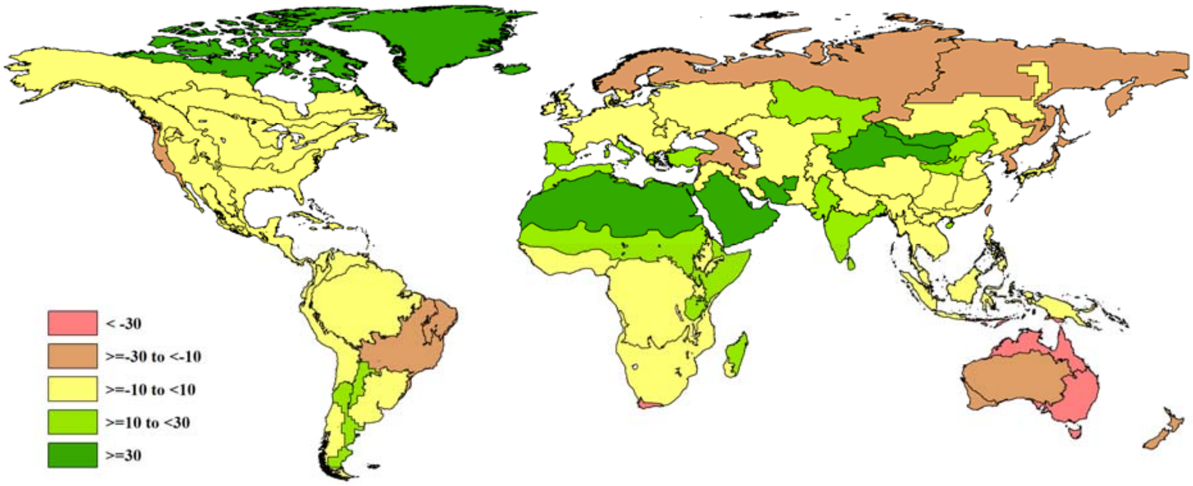


Figure 1.2. Global map April - July 2018 biomass accumulation (BIOMSS) by MRU, departure from 5YA, (percentage)



1.3 Temperature anomalies

Temperature anomalies to some extent follow rainfall anomalies (R=-0.302).

C. Below average temperature

Temperatures were below average in six areas that have been mentioned above. They do not, however, belong to the same clusters of anomalies as those noted for rainfall. In other words, some extremes of rainfall and temperatures overlap, but the spatial patterns are different. Low temperatures affect roughly the northern tropics from South America to Africa, and southern Asia to the mainland and maritime south-east Asia.

The largest negative departure was recorded over MRU-62 (Ural to Altai Mountains, where the departure was -1.8°C). The area is followed, in terms of the magnitude of the departure, by MRU-07 (North Africa-Mediterranean, -1.5°C) and the Horn of Africa (MRU-04, -1.2°C).

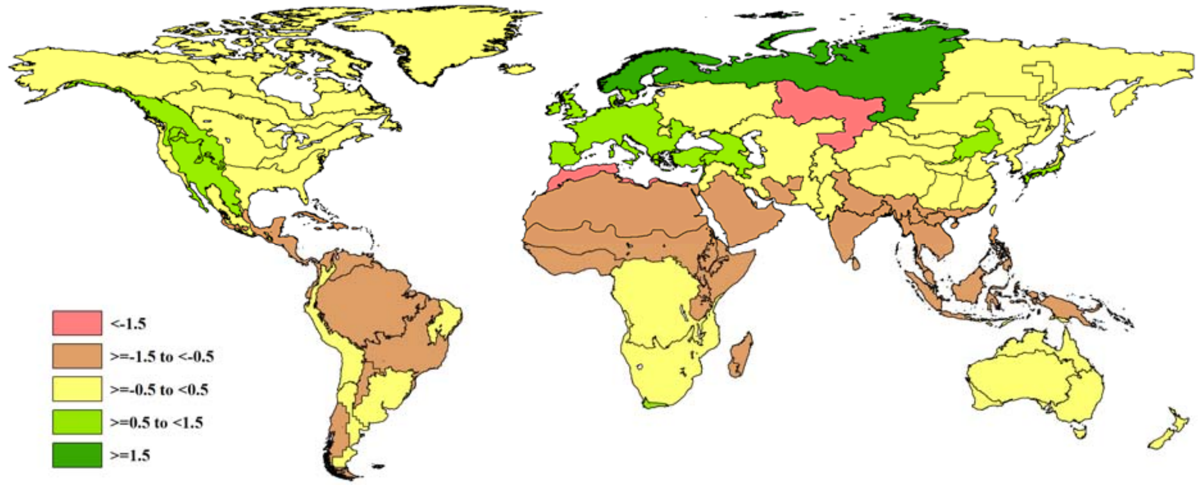
In MRU-33 (Hainan) and MRU-50 (Mainland South-east Asia) the respective deficits were -1.3°C and -1.1°C)

Finally, MRU-27 (Western Patagonia) recorded an average of 5.8 °C, 1.1°C below average.

D. Above average temperature

Above-average temperature relatively consistently affected the western north-American coast and the Rocky Mountains (departures in the range of 0.5°C), and Western Europe to the Caspian Sea. In the second area, more significant departures occurred in MRU-59(Mediterranean Europe and Turkey, 1.0°C) and Western Europe as a whole (MRU-60, +1.4°C).

Figure 1.3. Global map of April - July 2018 air temperature anomaly (as indicated by the TEMP indicator) by MRU, departure from 15YA (degrees Celsius)



1.4 Radiation RADPAR anomalies

E. Below average sunshine

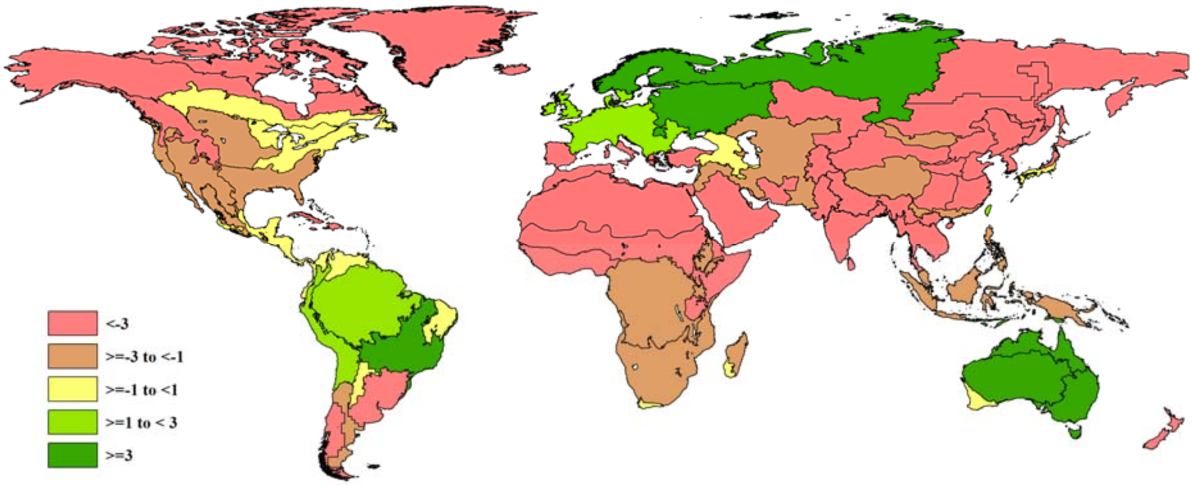
Below average sunshine has been the norm over most of North America and the Caribbean, southern South America, Africa and all of Asia except the west. The largest departures consistently occurred in China, in particular, MRU-34 (Huanghuaihai, -15%), MRU-36 (Loess region, -14%), MRU-32 (Gansu-Xinjiang, -9%), MRU-35 (Inner Mongolia, -8%) and MRU-38 (North-east China -7%). The MRU bordering this area to the north (MRU-52, Eastern Central Asia) suffered a deficit of 9%. To the south, the sunshine deficit area extends to India, the south-east Asian Islands, and New-Zealand. The MRUs affected are too numerous to be listed in detail. Suffice it to say that MRU-48 (Punjab to Gujarat, -7%) recorded the lowest sunshine in the area.

In Africa, MRU-07 (North Africa-Mediterranean, -7%) and MRU-03, the Gulf of Guinea (-7%) need to be mentioned.

F. Positive sunshine departures

Positive sunshine departures are rare and their magnitude is much less than for sunshine deficits. MRU-60 (non-Mediterranean Western Europe) and MRU-58, the area encompassing Ukraine to the Ural Mountains recorded +3% and +4% increases above average, respectively. In South America MRU-23 (Central eastern Brazil) is listed with +4%, the same value as in Oceania, MRU-54, Queensland to Victoria.

Figure 1.4. Global map of April - July 2018 PAR anomaly (as indicated by the RADPAR indicator) by MRU, departure from 15YA (percentage)



1.5 combinations of extremes

For the following discussions, variables have been considered to be “extreme” when they fall into the upper or lower quintiles of the departures from average of RAIN, TEMP, and RADPAR.

If we ignore Boreal Eurasia (MRU-57), only two MRUs are characterized by extreme values for the three above-mentioned CWAIS: The Mediterranean coast of North Africa (MRU-07) and Hainan. Both were characterized by excess precipitation (+30% and +53, respectively), below average TEMP (-1.5°C and 1.3°C) and low sunshine (7% and -6%). In the case of Hainan, the abundant precipitation derives from tropical cyclone Son-Tinh, which crossed the island twice (refer to the section on disasters for more detail).

Combined abnormal RAIN and TEMP occurs in three MRUs and corresponds to three different situations: low rainfall (-53%) and high temperature (+0.8°C) in Western Cape (MRU-10) in South Africa; low rainfall (-27%) and low temperature (-1.1°C) in Western Patagonia and high rainfall (+51%) and low TEMP (-1.2°C) in the Horn of Africa.

Not surprisingly, numerous combinations of anomalous RADPAR with anomalous RAIN and TEMP do occur.

In the case of RAIN and PAR, temperature departures are mostly weak and comprised between 0.6°C and +0.3°C. A first group includes essentially three MRUs with a shortage of RAIN (24% to -51%) and positive RADPAR departures (+1% to +4%): MRU-54 (Queensland to Victoria), MRU-23 (Central eastern Brazil) and MRU-42 (Taiwan). The second group, with high RAIN (+26% and +43%) and low RADPAR (-7% and 9%) includes MRU48 (Punjab to Gujarat) and MRU-32 (Gansu-Xinjiang).

The group of MRUs with abnormal TEMP and RADPAR includes 8 MRUs but there is, otherwise, little homogeneity. A first typical pattern includes the Gulf of Guinea countries (MRU-03) and the Sahel (MRU-08) where precipitation was relatively abundant with low TEMP and low RADPAR. A second pattern is characterised by positive TEMP departures (0.4°C to 1.4°C) while RADPAR underwent positive of negative departures: MRU-58 (Ukraine to Ural Mountains) and MRU-60 (Western Europe) with high sunshine and MRU-34 (Huanghuaihai) and MRU-38 (North-east China) with negative RADPAR (-15% and -7%, respectively).

Chapter 2. Crop and environmental conditions in major production zones

Chapter 2 presents the same indicators—RAIN, TEMP, RADPAR, and BIOMSS— as those used in Chapter 1, and combines them with the agronomic indicators—cropped arable land fraction (CALF), maximum vegetation condition index (VCIx), and minimum vegetation health index (VHIn)— to describe crop condition in six Major Production Zones (MPZ) across all continents. For more information about these zones and methodologies used, see the quick reference guide in Annex C as well as the CropWatch bulletin online resources at ***www.cropwatch.com.cn****.*

2.1 Overview

Tables 2.1 and 2.2 present an overview of the agroclimatic (table 2.1) and agronomic (table 2.2) indicators for each of the six MPZs, comparing the indicators to their fifteen and five-year averages, respectively.

Table 2.1. April-July 2018 agro-climatic indicators by Major Production Zone, current value and departure from 15YA

	RAIN		TEMP		RADPAR	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)
West Africa	644	5	27.8	-0.8	1034	-7
South America	286	-13	18.9	0.0	789	0
North America	416	-2	19.3	-0.3	1293	-1
South and SE Asia	935	18	28.9	-0.7	1097	-5
Western Europe	245	-10	16.6	1.7	1204	3
C. Europe and W. Russia	242	-3	16.3	0.5	1192	4

*Note: Departures are expressed in relative terms (percentage) for all variables, except for temperature, for which absolute departure in degrees Celsius is given. Zero means no change from the average value; relative departures are calculated as (C-R)/R*100, with C=current value and R=reference value, which is the fifteen-year average (15YA) for the same period (April-July) for 2003-2017.*

Table 2.2. April-July 2018 agronomic indicators by Major Production Zone, current season values and departure from 5YA

	BIOMSS (gDM/m^2)		CALF (Cropped arable land fraction)		Maximum VCI Intensity
	Current	Departure (%)	Current	Departure (% points)	Current
West Africa	1713	3	89	-1	0.88
South America	791	-13	96	-2	0.68
North America	1281	0	94	0	0.90
S. and SE Asia	1612	8	64	-13	0.77
Western Europe	950	-10	96	0	0.91
Central Europe and W Russia	963	-6	98	-1	0.88

Note: See note for table 2.1, with reference value R defined as the five-year average (5YA) for the same period (April-July) for 2013-2017.

2.2 West Africa

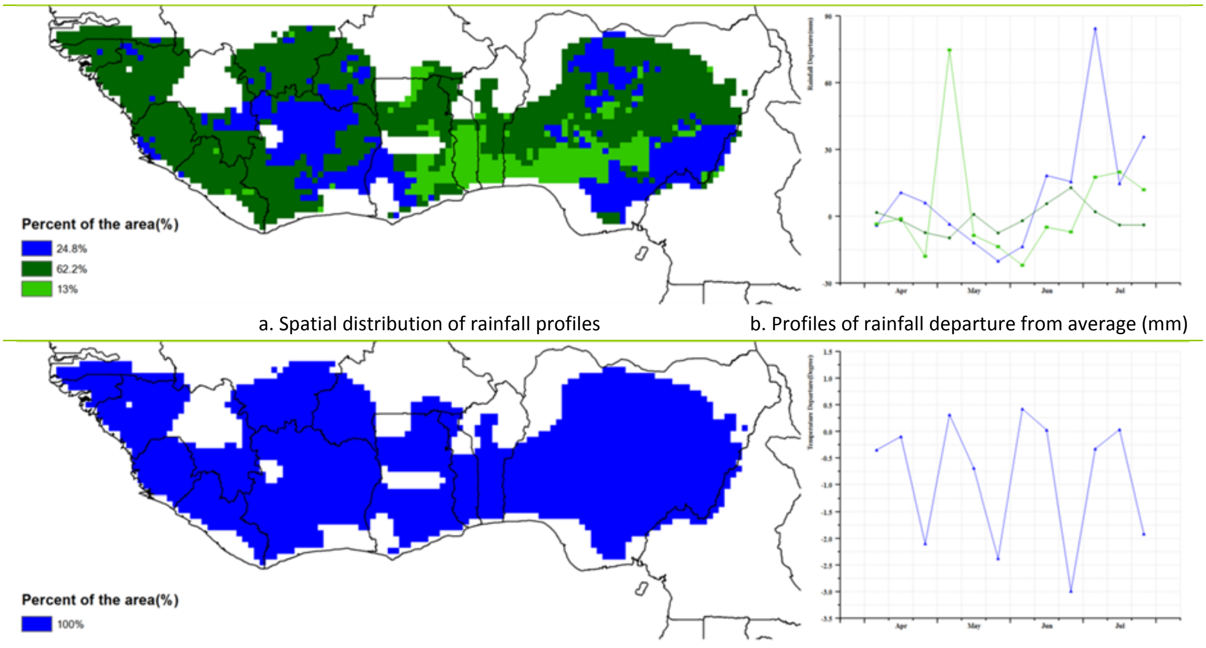
The reporting period is part of the main rainy season and covers the sowing of main cereals (maize, sorghum, millet, and rice) throughout the region. The south of the MPZ, especially a region covering southern Côte d'Ivoire to Nigeria tends to record bimodal rainfall, and harvesting of yams predominates. However in the west (Guinea to Liberia), rice plays an important role, the harvest of which extends into December. Under bimodal rainfall, the first maize crop is harvested in October, while the short season maize was harvested in early 2018. In contrast, cassava (the main staple in the region) is still growing, as reflected by the area of cropped arable land.

Based on CropWatch observations, average rainfall was 644 mm over croplands of the MPZ, corresponding to an increase of +5% for RAIN. The highest rainfall was recorded in Sierra Leone (843 mm, -2%), and Liberia (804 mm, +10%). Above average rainfall peaks occurred in Côte d'Ivoire and south-west Nigeria in early July and parts of Ghana to central Nigeria during late April.

The MPZ had close to average temperature (27.8°C, -0.8%) and sunshine (RADPAR 1034 MJ/m2 with a -7.0% deviation), which gave a slight increase of the biomass production potential (BIOMSS of 1713gDM/m2, +3%). For the MPZ as a whole, the cropped arable land fraction (CALF) reached 89%. The buildup of the precipitation is indicating currently positive support of plant growth. The maximum VCI (VCIx) map was above 0.8 (BIOMSS, +2%) with these values exceeding 1.0 in most parts of northern Nigeria, thus favoring conducive condition across the northern Savannah agro-ecological zone. During this reporting period, Nigeria showed a good share of cropped arable land of agricultural production in the region.

Based on these observations from the measured indexes, the growing season intensified with climatic conditions close to average, with well distributed precipitation. The temperature fluctuated around average within a +/-0.7°C margin after onset of the main rainy season. These CropWatch indicators depict a stable and coherent climatic condition conducive for crop growth leading to harvest in late 2018, earlier in the semi-arid north.

Figure 2.1. West Africa MPZ: Agro-climatic and agronomic indicators, April to July 2018.

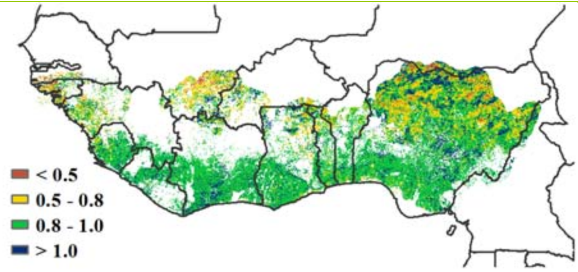


a. Spatial distribution of rainfall profiles

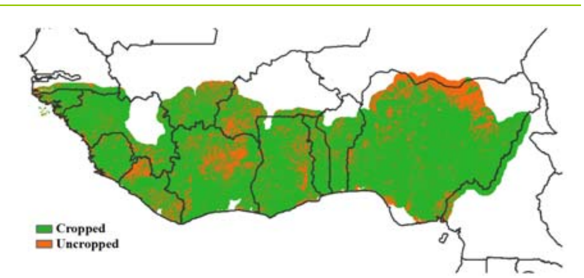
b. Profiles of rainfall departure from average (mm)

c. Spatial distribution of temperature profiles

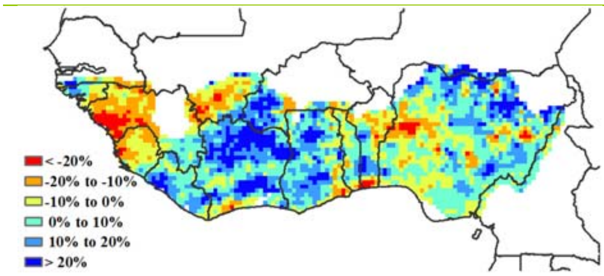
d. Profiles of temperature departure from average (mm)



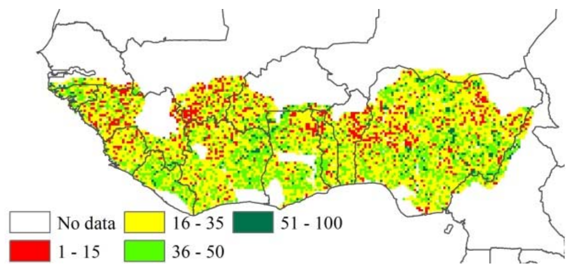
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

Note: For more information about the indicators, see Annex C.

2.3 North America

This monitoring period covers the late growth and harvesting stage of winter crops and the planting and development of summer crops (maize, soybean, rice, and spring wheat). In general, crop condition was mixed with Northern Plains above the average, while it was poor in the Canadian Prairies.

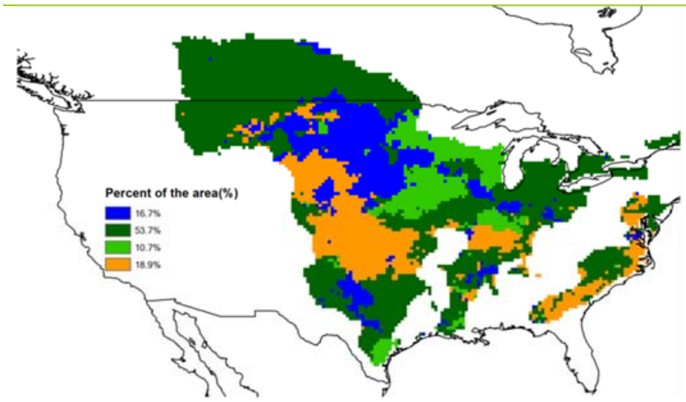
Agroclimatic variables were basically "average": RAIN, TEMP, and RADPAR were marginally below average by 2%, 0.3℃, and 1%, respectively. RAIN in Canada was significantly below average (-18%), but average in the United States (+1%). The Northern Plain, west Corn Belt, and east of the United States received abundant precipitation (60-90mm above average) in June. July precipitation was mostly average, except in the central plain and the east of the United States which recorded abundant precipitation. The Canadian Prairies suffered below average precipitation over the entire monitoring period.

It is also worth noting that most areas in the MPZ experiencing extreme temperature from late April to early June. Below average precipitation and high temperature in the Canadian Prairies affected the crop growth. The southern Plains also suffered below average precipitation in the previous reporting period (January to April). The drought continued into AMJJ in Texas and the state thus suffered prolonged drought which caused the poor crop condition in this region.

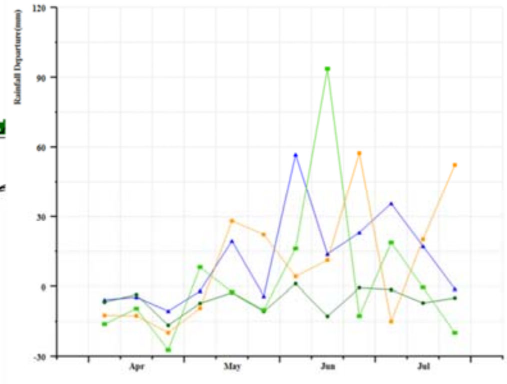
Below average precipitation and above normal temperature caused a sharp decline of potential biomass (-20%), especially for the Canadian Prairies and the Southern Plains. The Corn Belt also suffered below average precipitation (RAIN: -11%) and a reduction of the biomass production potential, especially in the eastern part of Corn Belt (e.g. the rain of Michigan was 33% below average). Severe water deficit was also caused by the decline of BIOMASS in the east part of Corn Belt.

The cropped arable land fraction (CALF) was average. In general, crop condition was mixed; it was satisfactory in the Northern plains according to the maximum vegetation condition index (VCIx) of 0.9.

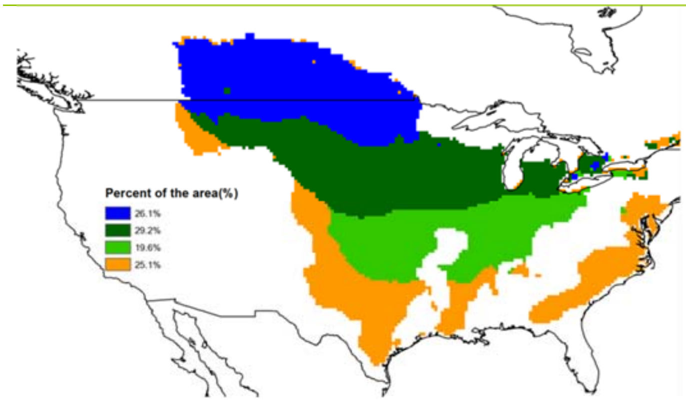
Figure 2.2. North America MPZ: Agroclimatic and agronomic indicators, April to July 2018.



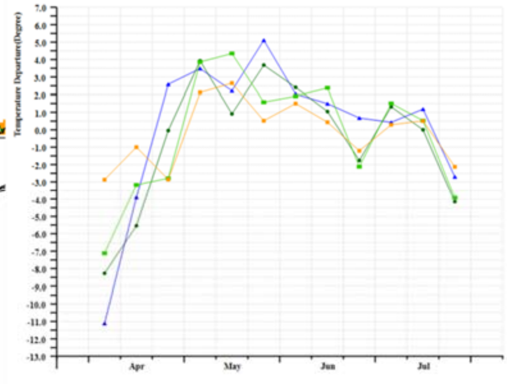
a. Spatial distribution of rainfall profiles



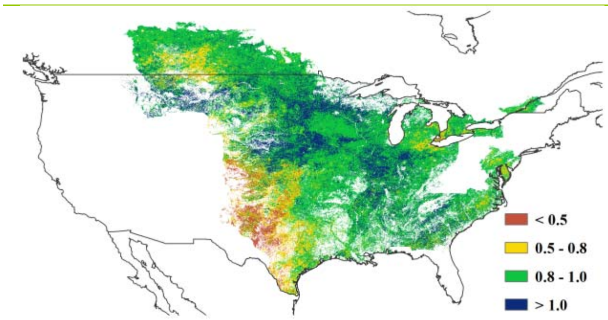
b. Profiles of rainfall departure from average (mm)



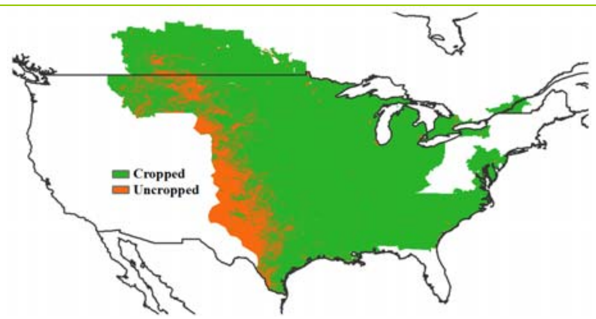
c. Spatial distribution of temperature profiles



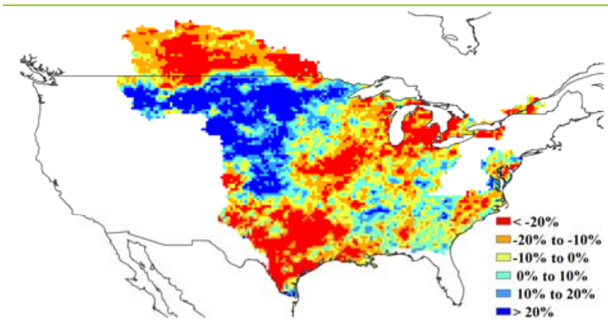
d. Profiles of temperature departure from average (mm)



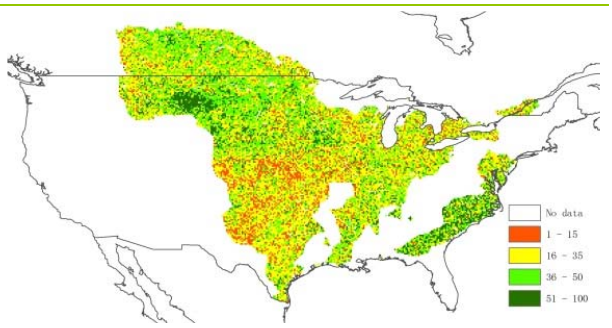
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

Note: For more information about the indicators, see Annex C.

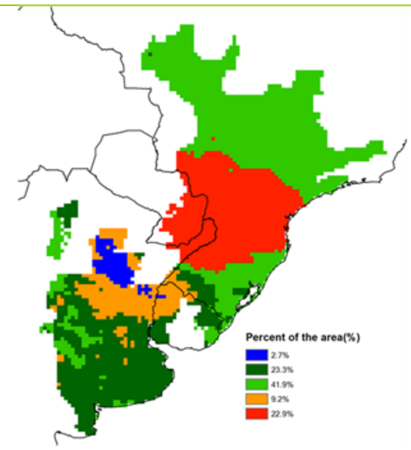
2.4 South America

The region showed in general better conditions for crop growing in the South than in the North. In addition, excessive rainfall could have generated problems for soybean harvesting.

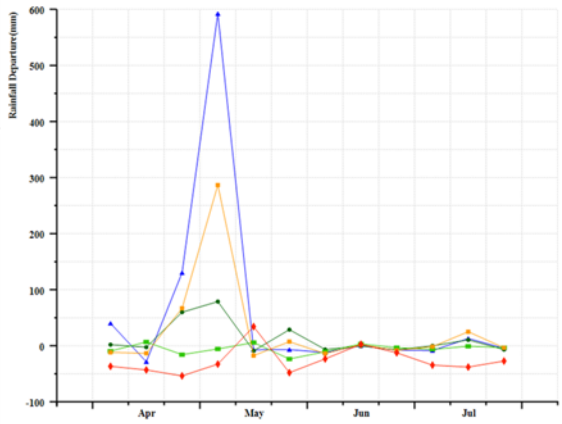
A reduction in rainfall compared to average was observed (13% on average). It particularly affected an area located in South Brazil, East Paraguay and Misiones province in Argentina which suffered an almost continuous negative anomaly. Two relatively small areas located in East Chaco and North of the Argentinian Pampas showed strong positive anomalies of rainfall during April and beginning of May when the main harvest period of soybean occurs. Extreme rainfall hampered the harvest of soybean but only with limited and localized impacts. TEMP and RADPAR showed no anomalies for the whole region. TEMP temporal profiles show in general positive anomalies at the beginning of May, negative anomalies in late May and positive anomalies at mid July. Main differences among regions were observed between Central (Figure b - Orange) and Northern agricultural regions of Brazil (Figure b - Dark green) showing more and less positive anomalies respectively.

Average VCIx for the whole MPZ was 0.68. VCIx values for most of the areas were between 0.8 and 1, and showed the highest values (higher than 1) in the Flooding Pampas. Lower values were observed in the West Pampas. The map of cropped and uncropped arable land shows that most of the area was cropped, except for small regions located in the West Pampas and in Northern parts of Brazilian agricultural areas. BIOMSS showed a contrasting behavior between North and South, presenting strong negative anomalies (-20 % or more) in most of Northern areas and strong positive anomalies in most of the South (+20 % or more). Minimum VHI shows discontinuous patterns along the MPZ. Dominance of higher values is observed in Uruguay and Northern areas of Brazil. Low values occur mostly in the Central regions of Brazil and Paraguay, and part of the Pampas in connection with negative rainfall anomalies.

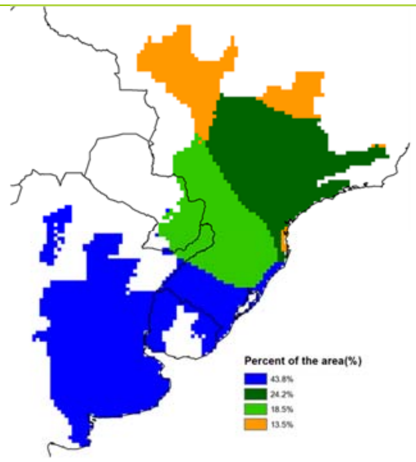
Figure 2.3. South America MPZ: Agro-climatic and agronomic indicators, April to July 2018.



a. Spatial distribution of rainfall profiles

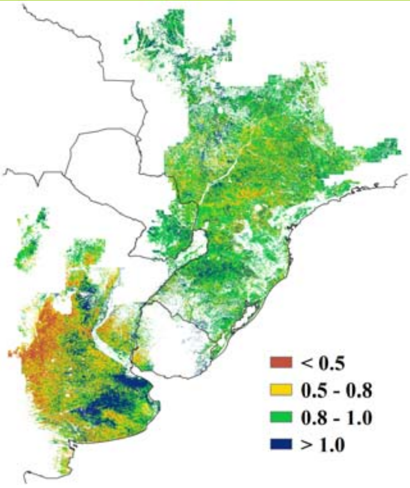


b. Profiles of rainfall departure from average (mm)

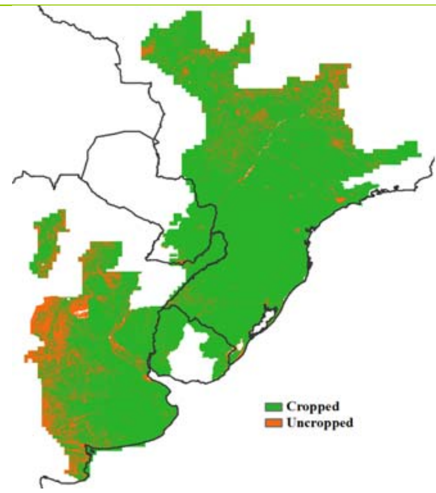


c. Spatial distribution of temperature profiles

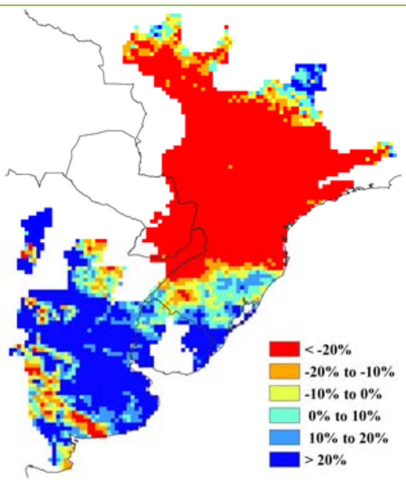
d. Profiles of temperature departure from average (mm)



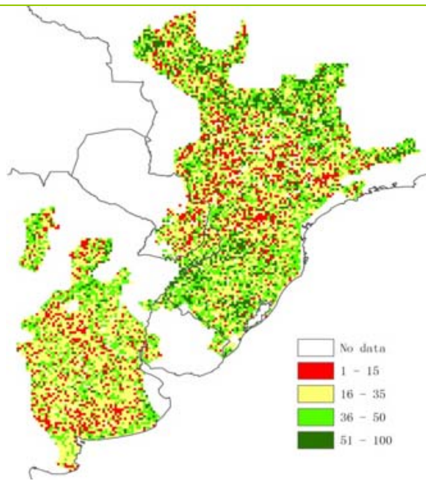
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

Note: For more information about the indicators, see Annex C.

2.5 South and Southeast Asia

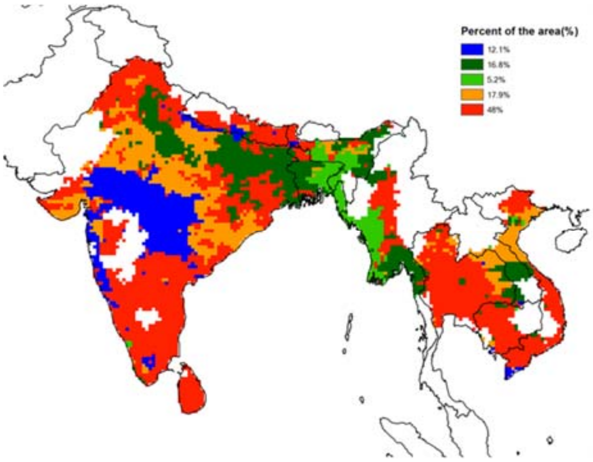
South and Southeast Asia is a region with very diverse climates, topogra?phy and crop phenology. Rice,maize, wheat, and soybean are common crops. The reporting period covers a variety of phenological conditions in the region and country-specific phenology during the reporting period is detailed hereafter; (1) in Bangladesh, Aman rice planting, Aus rice planting and harvesting, rice (Boro) and wheat crops are harvested during the reporting period, (2) Cambodia, maize planting, dry season rice harvesting, and wet season rice planting, (3) India, planting of Kharif rice, maize, and soybean, as well as harvesting of Rabi rice and wheat, (4) Myanmar and Nepal, planting of rice and maize and harvesting for wheat, (5) Thailand, rice and maize crops planting and harvesting, and (6) Vietnam, rice planting and harvesting, which continues here almost year-round.

Overall,the South and Southeast Asia MPZ received about 18% above average rainfall (RAIN), rather cool temperature (TEMP, -0.7°C below average) and low radiation (RADPAR, -5%). All countries had above average RAIN except Cambodia, which recorded a slight decrease (-1%): Bangladesh +23%, India +17%, Thailand +11%, Vietnam +11%, Nepal +2% and Myanmar +20%. The TEMP was below average in all countries; Bangladesh -1.3°C, Cambodia -1.4°C, India -0.4°C, Myanmar -0.8°C, Nepal -1.5°C, Thailand -1.2°C and Vietnam -0.8°C. RADPAR recorded low values relative to average in all countries as well: Bangladesh -7%, Cambodia -6%, India -4%, Myanmar -5%, Nepal -6%, Thailand -5% and Vietnam -6%. As a direct consequence of high moisture supply the prevailing biomass accumulation potential (BIOMSS) was above average average for most countries by values between 1% (Vietnam) and 13% (Bangladesh)

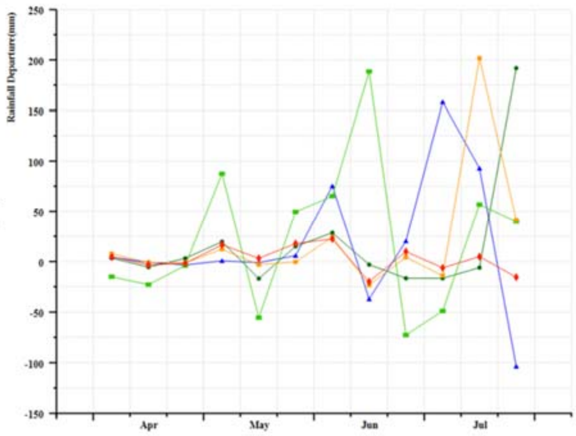
Among the agronomic indicators, the average of VCIx was 0.77. All countries were in the range between 0.83 and 0.94, except for India (0.70). The average Cropped Arable Land Fraction (CALF) indicates a reduction in cultivated by 13%, which is significant considering the size of the region. In general, all countries recorded slight changes in CALF except India, where the drop reached 21%.

The overall situation in South and continental Southeast Asia MPZ is currently mostly favorable, with the exception of India where contradictory indicators need to be monitored closely.

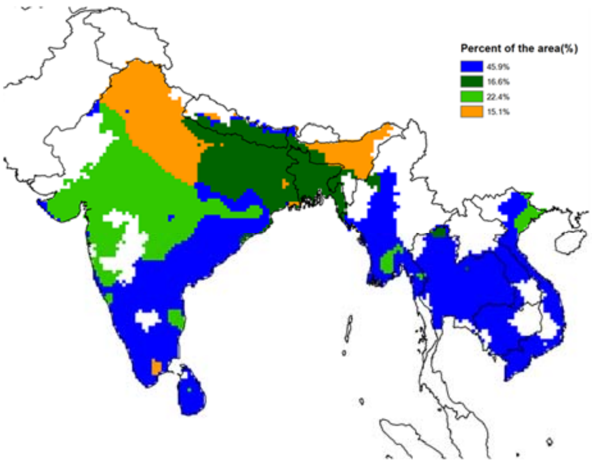
Figure 2.4. South and Southeast Asia MPZ: Agroclimatic and agronomic indicators, April to July 2018.



a. Spatial distribution of rainfall profiles

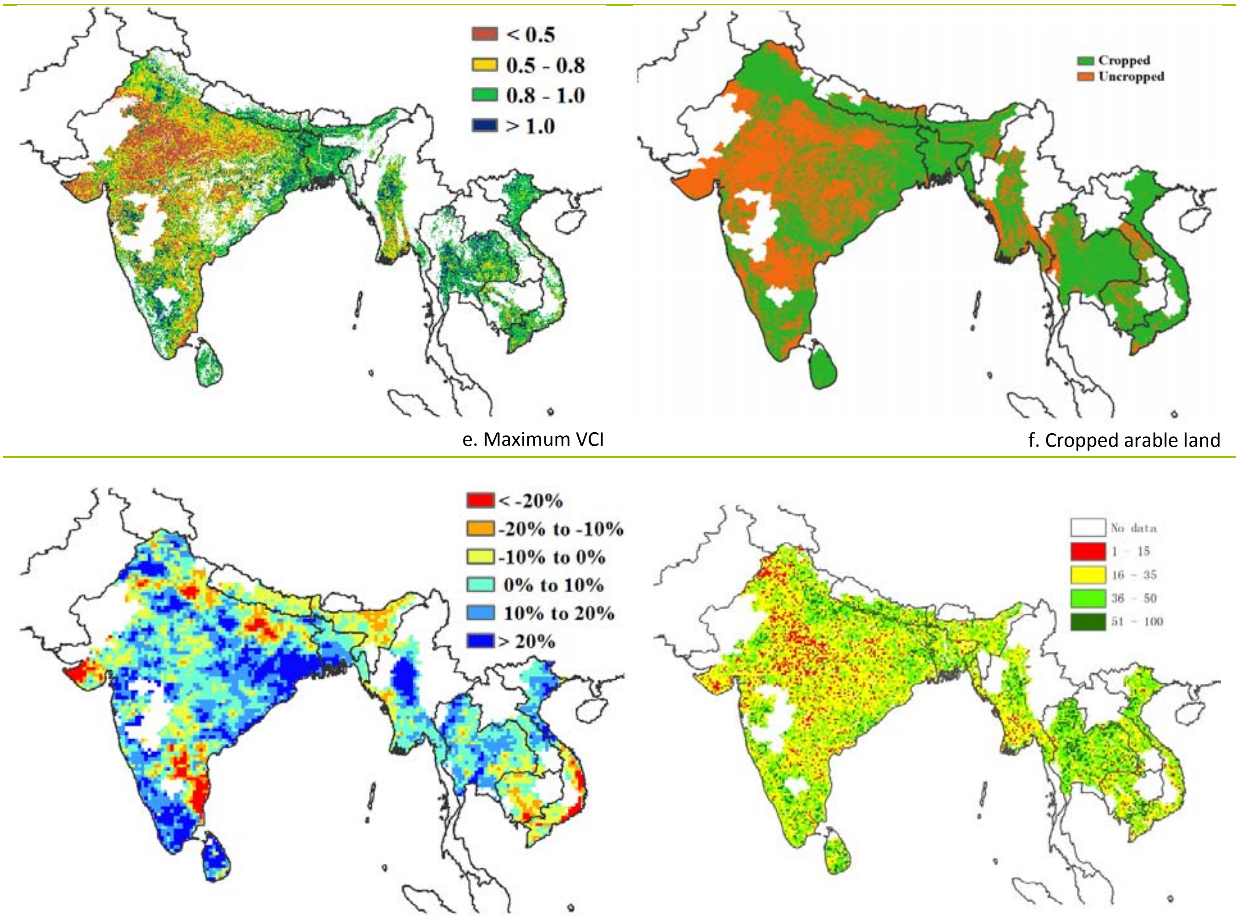


b. Profiles of rainfall departure from average (mm)



c. Spatial distribution of temperature profiles

d. Profiles of temperature departure from average (mm)



e. Maximum VCI

f. Cropped arable land

g. Biomass accumulation potential departure

h. VHI minimum

Note: For more information about the indicators, see Annex C.

2.6 Western Europe

In general, crop condition was below average at the scale of the Western European MPZ, resulting from a combination of negative and positive extremes. The figures present an overview of CropWatch agroclimatic and agronomic indicators for this MPZ.

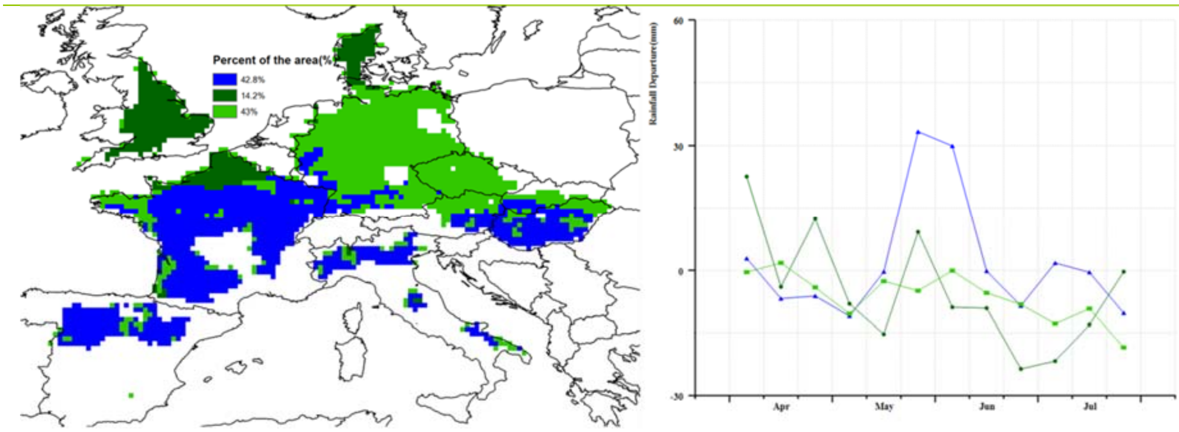
Total rainfall was 10% below average over the region, resulting from marked negative departures in the Czech Republic, most of Germany, northeast Austria, northeast Hungary, south-central Slovakia, western and northern France, southeast Italy, England,Denmark. The most severely affected four countries were Denmark (-48%), Germany (-33%), the Czech Republic (-23%) and England (-15%). In these regions, water stress affected the flowering and grain filling of winter crops and spring cereals. Exceptional positive departures, however, were recorded (i) in early-April, late-May, and late June over most of England, Denmark and northern France and (ii) from mid-May to mid-June in Spain, most of France, Italy, Hungary, southeast Austria, southwest Slovakia, southwest Germany. More rain is needed in some Northern European countries for summer crops. Abundant and locally very intense rainfall in North-central Italy, France and Spain caused lodging and water logging. Radiation for the MPZ as a whole was above average with RADPAR at +3%.

Temperature for the MPZ as a whole was above average (+1.7°C). Warm weather was observed in the whole MPZ before mid-June; coupled with a persistent rainfall deficit it affected winter crops flowering or grain filling in large parts of Northern and east-central Western European MPZ. Warmer-than-usual weather conditions continued to prevail throughout in England, France and Spain from mid-June to July, and throughout in Denmark and Germany in July. According to national source of climatic information, June and July was the warmest in large parts of the England, Denmark since 1975. High temperature shortened the graining filling stage of crops and accelerated the maturity which reduced crop yields. Below average temperatures were observed from late-June to early July in most of the Czech Republic, Hungary, Slovakia, Austria, Italy and southern Germany.

The agroclimatic conditions mentioned above resulted in a drop of the biomass accumulation potential BIOMSS, which was 10% below the recent five-year average. The lowest BIOMSS values (-20% and less) occurred in Denmark, most of Germany, West-central of the Czech Republic, Northeast Austria, Northeast France and most of England. In contrast, BIOMSS was above average (sometimes exceeding a 10% departure) in the southwest Slovakia, most of Hungary, Italy, southwest France and Spain. The average maximum VCI for the MPZ reached a value of 0.91 during this reporting period. More than 96% of arable lands were cropped, which is the same as the recent five-year average. Most uncropped arable land is concentrated in Spain, with more patchy distribution in other counties.

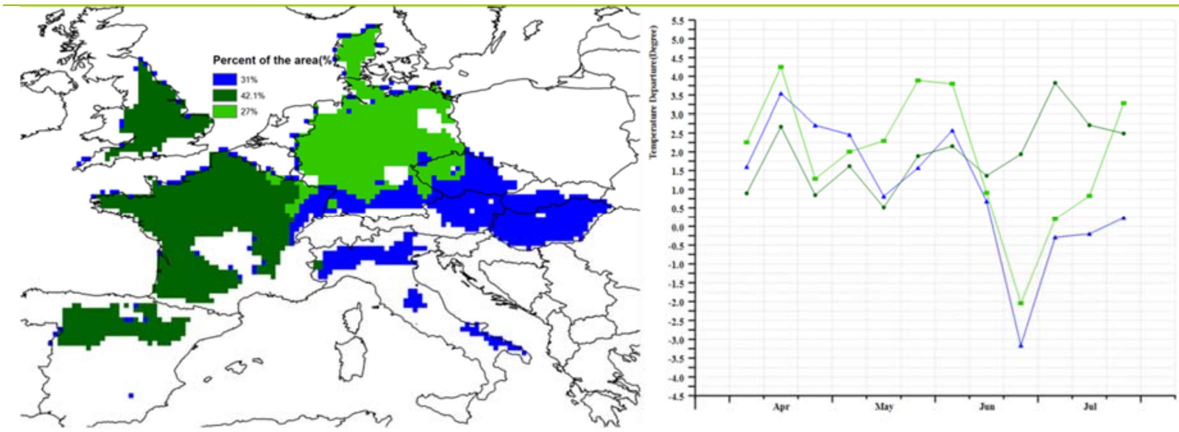
Generally, crop condition in the Western Europe MPZ was mixed: unfavorable in the north and favorable in the south. The overall situation is expected to be below average considering the persistent high temperature.

Figure 2.5. Western Europe MPZ: Agroclimatic and agronomic indicators, April to July 2018.



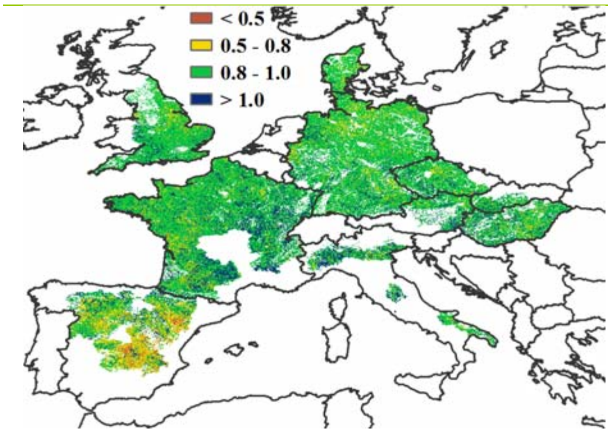
a. Spatial distribution of rainfall profiles

b. Profiles of rainfall departure from average (mm)

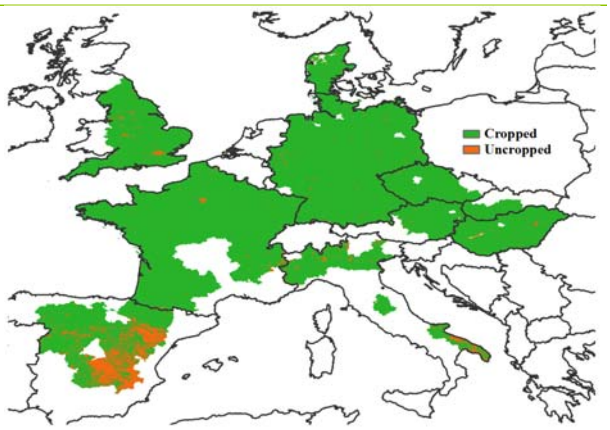


c. Spatial distribution of temperature profiles

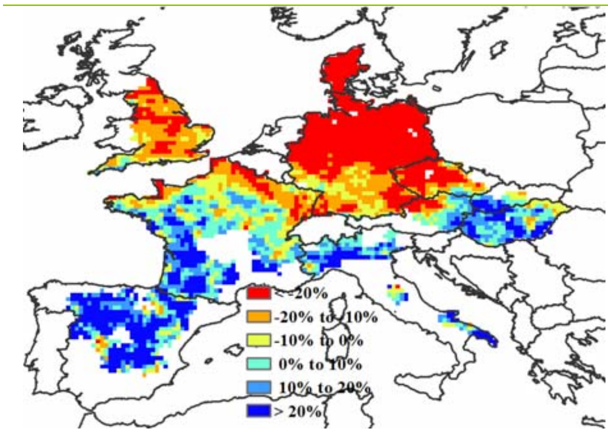
d. Profiles of temperature departure from average (mm)



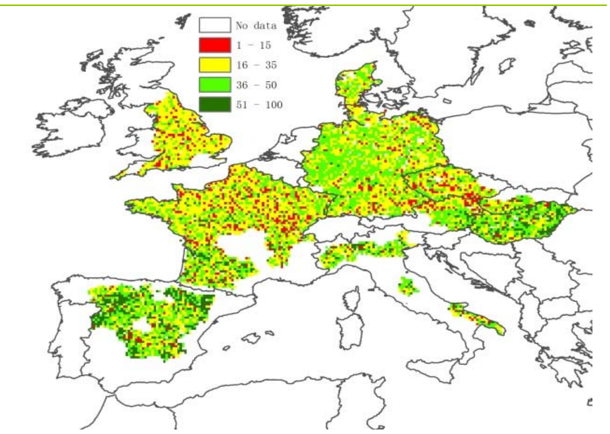
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

Note: For more information about the indicators, see Annex C.

2.7 Central Europe to Western Russia

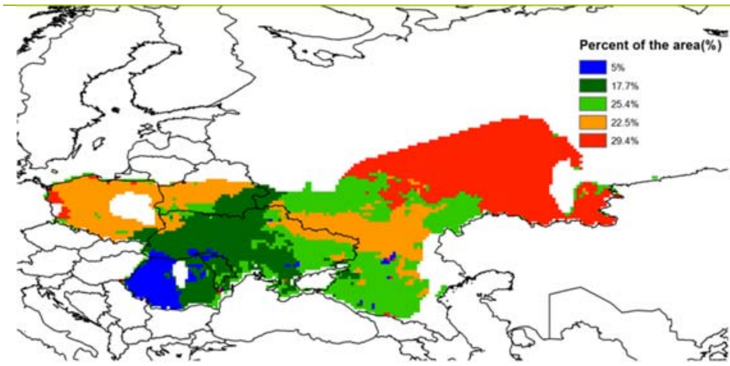
During the present monitoring period, most parts of the Central Europe to Western Russia MPZ displayed average conditions of winter and summer crop (average VCIx=0.88). Compared to average, the MPZ was globally somewhat warmer (TEMP +0.5°C), slightly drier (RAIN -3%) and more sunny (RADPAR 4%).

As indicated by the rainfall profiles, western Romania received well above average rainfall from May to June, with around 60% above average in middle June. Another 22.5% of arable lands in the MPZ received over 50% above average rainfall in July, including Poland, Belarus and the southern part of West Russia covering the following Oblasts: Kursk, Belgorod, Voronezh and Volgograd. The temperature profiles show that the lowest temperatures (about 4.8°C below average in late May) influenced mainly the eastern part of the MPZ, which is western Russia, including the Oblasts of Chelyabinsk, Orenburg, Samara and the Republics of Bashkortostan and Tatarstan. In Belarus, Poland, West Ukraine, Moldova and Romania, the temperature dropped by more than 3°C below average in late June, but then recovered to average in late July.

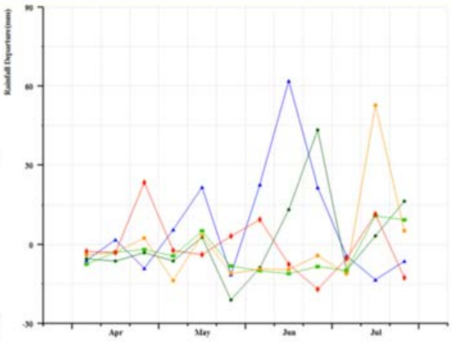
Almost all the arable land was cropped in the monitoring period (with a CALF of -1 % below average). Due to the average agroclimatic condition across the whole MPZ, the accumulated potential biomass (BIOMSS) is slightly (6%) below average, indicating an overall average level. However, Poland and some southern part of Western Russia (the Krays of Krasnodar and western Stavropol and the Rostov Oblast), showed a BIOMSS drop exceeding 20%, with low VHIn values, which should be paid attention to in the following months.

On the whole, with most parts indicating average crop conditions and agroclimatic factors, prospects for crop production are still promising in Central Europe to Western Russia.

Figure 2.6. Central Europe-Western Russia MPZ: Agroclimatic and agronomic indicators, April to July 2018.

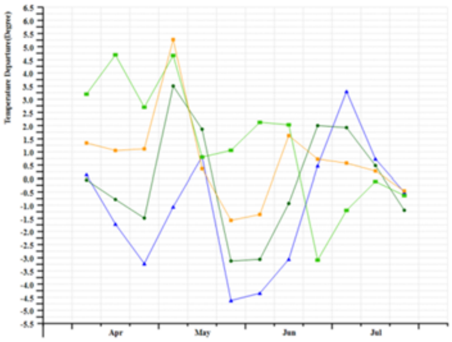


a. Spatial distribution of rainfall profiles

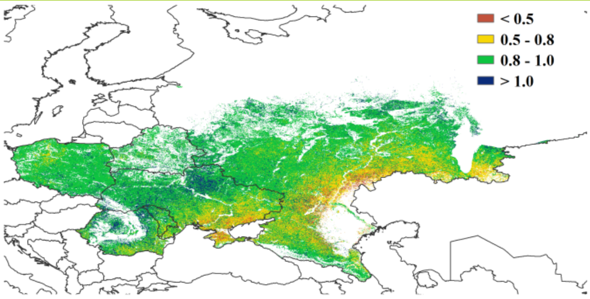


b. Profiles of rainfall departure from average (mm)

c. Spatial distribution of temperature profiles

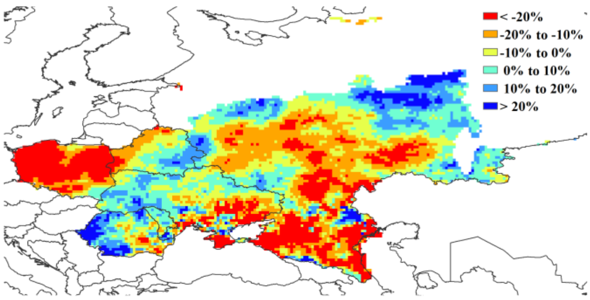


d. Profiles of temperature departure from average (mm)

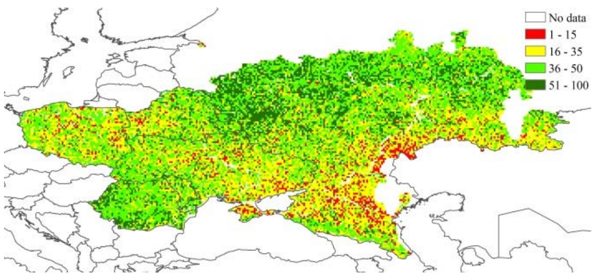


e. Maximum VCI

f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

Note: For more information about the indicators, see Annex C.

Chapter 3. Main producing and exporting countries

Chapter 1 has focused on large climate anomalies that sometimes reach the size of continents and beyond. The present section offers a closer look at individual countries, including the 30 countries that together produce and commercialize 80 percent of maize, rice, wheat, and soybean. As evidenced by the data in this section, even countries of minor agricultural or geopolitical relevance are exposed to extreme conditions and deserve mentioning, particularly when they logically fit into larger patterns.

3.1 Overview

The current reporting period recorded relatively few extreme conditions among the 41+1 countries specifically monitored by CropWatch and described in the current chapter. Some of them, however, are part of the large anomaly patterns described in Chapter 1 and they are often surrounded by less important countries in terms of agricultural production where conditions may be more extreme.

Several major cereal producers on all continents suffered from abnormally dry conditions over the reporting period, especially in Australia (RAIN 45% below average). In Europe, the reporting period (which corresponds with late dormancy and early vegetative growth of winter crops) was particularly dry in Germany (-33%), Poland and some Nordic and Baltic areas. In South Africa (-19%) the period corresponds to the final stages of late maize harvesting. In Canada (-18%) crop development is comparable to the European situation, but mostly less advanced. Finally, in Brazil (-16%), AMJJ corresponds to mid to late stages of summer crops and pre-planting of winter crops in the south, which are thus less likely to have been negatively affected. Rainfall was abundant for winter crops in Turkey (+37%) and possibly excessive in Argentina (+79%, with poor sunshine conditions) for the harvest of summer crops and the planting of winter wheat.

Cold “winter” temperatures affected Cambodia, Bangladesh and Thailand (around -1.4°C below average, with unfavorably low sunshine) where late stages of the second rice crop may have been affected. The coldest area among the major agricultural countries was Kazakhstan at 1.6°C; the planting of summer crops may have been delayed. Heat wave conditions affected much of Europe, with values in excess of 1.6°C above average in the United Kingdom, France, Germany, and Poland. All those areas, as well as Ukraine, experienced above average sunshine.

Figure 3.1 represents countries in the plane of the two first principal components computed based on RAIN, TEMP, BIOMSS, RADPAR, CALF, and VCIx. The two first component (PC1 and PC2) accounts for 68% of the variance. PC1 is positively correlated with RAIN (R =0.858) and BIOMSS (R =0.878) and negatively with RADPAR (R =-0.863). PC2 represents mainly CALF (R =0.751) and VCIx (R=0.706). PC3 covers 18% of the variance and correlates best with TEMP (R =-0.665).

Data outside the concentration ellipse are deemed anomalous and include essentially ARG (point 1) with high RAIN and BIOMSS and low RADPAR, as well as low agronomic indices. EGY (8) comes next with high PC1 values but closer to average CALF and VCIx, while, at the other end of the scale, the group of DEU (7) and POL (22) had low rainfall and high RADPAR and nevertheless better CALF and VCIx. High agroclimatic indices occur in ZAF (31) while three countries had closer to average agroclimatic indices but low agronomic index values: IND (13), PAK (20) and UZB (29).

Rainfall and biomass accumulation potential anomalies

As already mentioned in chapter 1, the two indicators tend to follow very similar patterns, except where very unusual temperatures occur. Therefore, BIOMSS will not be specifically mentioned below, except where values markedly depart from RAIN.

1. Dry areas

The following discussion focuses on countries that experienced rainfall deficits in excess of 25%. Some of them (e.g. Botswana and Zimbabwe in southern Africa) do not raise any specific concern as they have now reached the end of their summer crop season.

The driest countries occur in Oceania and eastern South-east Asia, in particular, Timor Leste (-75%: 75 mm when the average reaches 260 mm), Australia (-45%), New Caledonia (-40%) and New Zealand (-38%). All of them except New Zealand are also characterized by above average sunshine. In the Caribbean, Dominica (-58%), Trinidad and Tobago (-51%) and the Dominican Republic (-42%) low precipitation was accompanied by low temperature with departures in excess of 1°C. Paraguay (-41%) and Chile (-30%) had the lowest rainfall at the national level in Latin America.

One of most spectacular deficits affects an area that has rarely been prone to very abnormal weather in recent years, i.e. northern central Europe, centred around Germany (-33%) and including Denmark (-48%), Sweden (-45%), the Netherlands (-44%), Belgium (-30%) , Latvia (-29%) and Finland (-28%). The whole area also experienced above average temperature ranging from +1.5°C in Latvia and as much as +3.4°C in Sweden. Not only: the area experienced positive sunshine departures between 8% (Latvia) and 12% (Sweden and Denmark). The conditions triggered early growth after overwintering, but under unfavorable moisture supply and higher than usual water demand owing to the high temperatures and sunshine.

In Asia, both east and west had some rainfall deficit areas at the national level, including the Korean Peninsula (-34% in the Korean DPR and the Korean Republic); in the west Georgia and Turkmenistan recorded a deficit of -33%, Afghanistan was at -30% and Azerbaijan at -26%. Several of the countries also had abnormal values for other indicators. Georgia is singled out because it followed the same pattern as the above mention “German group” with warm weather (+1.5°C) and abundant sunshine.

2. Wet areas

Positive Rainfall anomalies in excess of 50% occurred in limited and spatially coherent areas that were mentioned repeatedly in CropWatch bulletins since the feature appeared several years ago. The anomaly, which is very climate-change compatible, affects the normally hyper-arid and semi-arid area from West Africa to central Asia. It was mentioned in Chapter 1. Excess rainfall occurred in the long list of countries in the Arabian Peninsula, the Horn of Africa and the western Mediterranean. The record occurred in Oman where the AMJJ average amounts to 25 mm, but the current reporting period recorded 161 mm, equivalent to 554% increase. Other countries include Kuwait (+217%), Israel (+113%), Jordan (+142%), Iraq (+95%), Syria (+90%), Lebanon (+88%), Somalia (+77%), Saudi Arabia (+64%), Macedonia (+64%), Qatar (+63%), Yemen (+56%), Greece (+53%) and Libya (+50%). The countries experience mild positive or negative temperature anomalies but all had below average sunshine in the range from of -6% (Iraq, Kuwait, and Qatar) to -2% (Libya and Yemen). In Israel, Jordan, Kuwait, and Oman the biomass potential (BIOMSS) increases are significantly lower than the corresponding rainfall anomaly because BIOMSS response to rainfall reaches saturation and because of low temperature. Many of the listed countries practice ground-water irrigation but others, especially in the Mediterranean area, derive water from rivers, which benefited from the abundant moisture.

Eastern and Southern Africa also had some regions with abundant precipitation, although of a lesser magnitude. The countries include Mozambique (+61%), Namibia and Malawi (+53%), and Tanzania (+50%). While the three first have now reached the end of their summer maize season, rangeland will benefit from the late-season rainfall. Tanzania has more complex cropping patterns due to latitude and relief, and rainfall will benefit food production.

Two more, unrelated, countries need to be mentioned: (1) Mauritania, where the recorded amount of 335 mm exceeds the average by 71%, thereby providing an early start to the summer rainy season. Other Sahelian countries also benefited from an unusually early start of the season (Niger, +30%; North Sudan +23%); (2) Argentina, where the nationwide departure (+79%) hides a spatially complex situation described later in this chapter.

Temperature anomalies

1. Cool areas

Several of the countries that experienced negative temperature departures in excess of 1.5°C were already mentioned among the areas that recorded large rainfall amounts, in particular, Mauritania (-1.9°C), Somalia (-1.5°C) and Kazakhstan (-1.6°C). Note, however, that the precipitation excess in the last country was only 10%.

All the countries listed in this group has below average sunshine, but they do not follow any clear spatial pattern. The lowest temperature anomaly occurred in French Guyana (-2.6°C and -10% RADPAR), followed by Morocco (-2.3°C and -8% RADPAR), Eswatini in southern Africa (-1.6°C) and Nepal (-1.5°C).

2. Warmer than average areas

The countries to be mentioned almost exclusively confined to Western Europe. In fact, among 24 countries where the temperature anomaly exceeds 1.0°C, only one (Angola, +1.7°C) is not European. The highest values (between +2.0°C and +3.4°C) are those of Denmark, Belgium, Luxembourg, Finland, Norway, and Sweden.

Radiation or sunshine

The largest national sunshine deficits do not, again, follow any clear geographic pattern, although three of eight countries with very large deficits of 10% and more do occur in Africa: Sao Tome and Principe (-14%), Burkina Faso and Sierra Leone, both at -10%. Four countries of the group are located in central and South America (Guyana -13%, Uruguay -12%, French Guiana -10% and Suriname 10%). This leaves Portugal (-11%) in a somewhat isolated position as the country is characterized by average values of the other agroclimatic indicators.

The highest positive departures all belong in the already mentioned group of European countries with low rainfall and high temperature. The three largest departures are observed in the Netherlands (+10%), Denmark and Sweden (Both at +12%).

Figure 3.1: Countries in the plane of the two first principal components. 1 ARG, 2 AUS, 7 DEU, 8 EGY, 13 IND, 20 PAK, 22 POL, 29 UZB, 31 ZAF. The green concentration ellipse includes 90% of data.

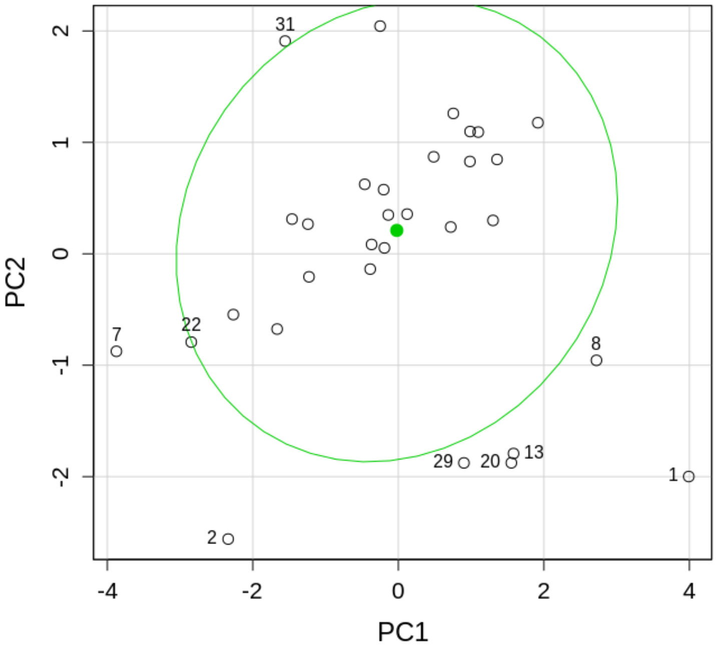


Figure 3.2. Global map of April to July 2018 rainfall (RAIN) by country and sub-national areas, departure from 15YA (percentage)

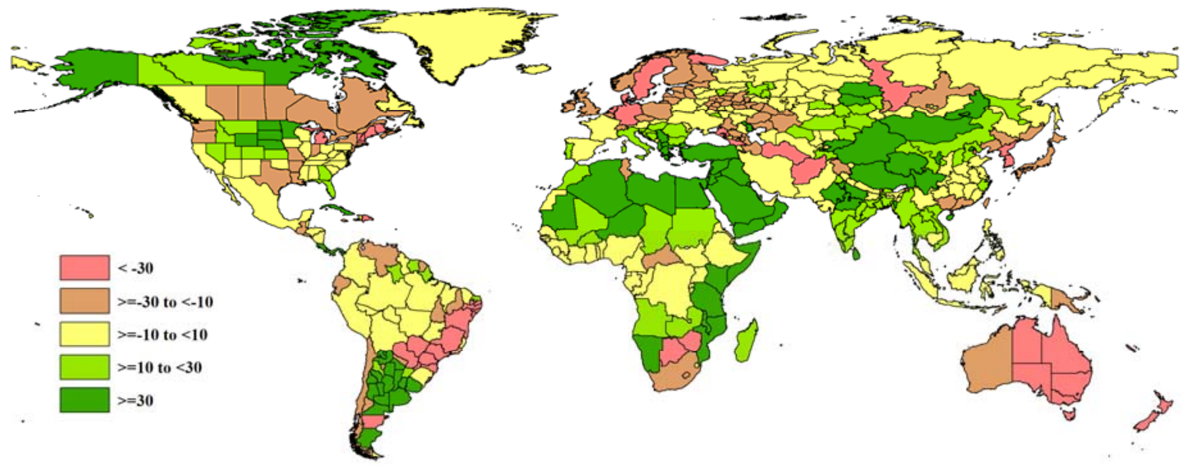


Figure 3.3. Global map of April to July 2018 biomass (BIOMSS) by country and sub-national areas, departure from 15YA (percentage)

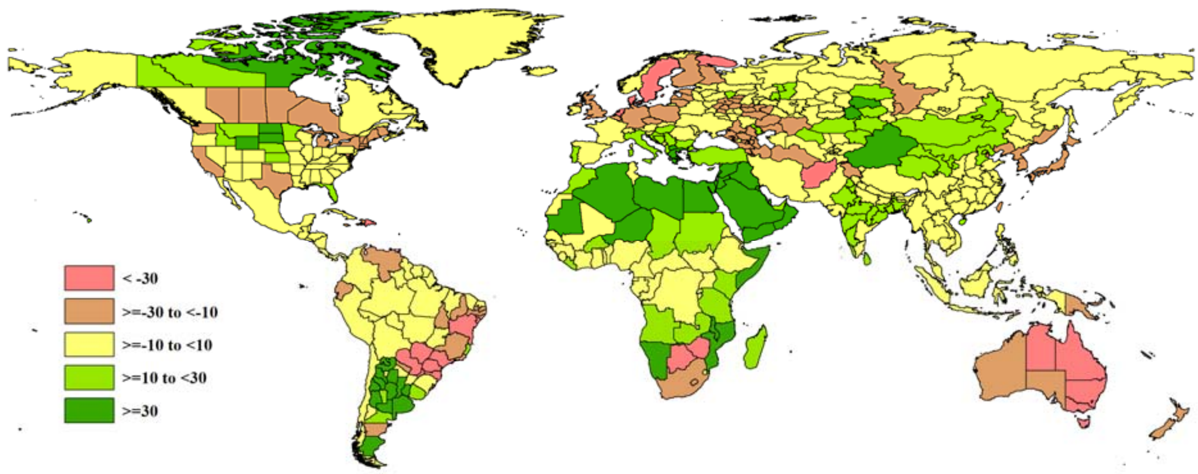


Figure 3.4. Global map of April to July 2018 temperature (TEMP) by country and sub-national areas, departure from 15YA (degrees)

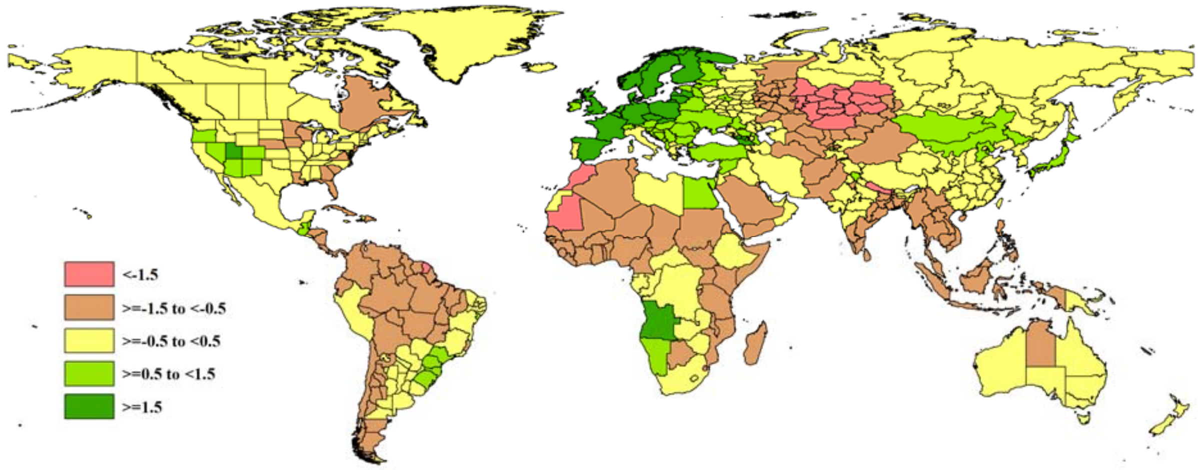
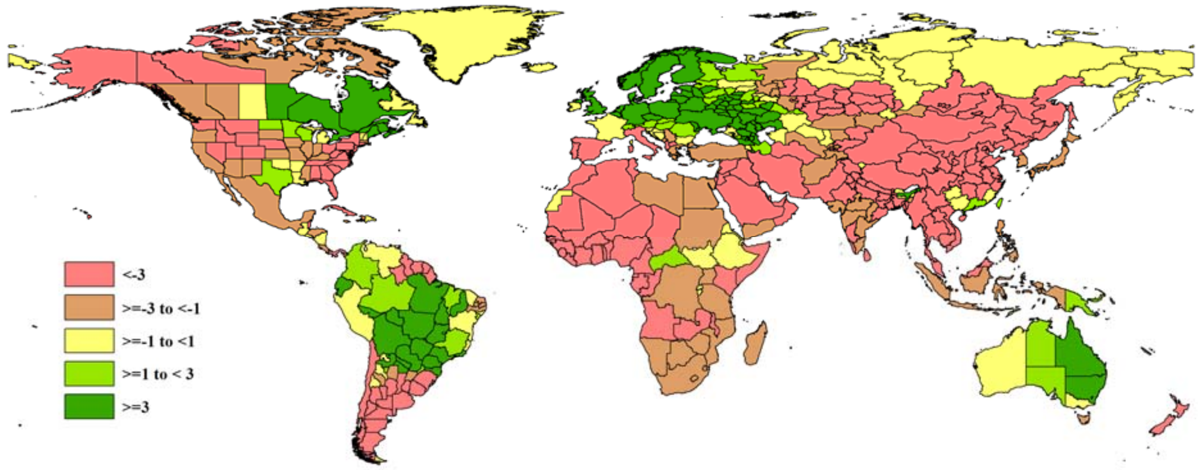


Figure 3.5. Global map of October April to July 2018 PAR (RADPAR) by country and sub-national areas, departure from 15YA (percentage)



3.2 Country analysis

This section presents CropWatch analyses for each of 41 key countries (China is addressed in Chapter 4). The maps refer to crop growing areas only and include: (a) Graph for the phenology of major crops; (b) Crop condition development graph based on NDVI average over crop areas at national scale, comparing the April-July 2018 period to the previous season and the five-year average (5YA) and maximum; (c) Maximum VCI (over arable land mask) for April-July 2018 by pixel; (d) Spatial NDVI patterns up to April 2018 according to local cropping patterns and compared to the 5YA; and (e) NDVI profiles associated with the spatial pattern under (d). Next, separate graphs (labeled as figures (f), (g), and subsequent letters) are included to illustrate crop condition development graphs based on NDVI average over crop areas for different regions within the country, again comparing the April-July 2018 period to the previous season and the five-year average (5YA) and maximum.

In addition, please see also Annexes A and B for additional information about indicator values and production estimates by country. Country agricultural profiles are posted on www.cropwatch.com.cn.

Figures 3.6 - 3.46.; Crop condition for individual countries ([AFG] Afghanistan - [ZMB] Zambia) including sub-national regions during April – July 2018.

AFG AGO ARG AUS BGD BLR BRA CAN DEU EGY ETH FRA GBR HUN IDN IND IRN ITA KAZ KEN KHM LKA MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[AFG] Afghanistan

Wheat, barley, maize, and rice are the major cereals grown in semi-arid Afghanistan. The bulk of winter wheat is cultivated in the northern border provinces and was harvested in May. Spring wheat was planted from March to April. Maize and rice were planted in June and July, respectively.

On average, the country received 30% below average rainfall; compared to average, TEMP dropped -0.5°C and RADPAR -3%. The biomass production potential fell 32% while CALF reached 50 % below 5YA and VCIx did not exceed 0.4. As a result, CropWatch foresees a wheat production drop of 22% relative to 2017.

Nationwide crop condition based on NDVI graphs was low compared to the last 5 years average as well as to 2017. Four provinces recorded low NDVI in April; Badghis, Faryab, Jawzian, and samangan. The same and Hirat, Saripul, Balkh, and Kunduz recorded VCIx value below than 0.5. Remaing provinces, however, had VCIx values between 0.8 and 1.

Regional analysis

Afghanistan is divided into four AEZs: Central, Dry, Dry with irrigated cultivation, and Dry and grazing regions.

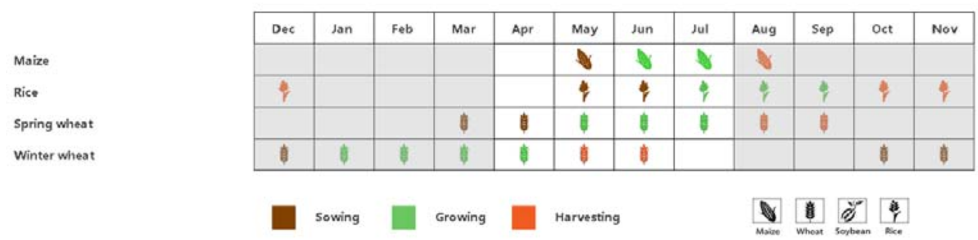
The Central region received low rainfall (50mm, -39% below average) and TEMP was 17.0°C (-0.4°C). RADPAR reached 1576 MJ/m2 (-3%). The reduction of rainfall resulted in 33% lower than 5YA BIOMSS accumulation potential. Low NDVI, CALF down -8 % and VCIx at 0.6 indicate unsatisfactory crop condition and output.

The Dry region received low rain (24mm, 56% below average) and TEMP was 0.4°C below average, while RADPAR was down 2.3 %. A drop in CALF (-22 %) associated with rather low VCIx (0.3) and a 51% BIOMSS loss compared with the 5YA) all indicate low production.

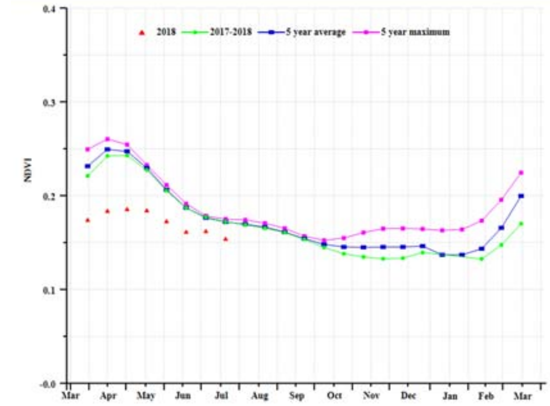
The Dry and irrigated cultivation region received the largest precipitation amount (96 mm) but it is still below the average by 19 %. TEMP was slightly cooler than average (-0.6°C) and RADPAR was 2 % below average. The BIOMSS reached 330 gDM/m2 (the highest regional value in the country) and it was 24 % under the 5YA. The CALF was -44% and VCIx scored 0.5.

The Dry and grazing region recorded 20 mm with reduction of 40% from the average, with below average TEMP at 20.0°C (-0.8°C) and a below average RADPAR of 154 was lower than the average by -31% and CALF reached -89% lower than the average, while crop condition was poor at 0.4 VCIx.

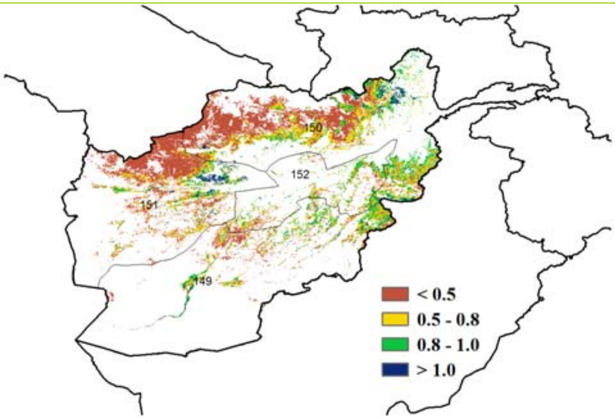
Figure 3.6. Afghanistan's crop condition, April -July 2018



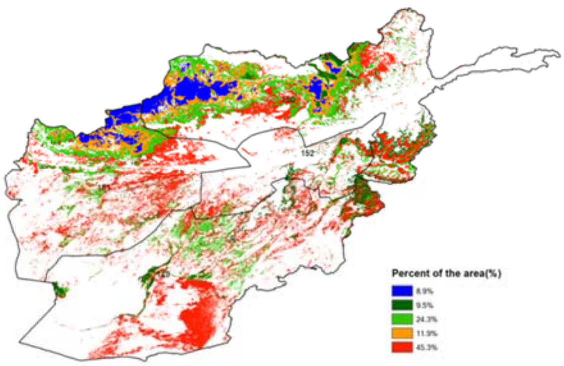
(a). Phenology of major crops



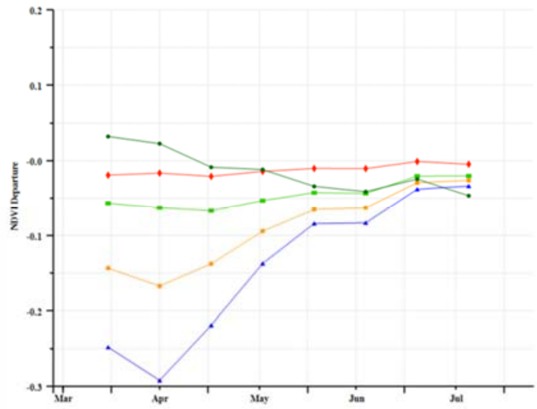
(b) Crop condition development graph based on NDVI



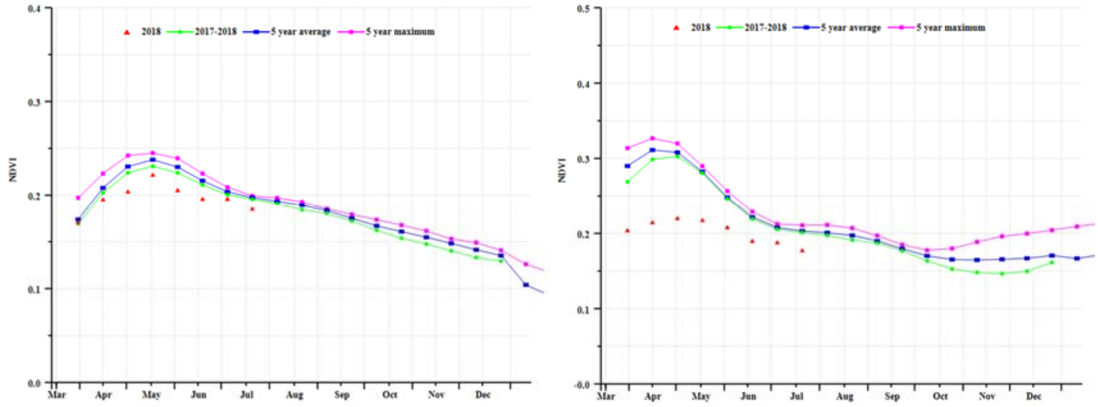
(c) Maximum VCI



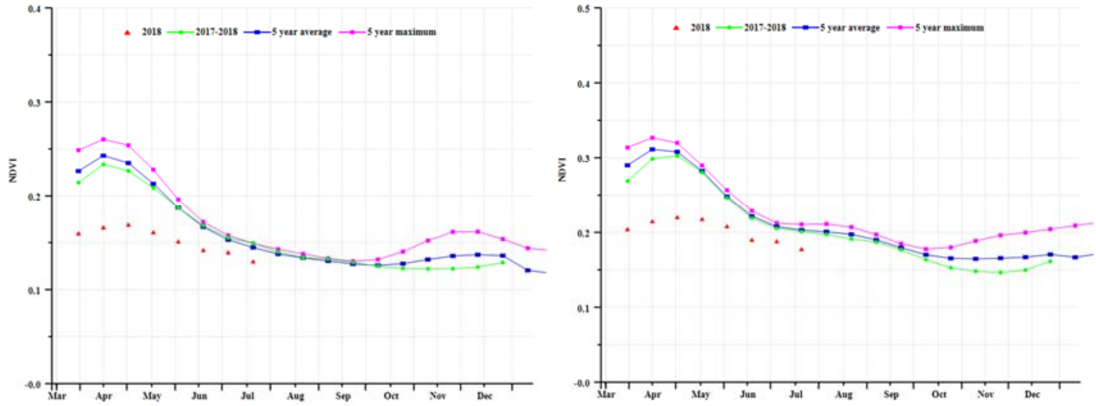
(d) Spatial NDVI patterns compared to 5YA



(e) NDVI profiles



(f) Crop condition development graph based on NDVI (central_Sparse_Veg Region (left) and Mixed_Farming_Graze Region (right))



(g) Crop condition development graph based on NDVI (Mixed_Dry_IrrigatedRegion (left) and Dry (right))

Table 3.1. Afghanistan's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Central region	50	-39	17	-0.4	1576	-2.6
Dry region	24	-56	23	-0.2	1576	-2.3
Dry and irrigated cultivation region	96	-19	19	-0.6	1480	-2.3
Dry and grazing region	20	-40	20	-0.8	1542	-3.5

Table 3.2. Afghanistan's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Central region	228	-33	7	-8	0.6
Dry region	90	-51	3	-22	0.3
Dry and irrigated cultivation region	330	-24	12	-44	0.5
Dry and grazing region	105	-31	1	-89	0.4

Table 3.3. CropWatch-estimated Wheat production for Afghanistan in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Wheat	4280	-24.60%	3.90%	3353	-21.70%

AFG **AGO** ARG AUS BGD BLR BRA CAN DEU EGY ETH FRA GBR HUN IDN IND IRN ITA KAZ KEN KHM LKA MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[AGO] Angola

During the current monitoring period (April-July 2018), the country was harvesting Maize and Rice from April to May while Wheat was at sowing and early growth. The agroclimatic indicators for this period show an increase in rainfall and temperature (RAIN, +20.2% and TEMP, +1.7ºC) and a decrease of about 3.1% in RAPDAR. Contrary to the agroclimatic indicator, an increase was observed in all agro-ecological indicators (BIOMASS, +6.2% and CALF, +4.1%).

The crop condition was generally below reference values at the start of April but above from the end of April to July. During this period, Angola registered favourable maximum vegetation cover index (VCIx) all over the country with values varying between 0.8 to 1.0 and above. The maximum VCIx recorded was 0.91. Based on the NDVI clusters, favorable crop condition representing 36% of arable land where observed in Southwest of the country, especially in the provinces of Huila and Cunene. Unfavorable crop condition prevailed in the Province of Zaire, covering one area of about 4.7%. The 2018 maize area is expected to increase 4.1% over 2017.

Regional analysis

Considering the cropping systems, climatic zones and, and topographic conditions, Angola is divided into five agro-ecological zones (AEZ): Sub-humid zone, Humid zone, Arid zone, Semi-arid zone and Desert zone.

In the Sub-humid zone, the agronomic indicators show an increase in rainfall and temperature (RAIN, +11% and TEMP, +1.8ºC) while the radiation fell 4%. Both biomass and cropped arable land fraction increased by 21% and 0.2% respectively. The crop condition development graph based on NDVI shows that the region registered unfavorable crop condition from April to May; it improved between May and the end of July.

Similar to the Sub-humid zone, favorable crop condition was observed from mid-May to July in the Humid zone. Rainfall and radiation dropped by 11% and 4% respectively when compared to average, while the temperature increased 1.0ºC. With CALF was close to the average of past five year's departure. The maximum VCI for this region was 0.88.

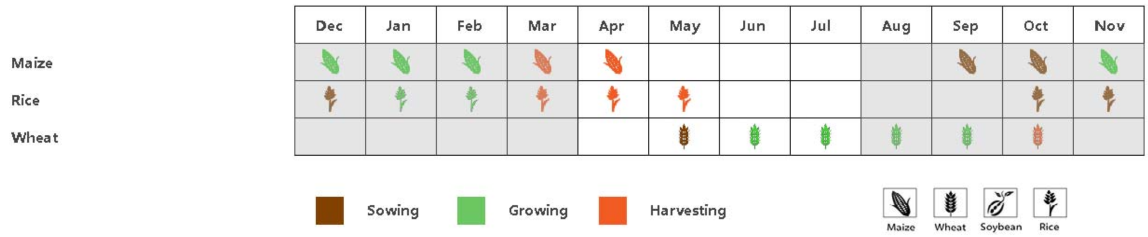
Increases in both rainfall and temperature (RAIN, +25% and TEMP, +0.5ºC) were recorded in the Arid zone, which was accompanied by a reduction in the sunshine by about 2%. Associated with CALF which increased by 20.6%, the agro-climatic conditions led to an increase in biomass (BIOMASS, +22%). With a VCIx of 0.90, the crop condition development graph for graph based on NDVI shows that during the monitoring period, crop conditions was generally satisfactory in the AEZ.

With a maximum VCI value of 0.94, favorable crop condition was observed in the Semi-arid zone. In this region, the rainfall and temperature increased by 44% and 1.5ºC, while the radiation decreased by 3%. An increase of 8.4% in cropped arable land faction and an increase in biomass (about 29%). indicate favorable crop prospects

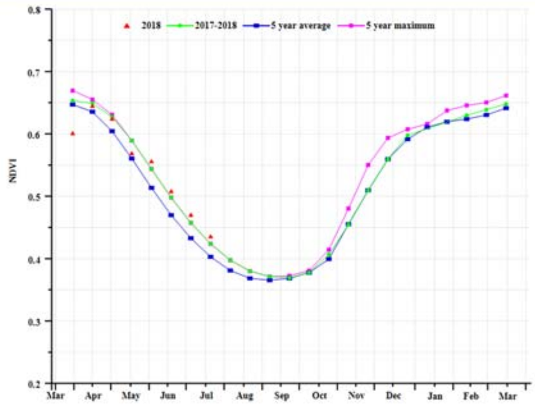
The Desert zone registered significant increases in both rainfall and temperature (RAIN, +76% and TEMP, +3.1º). The radiation during this period dropped by 3%. Concerning the agronomic indicators, the BIOMSS increased by 48% and CALF by 1.1%. The maximum VCI for the region was 0.91. The NDVI for this region, suggests better crop conditions from mid-May till the end of the monitoring period.

Based on the indicators observed for this monitoring period, in general, Angola registered favorable crop conditions.

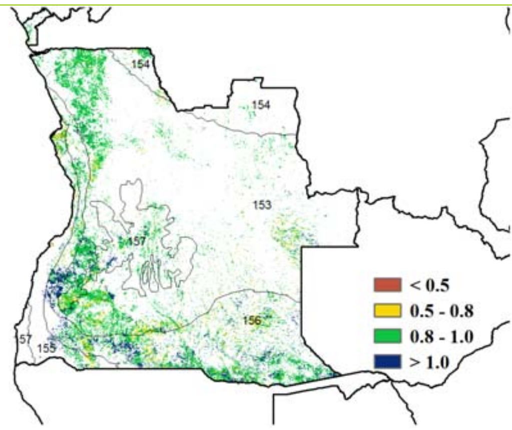
Figure 3.7. Angola's crop condition, April – August 2018



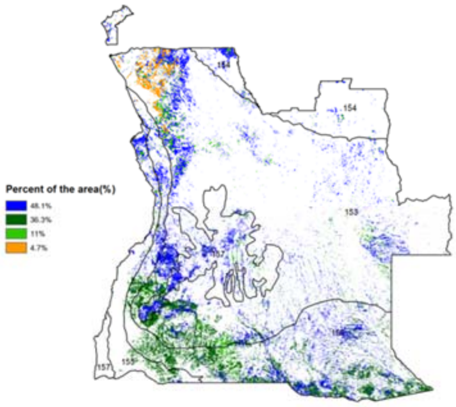
(a). Phenology of major crops



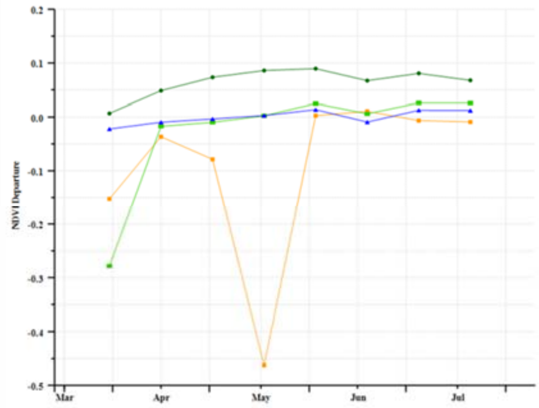
(b) Crop condition development graph based on NDVI



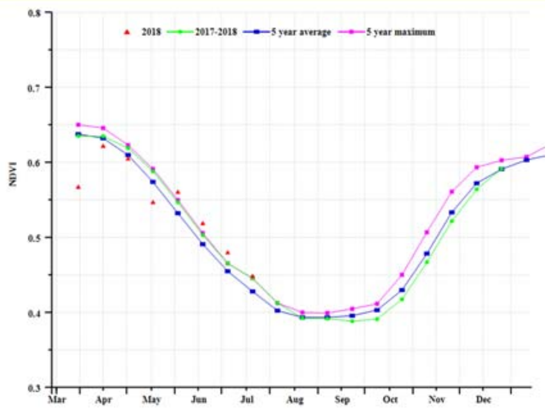
(c) Maximum VCI



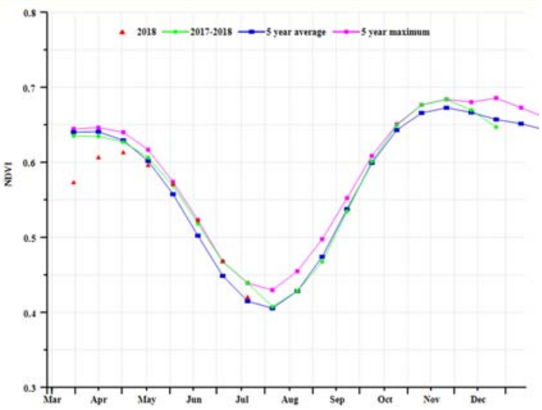
(d) Spatial NDVI patterns compared to 5YA



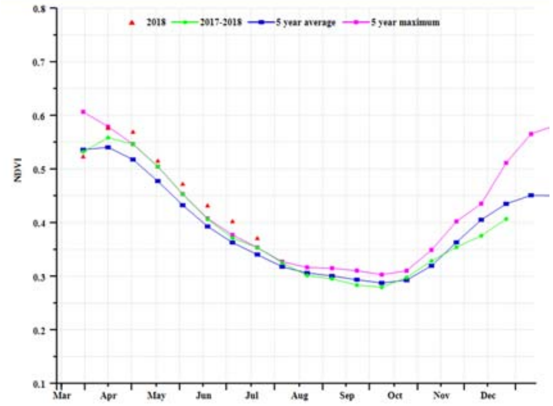
(e) NDVI profiles



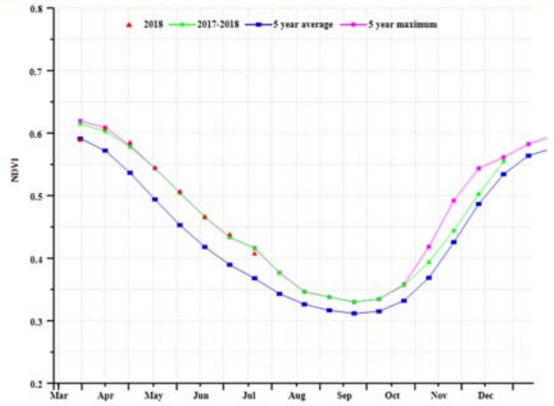
(f) Crop condition development graph based on NDVI - Sub-humid zone



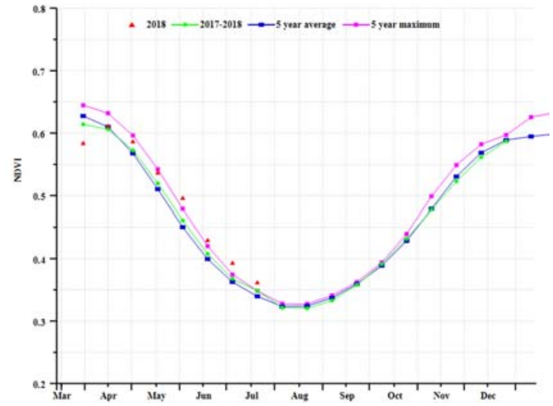
(g) Crop condition development graph based on NDVI - Humid zone



(h) Crop condition development graph based on NDVI - Arid zone



(i) Crop condition development graph based on NDVI - Semi-arid zone



(j) Crop condition development graph based on NDVI - Desert zone

Table 3.4. Angola agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Sub-humid zone	185	11	23.4	1.8	1075	-4
Humid zone	186	-11	24.9	1.0	1085	-4
Arid Zone	103	24	22.7	0.5	1099	-2
Semi-Arid Zone	92	44	22.6	1.5	1090	-3
Desert zone	158	76	20.8	3.1	1134	-3

Table 3.5. Angola agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Sub-humid zone	519	21	100	0.2	0.91
Humid zone	619	-9	100	0.0	0.88
Arid Zone	313	22	93	20.6	0.90
Semi-Arid Zone	282	29	100	8.4	0.94

Table 3.6. CropWatch-estimated maize production for Angola in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Maize	2680	2.10%	2.00%	2791	4.10%

AFG AGO **ARG** AUS BGD BLR BRA CAN DEU EGY ETH FRA GBR HUN IDN IND IRN ITA KAZ KEN KHM LKA MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[ARG] Argentina

Favorable conditions for crop growing were observed during the reporting period particularly when considering the severe drought that occurred during last reporting period. The crop calendar shows for this period the maturity of late summer crops (soybean, maize and rice), fallow for early planted summer crops and sowing of winter crops such as wheat.

Rainfall showed a marked positive anomaly of 79 %. Temperature was reduced by just 0.1° but radiation showed a more significant reduction of 7 % associated with rainy and cloudy weather. These conditions led to a significant increase in BIOMSS of 33%.

NDVI profiles show in general near averages values, with lower than average values at the beginning of the period and higher than average values at the end. Some regions (12.3% or arable land) showed a strong negative anomaly during May, probably associated to flooding conditions. Temporal behavior of NDVI for the whole region (Figure c) shows lower than average values during most of the period, probably associated to past drought conditions during growing stage of summer crops.

CropWatch subdivides Argentina into eight agro-ecological zones (AEZ) based on cropping systems, climatic zones, and topography; they are identified by numbers in the VCIx map. Only four of them are found to be relevant for crops cultivation: the Chaco, Mesopotamia, the Pampas, and the Subtropical highlands for which the crop conditions will be discussed with some detail in this section.

All four regions showed very high increments in RAIN. Higher anomalies were observed for Tropical Highlands (158 %), followed by Chaco (131 %), Pampas (92 %) and Mesopotamia (27 %). TEMP showed negative anomalies for Tropical Highlands (-0.5°) and Chaco (-0.1°), positive anomalies for Pampas (+0.2), and no anomalies for Mesopotamia. Pampas and Mesopotamia showed reductions in RADPAR of 14.6 and 4.9 % respectively, while Tropical Highlands and Chaco showed increments of 1.7 and 1.3 % respectively. The four regions showed significant increments in BIOMSS in response to high amounts of RAIN observed. Estimated increments in BIOMSS are +83 % for Tropical Highlands, 47% for the Pampas, 14 % for Chaco and 10 % for Mesopotamia

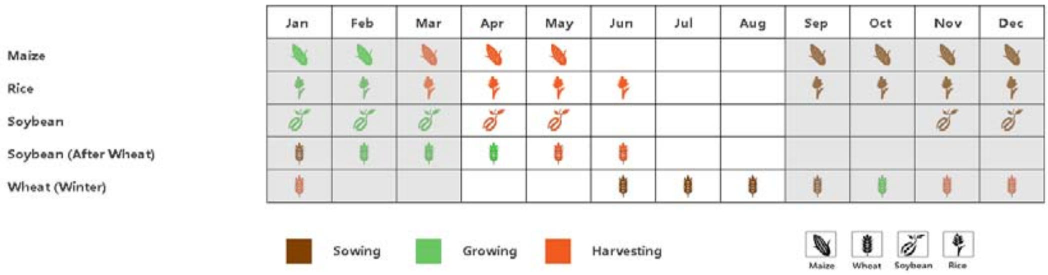
According to the cropped arable land fraction indicator (CALF), higher reductions were observed for Pampas (-6.7 %) and Chaco (-0.43 %), while Subtropical highlands and Mesopotamia showed increments of 1.6 and 0.7 % respectively.

Maximum VCI was characterized by near average values for most of the country (between 0.8 and 1) and low variation from average (among 0.5 and 0.8). Depressed Pampas region showed higher than average values and West Pampas very low values (less than 0.5). Considering sub regions, Maximum VCI was high for Tropical Highlands (0.87), Chaco (0.83) and Mesopotamia (0.83) and low for the Pampas (0.2). This low value can be associated to flooding conditions in part of this sub region.

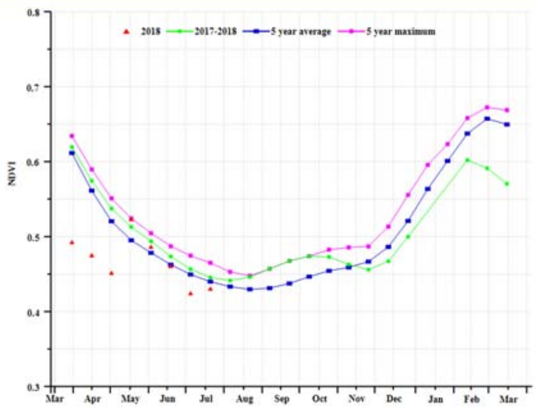
Crop condition development graph based on NDVI analysis for sub regions showed for Chaco, Mesopotamia and Pampas, a recovering pattern (NDVI anomalies at the beginning and more similar to average values during last months), probably due to drought conditions occurred during last reporting period and wetter conditions for this reporting period. For Subtropical highlands, a pattern more similar to average values was observed.

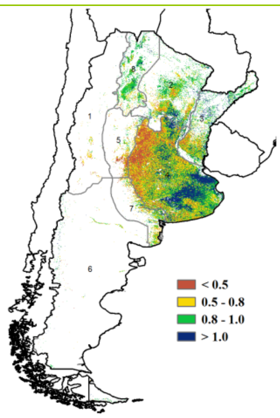
The CropWatch estimates for Soybean, Maize and Rice are 14.1%, 15.1% and 5.7% below previous year's production as a result of excess precipitation.

Figure 3.8. Argentina's crop condition, April-July 2018



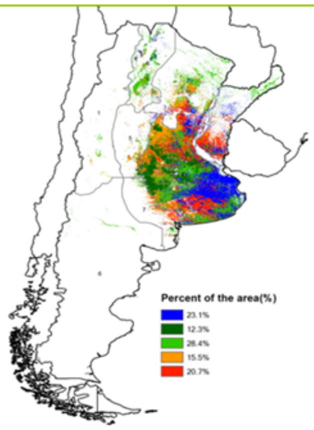
(a). Phenology of major crops

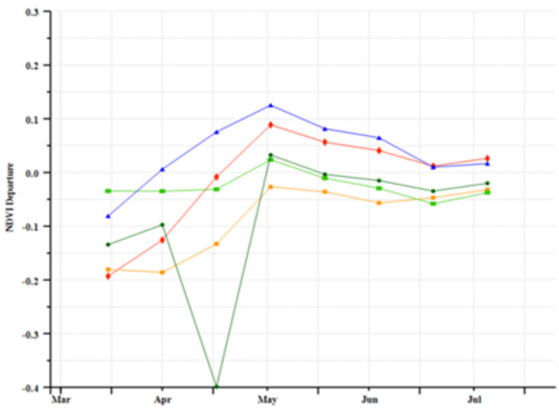




(b) Crop condition development graph based on NDVI

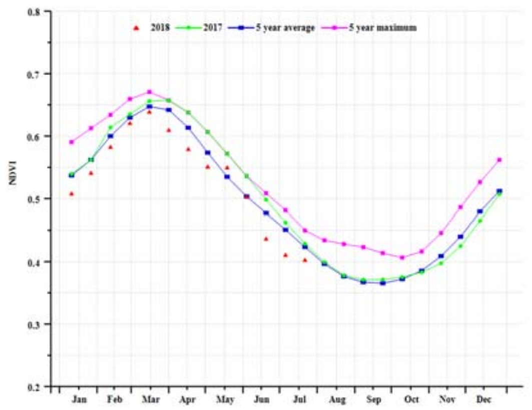
(c) Maximum VCI

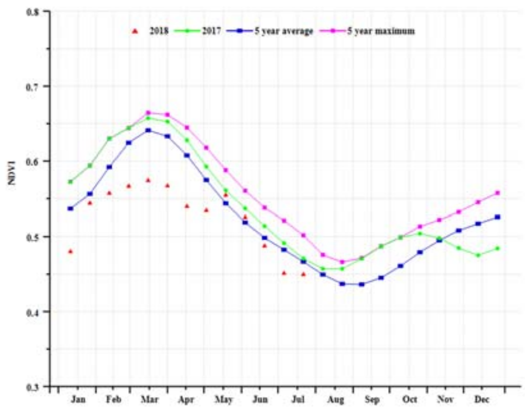




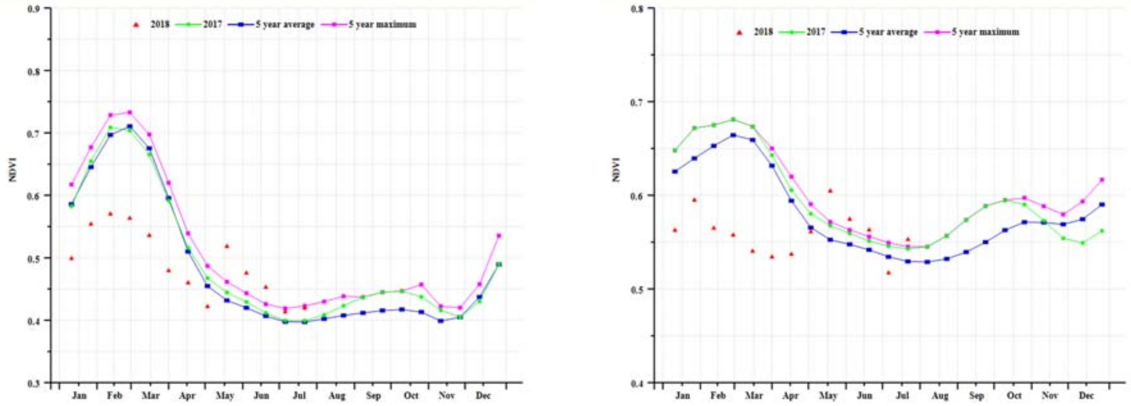
(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles





(f) Crop condition development graph based on NDVI (Subtropical highlands (left) and Chaco region (right))



(g) Crop condition development graph based on NDVI (Pampas region (left) and Mesopotamia region (right))

Table 3.7. Argentina’s agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018.

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m²)	Departure from 15YA (%)
Chaco	517	-7	25.6	-0.1	1134	-1
Mesopotamia	499	-23	24.7	0.1	1178	2
Pampas	345	-27	21.9	0.4	1197	2
Subtropical_highland	516	0	23.7	-0.5	1029	1

Table 3.8. Argentina’s agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m²)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Chaco	1412	-5	100	0	0.58
Mesopotamia	1368	-14	100	0	0.52
Pampas	1145	-17	97	-2	0.73
Subtropical_highland	1392	1	100	1	0.68

Table 3.9. CropWatch-estimated maize, rice and soybean production for Argentina in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Maize	29946	-3	0	28819	-4
Rice	1789	-15	0	1516	-15
Soybean	51116	-8	0	46942	-8

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[AUS] Australia

The main crops of Australia are wheat and barley, which are normally planted from the end of April to July to be harvested from October to January. The crop condition during the currently monitored period was mixed. The national NDVI profile showed around one month delay of sowing due to rather late and insufficient rainfall (RAIN, -45%), although the temperature (TEMP, -0.4°C) and sunshine (RADPAR, +1%) were average. The VCIx was rather low at 0.27 during the planting season of wheat and barley. The Cropped Arable Land Fraction (CALF) attained 86%, 4% below the five-year average.

The spatial NDVI pattern further showed that the central and southern New South Wales and some parts of north-east Victoria experienced severely lagged behind average growing conditions of the last 5 years, with the VCIx below 0.5. The below average crop condition of New South Wales and Victoria was due to poor rainfall (RAIN, -56% and -41%), as the States recorded average temperature (TEMP, 0.5°C and 0.1°C) and radiation (RADPAR, 6% and 0%). The resulting BIOMSS drop is 48% and 32%, respectively.

Regional analysis

Based on cropping systems, climatic zones, and topographic conditions, five sub-national regions can be distinguished for Australia, which are relevant for crops cultivation. These five regions are the Southeastern wheat zone, Southwestern wheat zone, Arid and semi-arid zone, Wet temperate and subtropical zone, and sub-humid subtropical zone.

The Southeastern wheat zone experienced severely delayed growing conditions, starting with planting, which closely followed the national NDVI profile. The region recorded a severe 43% deficit in rainfall with rises in temperature (+0.3°C) and RADPAR (+3%), resulting in BIOMSS being 36% below the recent average. CALF nevertheless remained surprisingly high (95%) and the same as the five-year average.

The southwestern wheat zone showed below average condition but with no sowing delay according to the regional NDVI profile: below average from April to June and close to average in July. The region had the least severe rainfall deficit (-23%), with stable temperature and radiation. The weather based potential biomass was 20% below the five-year average. The region was the only one in the country where CALF increased (+4%). The situation is confirmed by the NDVI cluster maps in the Western Australia region.

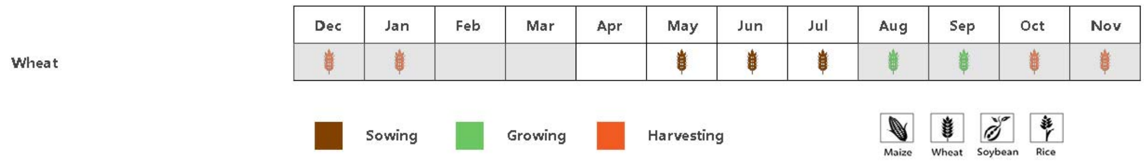
The crop condition in the country's arid and semi-arid zone displayed below average values. The regional NDVI profile was close to average in April but dropped below average thereafter, resulting from the insufficient rainfall (-49%), again combined with average TEMP and RADPAR. The potential biomass was 25% below average. CALF was 76%, and VCIx reached 0.73, indicating that lower rainfall has caused some adverse effect on the crops.

The crop condition in the wet temperate and subtropical zone appeared below average according to the regional NDVI profile during this period: below average from April to June but recovering to 5-year average in July. The region was 35% deficient in rainfall with marginally above average temperature (TEMP, +0.1°C) and stable radiation. BIOMSS was 37% below average. The area had high CALF (98%) with low VCIx (0.36), indicating a high cropped area but mediocre prospects.

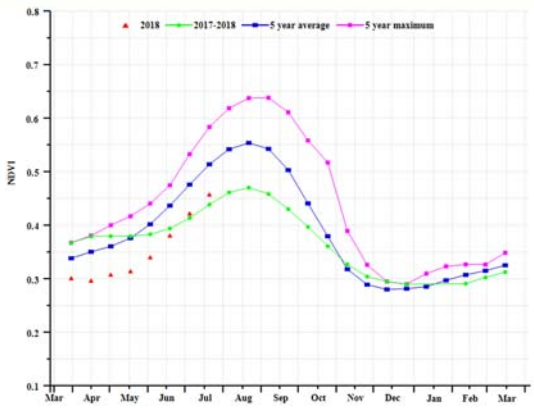
Crops in Australia's sub-humid subtropical zone showed generally below average condition during the whole monitored period, which was possibly related to the sowing delay caused by extreme drought mentioned above. Rainfall underwent a severe deficit of 63% with normal temperature and RADPAR, resulting in BIOMSS falling 55%. The area also experienced a low CALF (53%) as well as poor VCIx (0.3), indicating below average cropped area and unfavorable production prospects, which deserves close monitoring in the coming months.

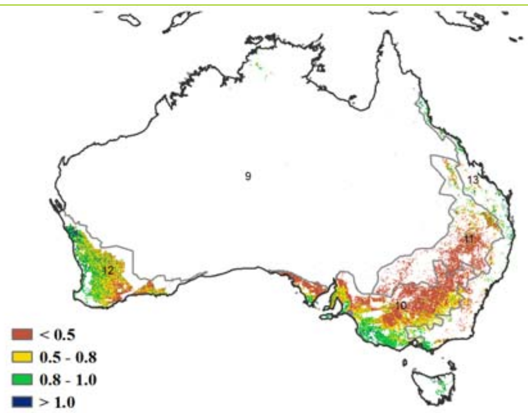
On the whole, CropWatch estimates the wheat production of Australia will decrease by 19.7% in 2018 with a yield decrease of 9.7% and an area increase of 11.1%, compared with 2017.

Figure 3.9. Australia’s crop condition, April -July 2018



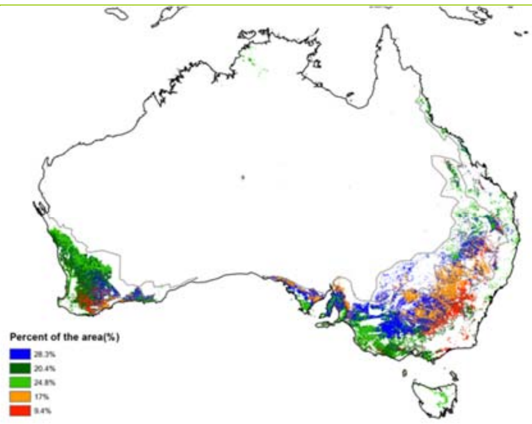
(a). Phenology of major crops

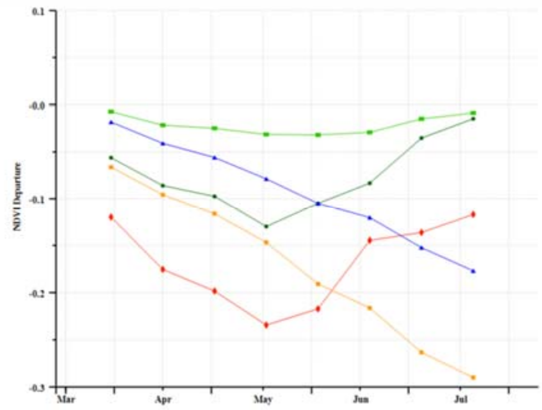




(b) Crop condition development graph based on NDVI

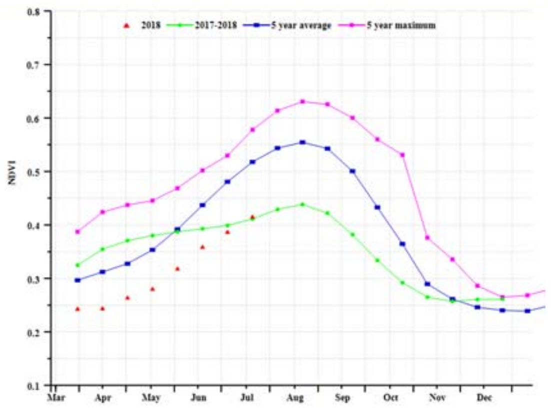
(c) Maximum VCI

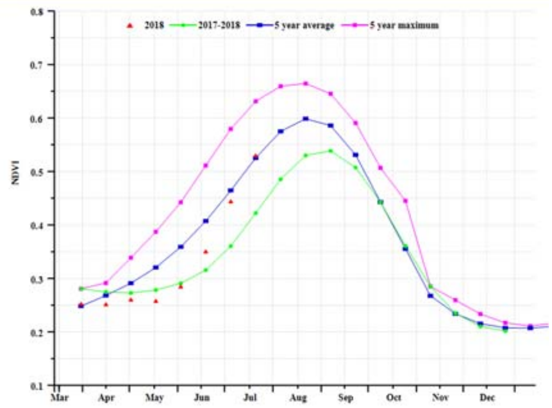




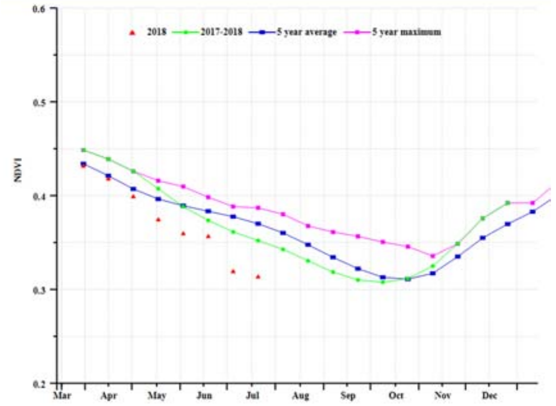
(d) Spatial NDVI patterns compared to 5YA

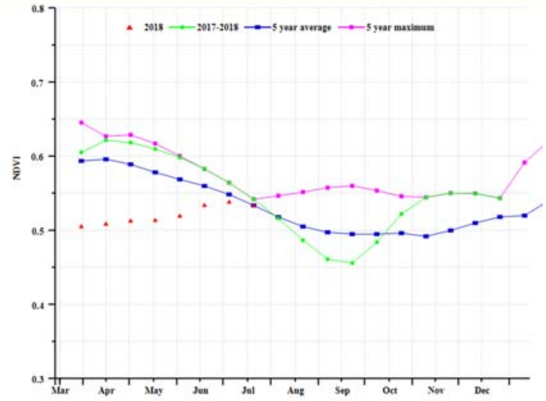
(e) NDVI profiles



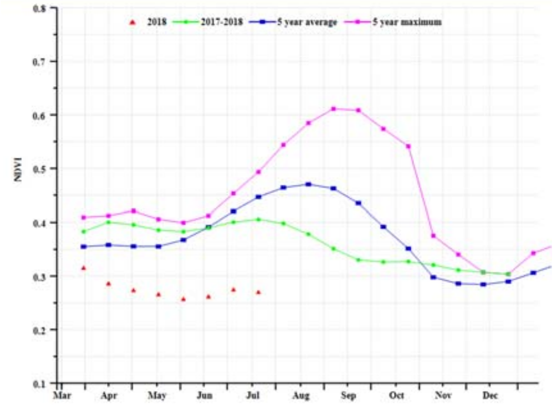


(f) Crop condition development graph based on NDVI (South-eastern wheat zone (left) and South-western wheat zone (right))





(g) Crop condition development graph based on NDVI (Arid and semi-arid zone (left) and Wet temperate and sub-tropical zone (right))



(h) Crop condition development graph based on NDVI (Sub-humid subtropical zone)

Table 3.10. Australia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m²)	Departure from 15YA (%)
outheastern wheat zone	94	-43	12.2	0.3	630	3
Southwestern wheat zone	163	-23	14.0	0.1	669	0
Arid and semiarid zone	50	-49	23.3	-0.3	1092	3
Wet temperate and subtropical zone	104	-49	13.9	0.1	711	3
Subhumid subtropical zone	46	-63	14.8	0.3	846	6

Table 3.11. Australia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m²)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Southeastern wheat zone	409	-36	95	0	0.06
Southwestern wheat zone	580	-20	89	4	0.58
Arid and semiarid zone	244	-25	76	-1	0.73
Wet temperate and	453	-37	98	-1	0.36

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
subtropical zone					
Subhumid subtropical zone	221	-55	53	-20	0.30

Table 3.12. CropWatch-estimated Wheat production for Australia in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Wheat	24606	-9.7	-11.1	19750	-19.7

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[BGD] Bangladesh

Bangladesh is located in a humid climate region. Rice is by far the preferred cereal, followed by maize and wheat. Dry season irrigated Boro rice and wheat crops were harvested during the reporting period (April-July). The Field preparation and planting of monsoon rice (Aus and Aman) was done during the reporting period.

Nationwide crop condition based on NDVI graphs was slightly below the average of the last 5 years, the 5-year maximum as well as the previous season (2017). NDVI peaked in April and decrease from the middle of May till July.

The Spatial NDVI patterns compared to 5YA showed a reduction of the vegetation cover in the east and an improvement in the west, especially in June and July. VCIx varied between 0.8 and 1, indicating good production prospects.

Regional analysis

Bangladesh is divided into four Agro-ecological zones (AEZ) or regions: Coastal region, Gangetic plain, the Hills and the Sylhet basin.

The Coastal region received high rainfall (1539mm, 23% above average) and TEMP was 29°C (-1.1°C). RADPAR reached 968 MJ/m2 a very significant drop of -10.6% below average. The increase of rainfall resulted in 24% higher than 5YA BIOMASS accumulation potential. High NDVI, CALF at 0.8 % and VCIx at 0.9 indicated higher production in general.

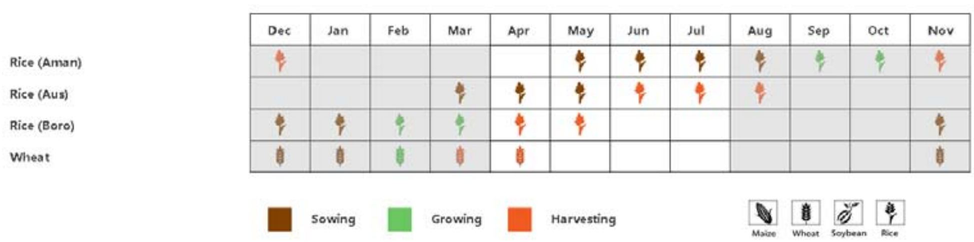
The Gangetic plain region received a high amount of rain (1424mm, 23% over average) and TEMP dropped 1.5 °C below average, while RADPAR was down 8 %. CALF (90 %) and VCIx at 0.9 with BIOMASS up to 17% (against 5YA) indicate good crops.

The Hills region precipitation amounted to 1985 mm (11% higher than average. TEMP was cooler by -1.4°C and RADPAR was 5 % below average. The BIOMASS reached 2355 gDM/m2 and was 3 % above the 5YA. The CALF did not change relative to the 5YA and VCIx was high at 0.9 which indicates good production.

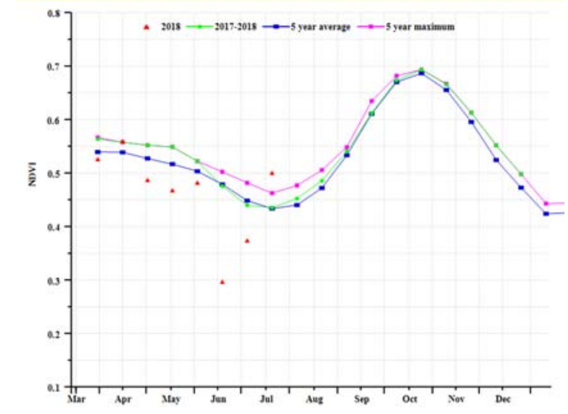
The Sylhet basin region recorded the highest precipitation in Bangladesh (2225 mm) up 29% above average, with below average TEMP at 27.7°C (-1.3°C) and a below average RADPAR (902 MJ/m2 or -5%). The BIOMASS was higher than the average (+10%) and CALF increased 2% higher than 5YA. Together with a VCIx value of 0.9, crop prospects are favorable.

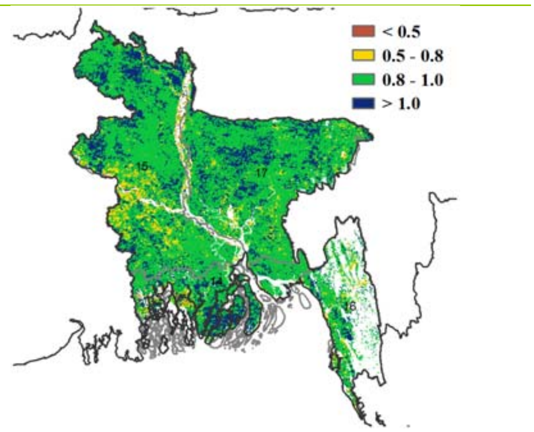
CropWatch puts the production estimate of Maize and Rice 4% and 6% above the output of the 2017 season.

Figure 3.10. Bangladesh's crop condition, April-July 2018.



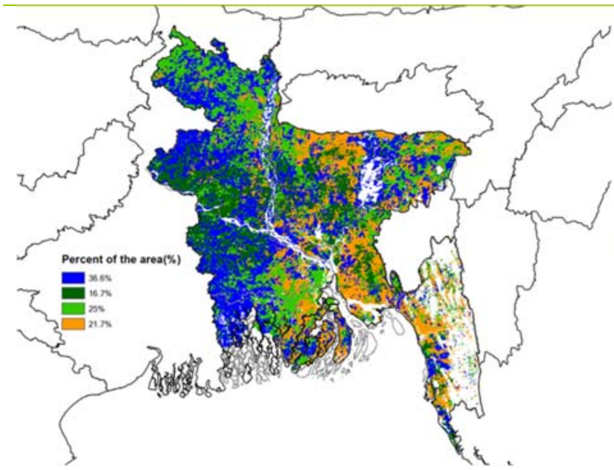
(a). Phenology of major crops

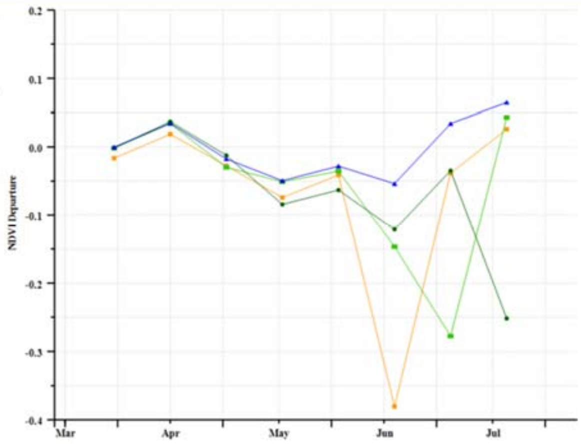




(b) Crop condition development graph based on NDVI

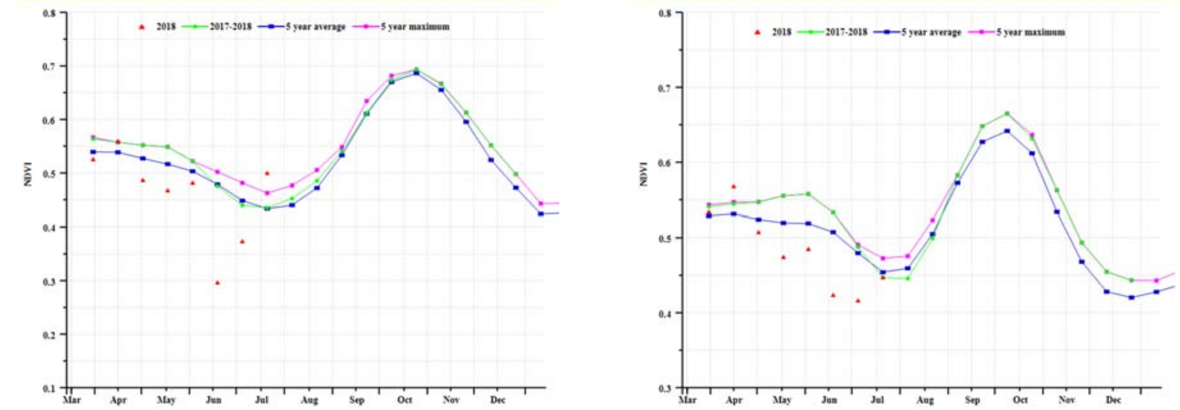
(c) Maximum VCI



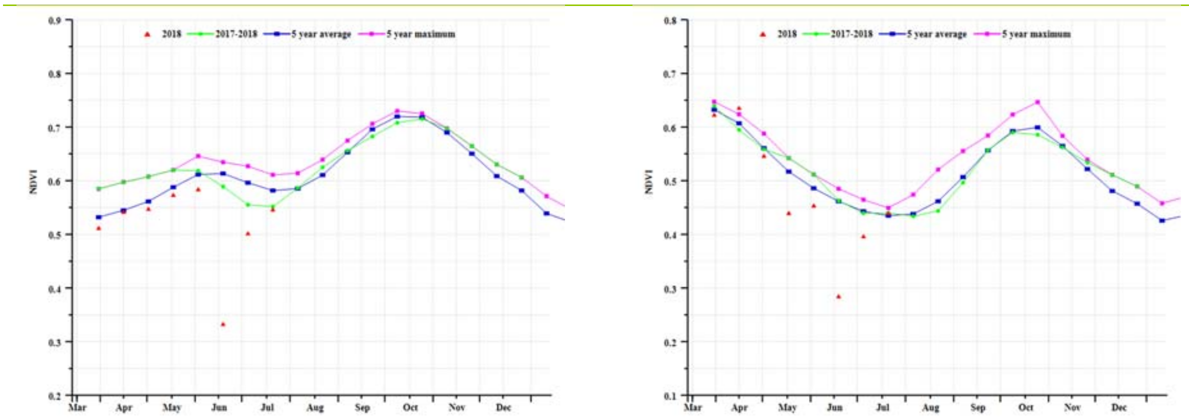


(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles



(f) Crop condition development graph based on NDVI (Coastal Region (left) and Gangetic Region (right))



(g) Crop condition development graph based on NDVI (Hill Region (left) and Sylhet Basin (right))

Table 3.13. Bangladesh's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA April-July 2018.

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Coastal region (Bangladesh)	1539	23	29	-1.1	968	-10.6
Gangetic plain (Bangladesh)	1424	23	28.7	-1.5	970	-7.9
Hills (Bangladesh)	1985	11	27.1	-1.4	970	-5.3
Sylhet basin (Bangladesh)	2225	29	27.7	-1.3	902	-4.9

Table 3.14. Bangladesh's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April-July 2018.

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Coastal region (Bangladesh)	2414	24	80	0.9	0.9
Gangetic plain (Bangladesh)	2361	17	100	0.2	0.9
Hills (Bangladesh)	2355	3	100	-0.2	0.9
Sylhet basin (Bangladesh)	2585	10	100	2	0.9

Table 3.15. CropWatch-estimated rice and Maize production for Bangladesh in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Maize	2245	4.10%	0.00%	2337	4.10%
Rice	45274	6.50%	-0.30%	48063	6.20%

[BLR] Belarus

Wheat, triticale and barley are three major cereal crops in Belarus, while during the current monitoring period Bielarussian farmers harvested winter wheat in July and planted spring wheat and other summer crops such as barley from April.

Agroclimatic conditions were satisfactory (RAIN 287 mm, +5%; TEMP 16.4℃, +1.4℃; RADPAR 1129 MJ/m², +4%). Agronomic indicators also showed a very good maximum vegetation condition index (VCIx, 0.93) and crop arable land fraction (CALF, 99%). At national level, the crop condition development graph was close to or above the 5YA average from middle April to middle May. After a temporary drop in June (in 18% of cropped areas), NDVI gradually recovered to normal levels. The drop is most likely due to premature harvest due to abnormally high temperature. According to the spatial distribution maps, VCIx was satisfactory in most areas of the country (above 0.8). Globally, BIOMSS is expected to decrease by 4%, while the winter wheat production will remain stable.

Regional analysis

Regional analyses are provided for three agroecological zones (AEZ) defined by their cropping systems, climatic zones and topographic conditions. They are referred to as Northern Belarus (159) with the Regions of Vitebsk, northern area of Grodno, Minsk and Mogilev; Central Belarus (158) with the southern part of Grodno, Minsk and Mogilev, the north of Brest and Gomel and Southern Belarus (160) with the southern halves of Brest and Gomel regions.

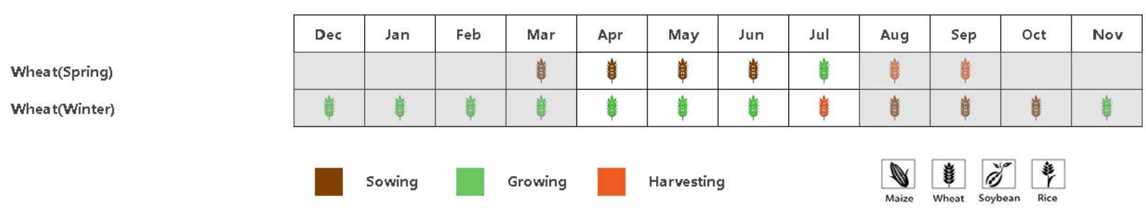
All three AEZs were exposed to abnormally high temperature with anomalies between 1.3℃ and 1.6℃, which is likely to have shifted phenology ahead by about one month, as shown in the NDVI-based crop development graphs, and caused water stress in summer crops.

Northern Belarus recorded average rainfall, 1.3% higher temperature, 4% higher radiation but satisfactory agronomic indicators: 99% of CALF and 0.94 for VCIx. However, NDVI profiles in this area dropped below 5 YA average since June, which agrees with projected biomass 5% lower than the 5 YA average level.

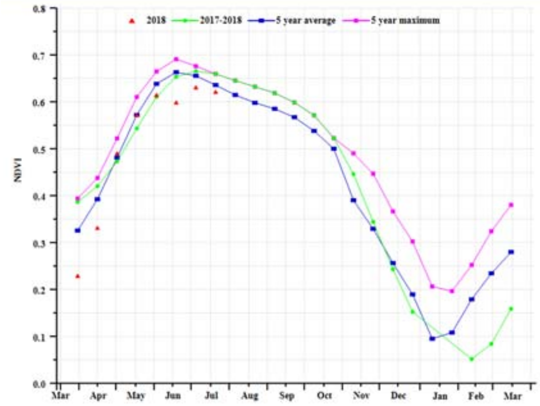
Central Belarus recorded above average rainfall (RAIN +8%), temperature (TEMP +1.6℃) and radiation (RADPAR +4%) with VCIx at 0.92 and high CALF (99%) indicating that nearly all arable land is cultivated. However, continuous near or below average NDVI until June restricted potential biomass (BIOMSS -3%).

The situation in Southern Belarus different little from the other area: 10% excess rainfall, +1.4℃ temperature anomaly and abundant radiation (+3%). CALF reached 100% and high VCIx (0.95) confirmed a good condition for crop growth. However, potential biomass seemed not benefit from above conditions (BIOMSS -2%).

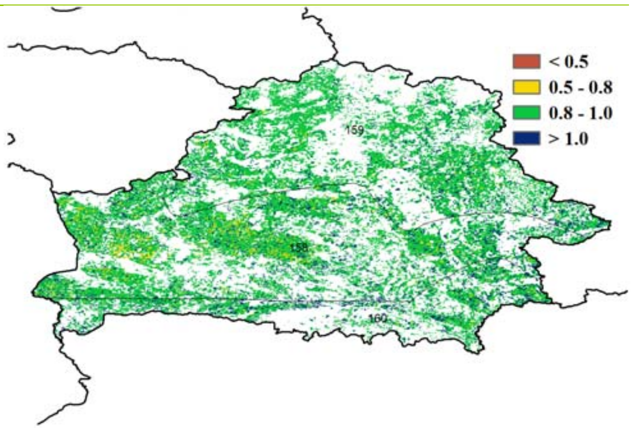
Figure 3.12. Belarus's crop condition, April-July 2018



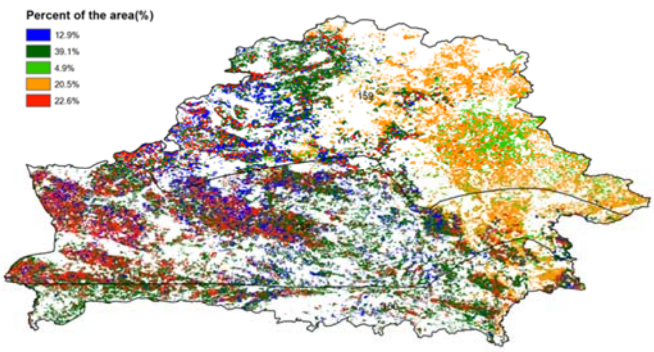
(a). Phenology of major crops



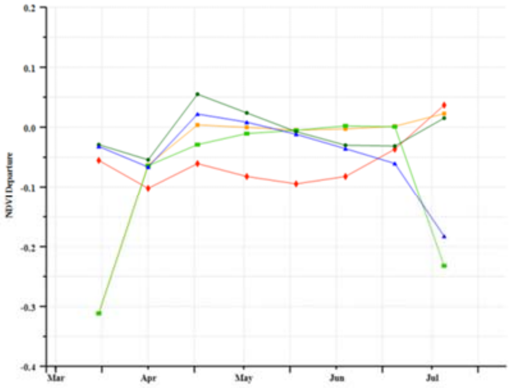
(b) Crop condition development graph based on NDVI



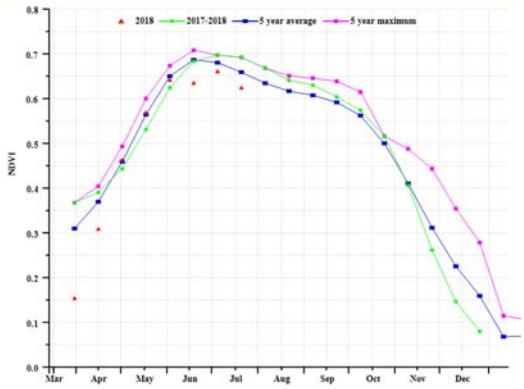
(c) Maximum VCI



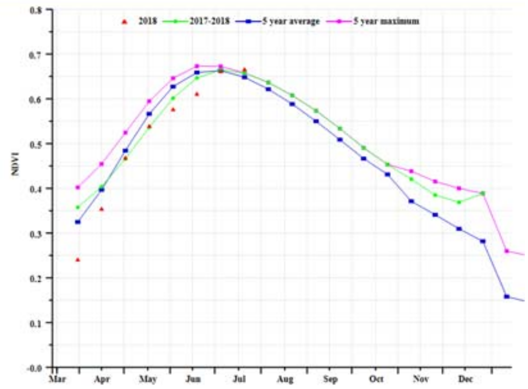
(d) Spatial NDVI patterns compared to 5YA



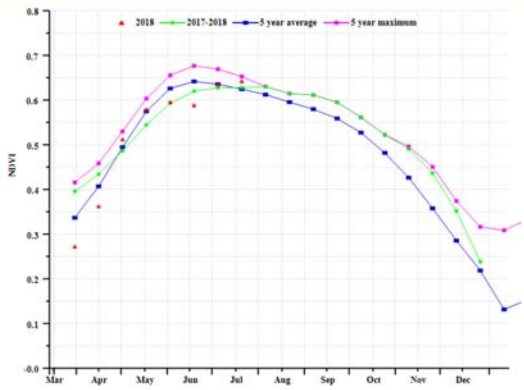
(e) NDVI profiles



(f) Crop condition development graph based on NDVI (Northern Belarus)



(g) Crop condition development graph based on NDVI (Central Belarus)



(h) Crop condition development graph based on NDVI (Southern Belarus)

Table 3.16. Belarus's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA April-July 2018.

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Northern Belarus	283	0	15.7	1.3	1112	3
Central Belarus	294	8	16.7	1.6	1138	4
Southern Belarus	285	10	17.4	1.4	1150	3

Table 3.17. Belarus's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April-July 2018.

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Northern Belarus	1123	-5	99	0	0.94
Central Belarus	1105	-3	99	0	0.92
Southern Belarus	1080	-2	100	0	0.95

Table 3.18. CropWatch-estimated rice and Maize production for Belarus in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Wheat	2766	-24.3%	2.4%	2768	0.1%

[BRA] Brazil

This bulletin covers the harvesting of summer crops (maize, soybean and rice) in most areas of Brazil except for north-east where maize is still at peak growing stage. After sowing from the end of April, wheat is currently at early to peak of growing season.

Generally, crop condition in Brazil was average compared to the same period in the previous five years. The CropWatch agroclimatic indicators show below average weather conditions compared with average (15YA) with 16% below average rainfall (308 mm) and 0.4 °C below average temperature (24.1 °C). Together with 2% above average radiation, BIOMSS was 18% lower than the previous five years average. Most states received below average rainfall except for Goias where rainfall was 8% above average. Five major states including Mato Grosso Do Sul, Minas Gerais, Parana, Santa Catarina, and Sao Paulo are suffering from drought with more than 30% rainfall deficit compared with 15YA. Shortage of rainfall in those states hampered the Biomass accumulation as indicated by the significant negative departure. However, since summer crops were at maturity and harvesting stage during the monitored period, the low rainfall does not have much impacts on the crop outputs.

Overall crop conditions in Brazil were slightly below average according to the national NDVI profile for Brazil from April to July 2018. NDVI departures cluster and the map show spatial and temporal diversity of crop condition during the monitoring period. Over more than half of croplands conditions were average with above average crops (16%) mostly distributed in coastal areas and Mato Grosso. Crops with below average condition concentrated in western Sao Paulo and neighboring regions. National maximum vegetation condition index (VCIx) presents same spatial pattern with lower value only in Parana River zone. Average VCIx value for Brazil was 0.90 during the monitoring period. Almost 99% of arable land was cultivated, 0.4% above 5YA.

Maize and soybean production for Brazil is revised down at 85482 ktons and 96311 ktons, 1 million tons down from the previous forecast but still slightly above previous year. Rice production is revised up at 3% above 2017 or 11666 ktons thanks to the favorable conditions in Rio Grande Do Sul. Wheat production is projected at 8205 ktons, 1% more than 2017 wheat outputs.

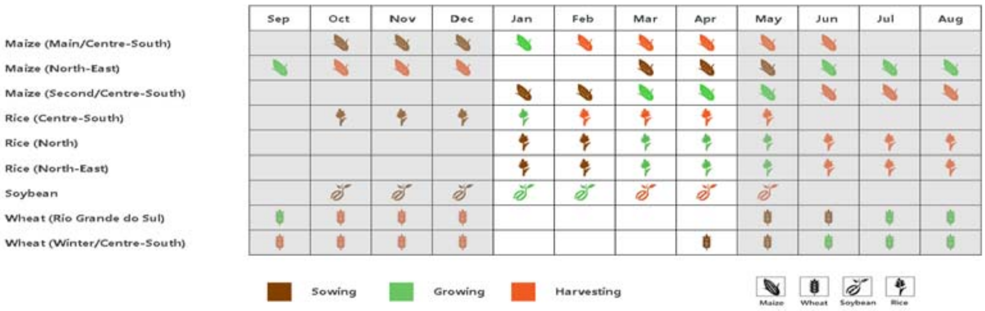
Regional analysis

Based on cropping systems, climatic zones, and topographic conditions, eight agro-ecological zones are identified for Brazil. They include the Amazonas (18), Central Savanna (19), Eastern coastal zone (20), Northeastern mixed forest and farmland (21), Mato Grosso (22), Nordeste (23), Parana basin (24), and Southern subtropical rangelands (25).

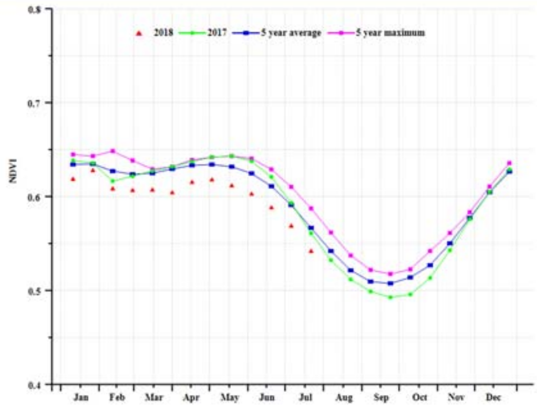
Over the recent reporting period, only one AEZ (Amazonas) received above average rainfall (+7%). RAIN in Central Savana, Northeastern mixed forest and farmland, Mato Grosso and Southern Subtropical rangelands was close to average while the remaining three AEZs suffered from water shortage, ranging from 17% to 49%. Three AEZs including Nordeste, Parana Basin, and Southern Subtropical rangelands experienced close to average temperature while other AEZs experienced lower temperature. Favorable temperature conditions were beneficial for crops because they lengthened the period for dry matter distribution to seeds.

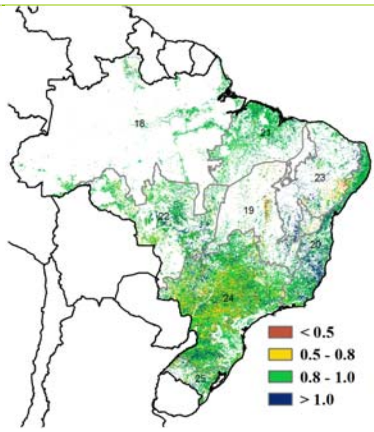
The variation of weather conditions among AEZs distributes the crop condition into different categories: (1) well below average condition were observed in Amazonas, Northeastern mixed forest and farmland, Parana Basin, and Southern subtropical rangelands mainly due to the continous unfavorable conditions; Among those AEZs, Parana Basin presents the worst situation but VCIx was still at 0.87; (2) Central Savana and Mato Grosso presented average condition thanks to the average and stable weather conditions; (3) even the rainfall during the monitoring period is lower than average; crops in Nordeste and Eastern coastal zones were at above average condition as indicated by the above average NDVI peak resulting mainly from adequate rainfall during the previous monitoring period.

Figure 3.13. Brazil's crop condition, April – July 2018

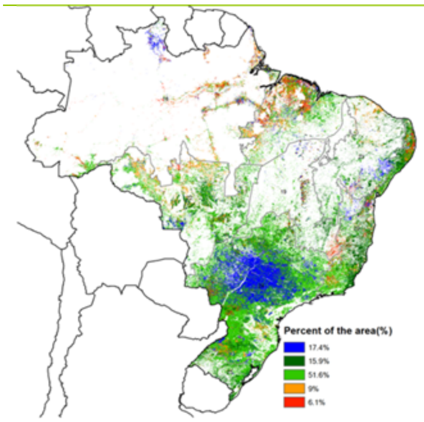


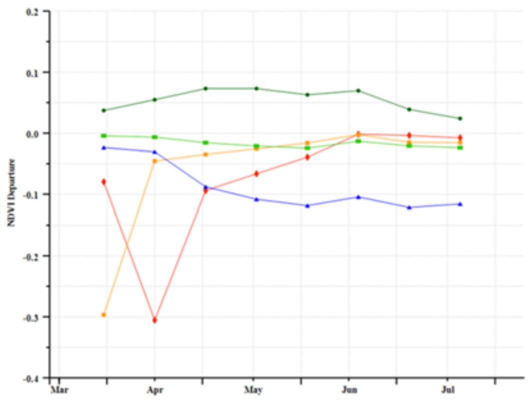
(a). Phenology of major crops



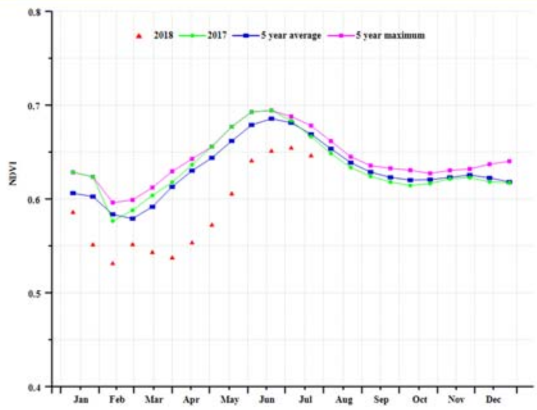


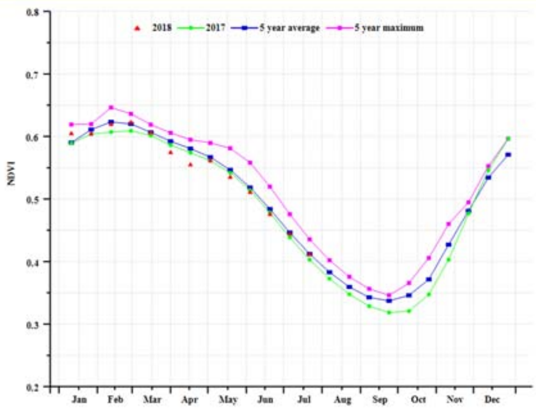
(b) Crop condition development graph based on NDVI (c) Maximum VCI



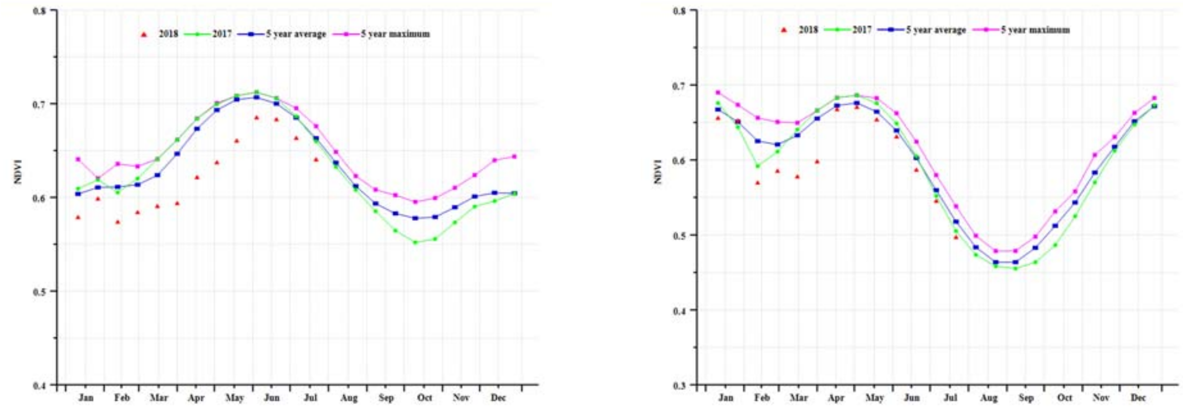


(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles

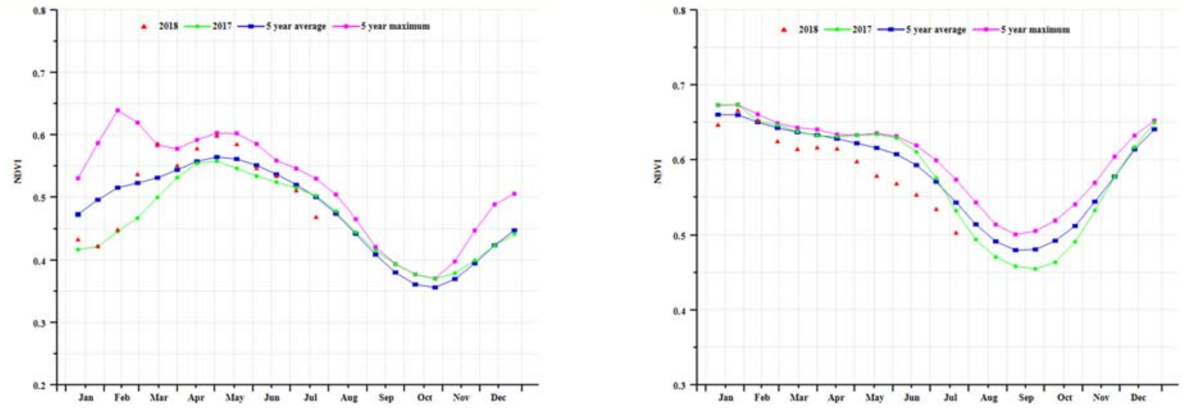




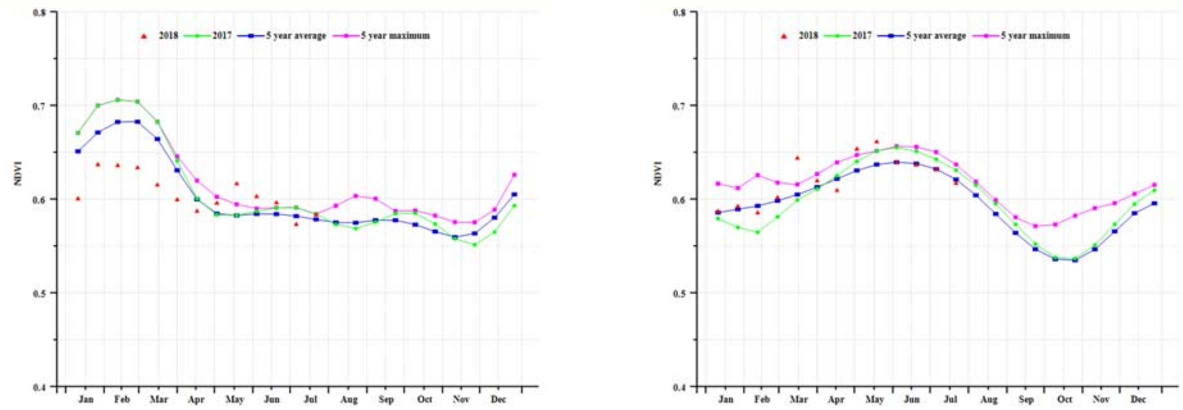
(e) Crop condition development graph based on NDVI ((Central Savanna) (left) and (East coast zone) (right))



(f) Crop condition development graph based on NDVI (Parana River (left) and Amazonas (right))



(g) Crop condition development graph based on NDVI (Mato Grosso region (left) and Sub-tropical rangeland (right))



(h) Crop condition development graph based on NDVI (Mixed forest and farmland (left) and (Brazil Nordeste)(right))

Table 3.19. Brazil’s agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April – July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m2)	Departure from 15YA (%)
Amazonas	809	7	26.9	-0.8	933	0
Central Savanna	140	0	24.3	-0.9	1066	3
East coast	142	-33	22.9	-0.6	844	0
Northeastern mixed forest and farmland	562	-3	27.6	-0.8	1034	3

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m2)	Departure from 15YA (%)
Mato Grosso	222	-4	25.8	-1.1	1043	3
Nordeste	159	-17	26.4	0.1	1027	0
Parana basin	183	-49	21.1	0.3	895	4
Southern subtropical rangelands	519	1	16.9	0.1	611	-7

Table 3.20. Brazil's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April – July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Amazonas	1740	-1	100	0	0.94
Central Savanna	406	-10	95	-1	0.89
East coast	545	-19	100	0	0.97
Northeastern mixed forest and farmland	1220	-10	100	0	0.94
Mato Grosso	676	-9	100	0	0.91
Nordeste	474	-21	96	7	0.95
Parana basin	597	-41	100	0	0.87
Southern subtropical rangelands	1526	7	99	1	0.91

Table 3.21. CropWatch-estimated maize, rice and soybean production for Brazil in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Maize	84019	0	2	85482	2
Rice	11344	1	2	11666	3
Wheat	8120	1	0	8205	1
Soybean	96726	0	0	96311	0

AFG AGO ARG AUS BGD BLR BRA **CAN** DEU EGY ETH FRA GBR HUN IDN IND IRN ITA KAZ KEN KHM LKA MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[CAN] Canada

The current reporting period covers both the harvest of winter wheat and the early development of summer crops. Rainfall was below the recent 15-years average in most of Canada (RAIN, -18%). Both the temperature and radiation were almost average (TEMP, -0.1°C; RADPAR, +1%), and the maximum VCI value was 0.92. Because of the insufficient rainfall, the potential biomass was slightly below the recent 5-years average (BIOMSS, -10%).

Based on the NDVI profiles and crop condition clusters, crop growth conditions were below those of both the last year and recent 5-years average from April to June, and improved in July. This was mostly the result of poor growth conditions of winter wheat. Most of Canada had VCIx greater than 0.8, but values were below in the middle-southern Prairies.

Both agro-climatic and remote sensing indicators show crop condition that could be slightly below the average of the recent 5-years average. In particular, the conditions in three main production provinces of Canada were unsatisfactory, with below average rainfall and biomass production potential: Alberta -17% and -12 %, respectively; Manitoba -22% and -17% and Saskatchewan -24% and -19%.

As a result, the overall condition of winter wheat in Canada was poor, and the summer crops, except the spring wheat, also had worrying early stages. CropWatch predicts that the crop production of Canada is unlikely to reach 2017 levels.

Regional analysis

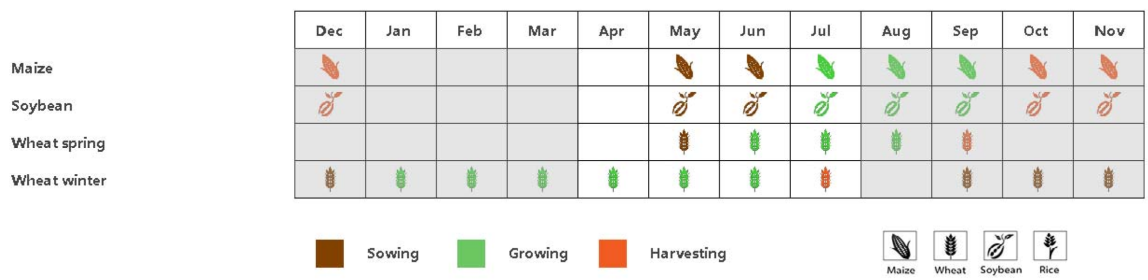
The Prairies (area identified as 30 in the maximum VCI map) and Saint Lawrence basin (26, covering Ontario and Quebec) are the major agricultural regions.

The rainfall in the Prairies, the main food production area in Canada, was below average (RAIN 215 mm, -22%), while both the temperature and radiation were almost normall (TEMP, 0.1°C; RADPAR, +1%). Due to the poor rainfall, the potential biomass was below the 5-years average (BIOMSS, -17%). According to the NDVI profiles, the growth condition of winter wheat was generally worse than the 5YA, which is likely to lead to a reduction of production. At the same time, the summer crops also experienced an unfavorable start.

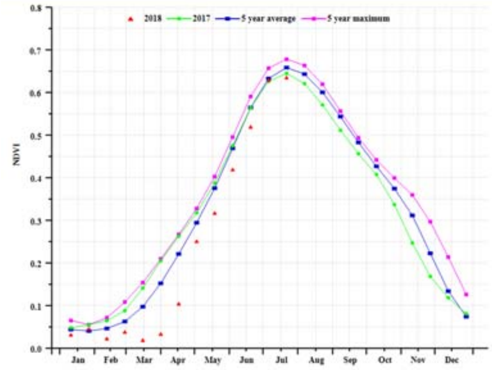
The rainfall of the Saint Lawrence basin was below average (RAIN 268 mm, -22%) as well, but temperature was almost average (-0.3°C), and the radiation was above average (+4%). The potential biomass was below the average (BIOMSS, -12%). The NDVI profiles also indicated that the crop conditions were poor from April to June, which was the end of the growth period of winter wheat. This was similar to the Prairies subregion, but the condition of summer crops in July was almost equal to the recent 5-years maximum.

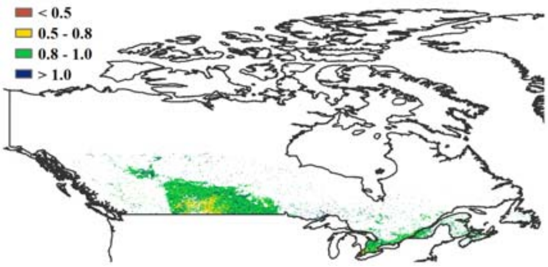
Overall, the crop condition of Canada is mixed: the winter wheat was probably poor but spring wheat could be fine; other summer crops still have chance to improve if the weather becomes favorable. Current CropWatch estimates indicate a slightly increase in wheat production (30,741 ktons, 0.2% above 2017), and drops in maize (11,387 ktons, -4.2% below 2017) and soybean (5,183 ktons, -5.3% below 2017).

Figure 3.14. Canada's crop condition, April – August 2018



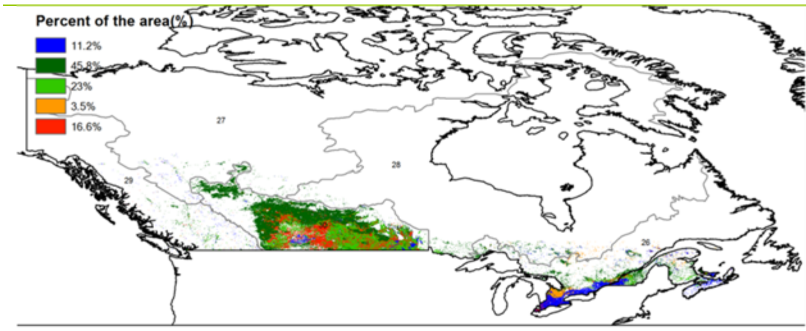
(a). Phenology of major crops

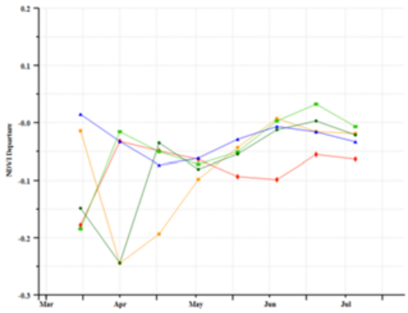




(b) Crop condition development graph based on NDVI

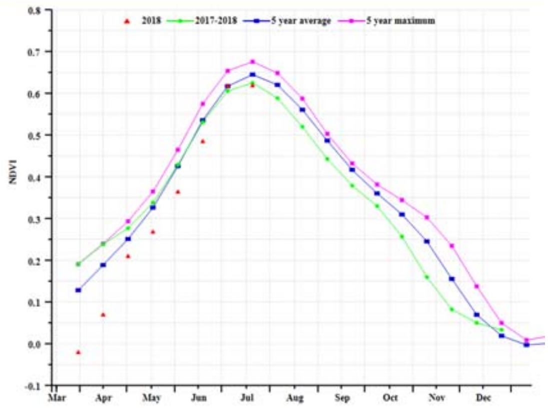
(c) Maximum VCI

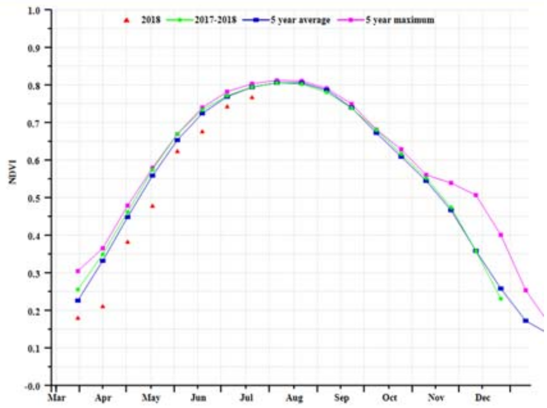




(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles





(f) Crop condition development graph based on NDVI (Canadian Prairies region (left) and Saint Lawrence basin region (right))

Table 3.22. Canada's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April – August 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Prairies (Canada)	215	-22	11.8	0.1	1261	1
Saint Lawrence basin (Canada)	268	-22	11.4	-0.3	1196	4

Table 3.23. Canada agronomic indicators by sub-national regions, current season's values and departure from 5YA, April – August 2018

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Prairies (Canada)	899	-17	98	0	0.90
Saint Lawrence basin (Canada)	1088	-12	100	0	0.93

Table 3.24. CropWatch-estimated wheat production in Canada for 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Wheat	30679	2.5	-2.2	30741	0.2
Maize	11881	-3.6	-0.6	11387	-4.2
Soybean	5471	-4.5	-0.8	5183	-5.3

[DEU] Germany

Overall, the crops in Germany showed below average condition during the reporting period from April to July during which winter wheat, spring wheat, and maize are the main grain crops. Currently winter wheat has been harvested while the other two are nearing harvest. At the national level, CropWatch agroclimatic indicators show below average precipitation (Rain, -33%), temperature and radiation well above average (TEMP +1.8°C, RADPAR, +9%). Below average precipitation occurred throughout most parts of Germany during the reporting period, except in Rheinland-Pfalz and Baden-Wuertenberg from mid-May to mid-June. Above average temperatures were observed throughout Germany before mid-June, and warmer-than-usual weather conditions continued to prevail throughout Germany after early-July. Below average temperatures were only observed from late-June to early July. Warm temperatures coupled with a persistent rainfall deficit affected winter crops flowering and grain filling in large parts of Germany, and the biomass accumulation potential BIOMSS was 28% below the recent five-year average.

As shown by the crop condition development graph, national NDVI values were below average during the whole reporting period, except for one period in late-April with close to or above average values. These observations are confirmed by the NDVI profiles. Winter crops in the Schleswig-Holstein, Mecklenburg-Vorpommern, eastern Niedersachsen and Sachsen-Anhalt had generally unfavorable condition, with low VCIx areas and NDVI due to warmer-than-usual weather conditions. Summer crops were also below average in Schleswig-Holstein, Mecklenburg-Vorpommern, eastern Niedersachsen, Sachsen-Anhalt, Brandenburg, Thüringen and Sachsen according to the NDVI, as result of warm temperature coupled with a persistent rainfall deficit.

Generally, the values of agronomic indicators show unfavorable condition for most winter crops and the sowing of summer crops. In the wheat area, crop condition is slightly below the average of last year. The condition of maize is slightly above average that of last year's, and the production of wheat and maize is estimated at respectively 4.4% and 2.8% below 2017 values.

Regional analysis

Based on cropping systems, climatic zones, and topographic conditions, six sub-national regions can be distinguished for Germany, among which three are relevant for crops cultivation. These three regions are the northern wheat zone, northwest mixed wheat and sugar beets zone, central wheat zone.

The CropWatch agroclimatic indicator for Schleswig-Holstein and the Baltic coast show that RAIN was below average (-45%), radiation was above average (RADPAR +12%), and temperature was significantly above average (TEMP +2.0°C, which is the largest temperature departure in Germany). as a result, biomass (BIOMSS) in this zone fell by 36% compared to the five-year average. As shown in the crop condition development graph based on NDVI, the NDVI values were below average during the whole reporting period and with low VCIx areas. Warmer-than-usual weather conditions caused crops to mature early and yields were affected; NDVI clusters show the same pattern, indicating unfavorable crop prospects.

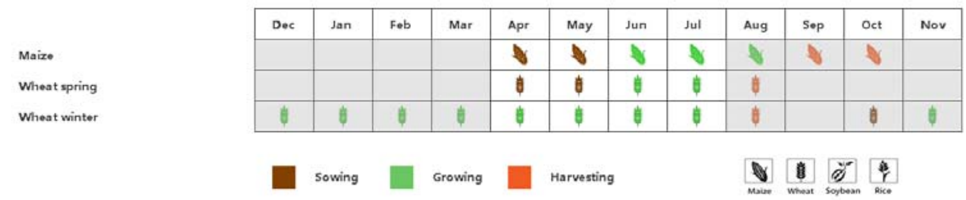
The CropWatch agroclimatic indicators for **Mixed wheat and sugar beet zone of the north-west** show that RAIN was below average (-42%), temperature was above (TEMP +1.9°C) and so was radiation, resulting in unfavorable crop condition for both crops. Biomass (BIOMSS) in this zone dropped by 35% compared to the five-year average. As shown in the crop condition development graph based on NDVI, the values were below average throughout. Crop condition for the region is unfavorable.

For Central wheat zone of Saxony and Thuringia region, it is the region with the most serious precipitation stress (RAIN -47%). Warm temperature (TEMP +1.8°C) and the precipitation deficit caused biomass potential (BIOMSS indicator) to fall 40% below average. As shown in the crop condition development graph based on NDVI, the values were below average during the whole period, showing unfavorable crop prospects.

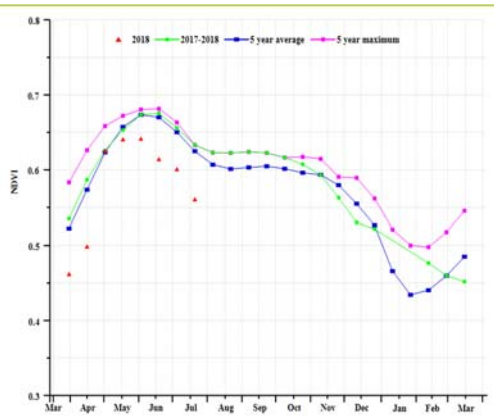
The cropland in **the sparse crop area of the east-German lake and Heathland** and **western sparse crop area of the Rhenish massif** are more marginal. Rainy weather was recorded (RAIN -46% and -24%, respectively), as well as above average temperatures (TEMP, +1.9°C in both areas) and radiation (RADPAR, +10% and +9%). Compared to the average of the last five years, BIOMSS was lower by 36% and 19% respectively, while the Cropped Arable Land Fraction was at 100% for both. As shown in the crop condition development graph based on NDVI, the values in the region of sparse crop area of the east-German lake and Heathland were below average during the reporting whole period, showing unfavorable crop prospects. In the western sparse crop area of the Rhenish massif, values were above average only from mid-April to mid-May; crop prospects are unfavorable as well.

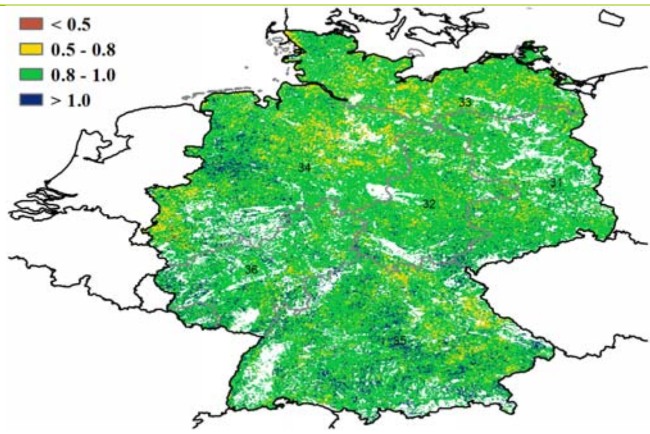
Maize, wheat and potato major crops in the **Bavarian Plateau**. The CropWatch agroclimatic indicators show that abnormal weather was recorded for RAIN (-21%), TEMP (+1.6°C), and RADPAR (+7%). Compared to the five-year average, BIOMSS decreased 17% but the Cropped Arable Land Fraction stayed at 100%. Due to precipitation deficit and warm temperature, the crop condition was below average.

Figure 3.15. Germany's crop condition, April -July 2018

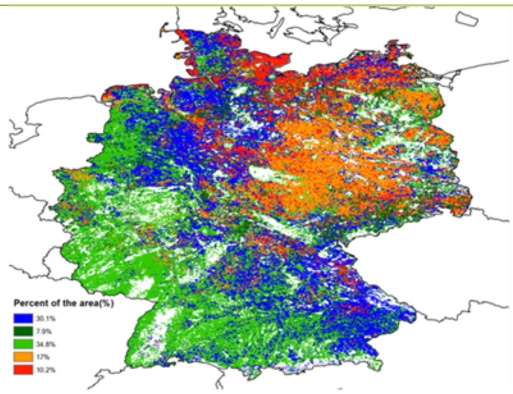


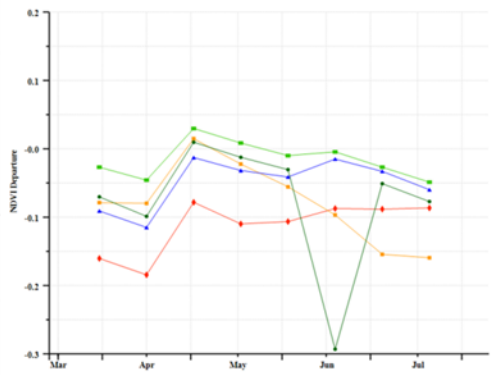
(a). Phenology of major crops



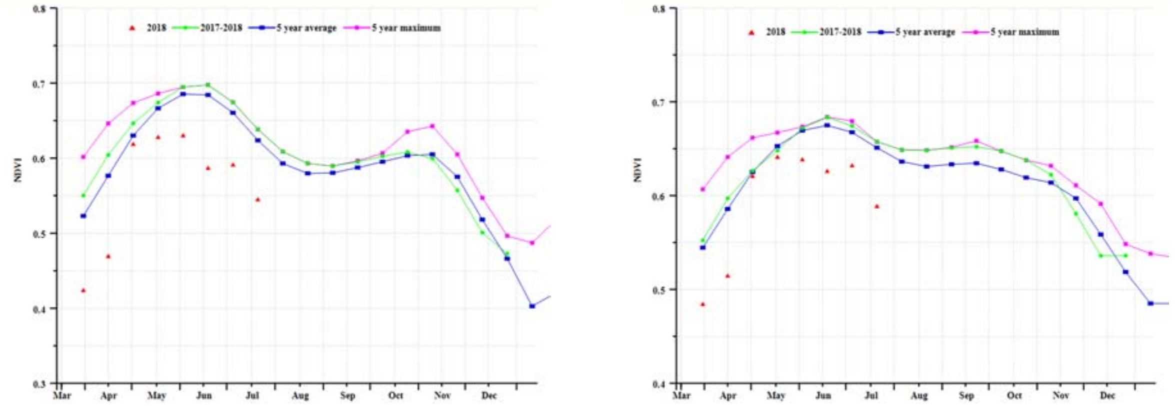


(b) Crop condition development graph based on NDVI (c) Maximum VCI

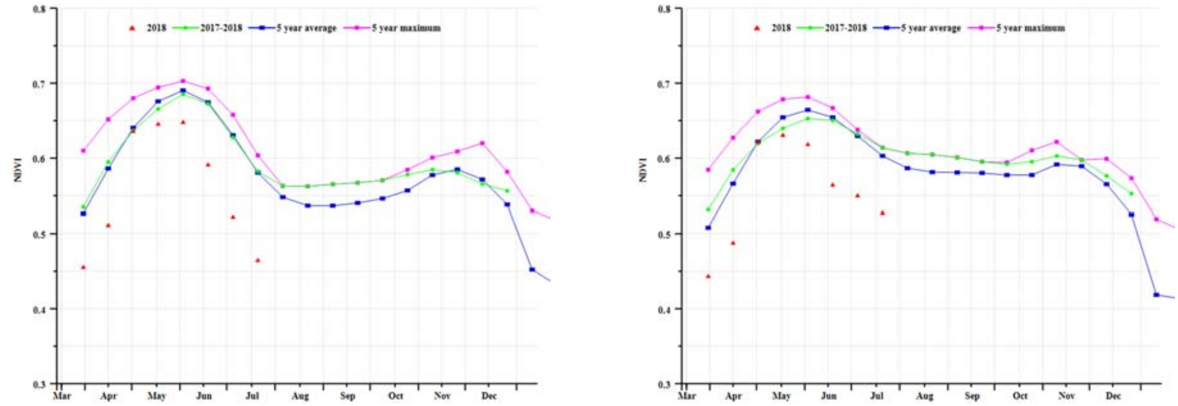




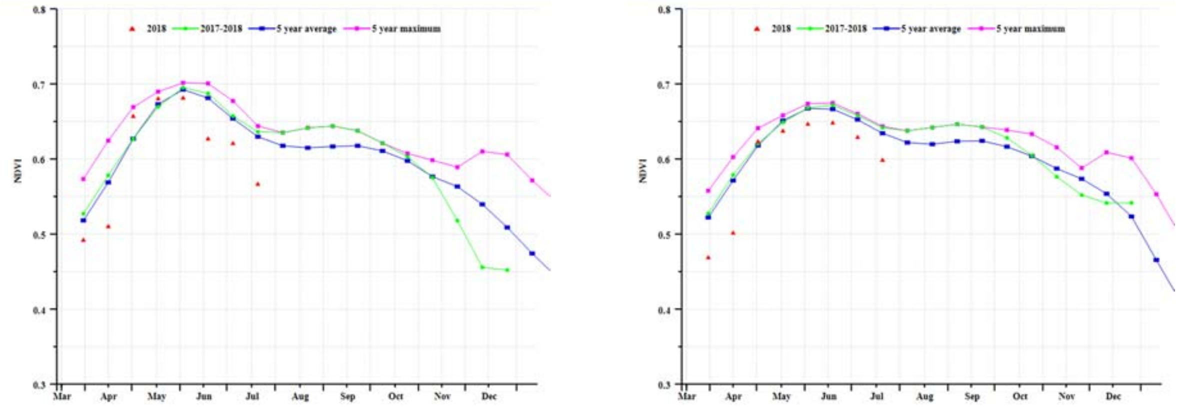
(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles



(f) Crop condition development graph based on NDVI (Wheat zone of Schleswig-Holstein and the Baltic coast (left) and Mixed wheat and sugar beets zone of the north-west(right))



(g) Crop condition development graph based on NDVI (Central wheat zone of Saxony and Thuringia(left) and Sparse crop area of the east-German lake and Heathland (right))



(h) Crop condition development graph based on NDVI (Western sparse crop area of the Rhenish massif (left) and Bavarian Plateau (right))

Table 3.25. Germany's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m2)	Departure from 15YA (%)
Wheat zone of Schleswig-Holstein and the Baltic coast	137	-45	16.5	2.0	1230	12
Mixed wheat and sugar beets zone of the north-west	154	-42	16.9	1.9	1178	10

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m2)	Departure from 15YA (%)
Central wheat zone of Saxony and Thuringia	133	-47	17.5	1.8	1207	11
Sparse crop area of the east-German lake and Heathland	133	-46	17.4	1.9	1198	10
Western sparse crop area of the Rhenish massif	203	-24	17.1	1.9	1202	9
Bavarian Plateau	283	-21	16.6	1.6	1198	7

Table 3.26. Germany's agronomic indicators by sub-national regions, current season's value and departure from 5YA, April -July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Wheat zone of Schleswig-Holstein and the Baltic coast	669	-36	100	0	0.86
Mixed wheat and sugarbeets zone of the north-west	725	-35	100	0	0.89
Central wheat zone of Saxony and Thuringia	636	-40	100	0	0.90
Sparse crop area of the east-German lake and Heathland	660	-36	100	0	0.91
Western sparse crop area of the Rhenish massif	913	-19	100	0	0.93
Bavarian Plateau	1116	-17	100	0	0.92

Table 3.27. CropWatch-estimated wheat and Maize production for Germany in 2018 (thousands tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Wheat	2813.0	-4.2%	-0.2%	2688.5	-4.4%
Maize	475.5	-2.9%	0.1%	462.	-2.8%

AFG AGO ARG AUS BGD BLR BRA CAN DEU **EGY** ETH FRA GBR HUN IDN IND IRN ITA KAZ KEN KHM LKA MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[EGY] Egypt

During the April to July 2018 period, winter wheat reached its final stage (pre-harvest or harvest), while the summer crops (e.g. maize and rice) were sown and were still growing. Nationwide agro-climatic indicators show that rainfall (RAIN) and TEMP were average (TEMP was 25°C, 0.5°C above the 15YA). The radiation (RADPAR) was 1553 MJ/m2, -3% below 15YA, while the estimated biomass (BIOMSS) was 57 gDM/m2, and 47 % above 5YA. Generally, crops being irrigated, RADPAR is the main limiting factor.

The spatial NDVI patterns show that the conditions of 71% of the total cropped area were below the 5 years average from April to mid-May, after which crop condition became either above or close the 5YA conditions. The maximum VCI map shows poor and fair crops (< 0.5 and 0.5 to 0.8) are mostly located in the Nile Delta, whereas the value of the maximum VCI for the whole country was 0.7. The Cropped arable land fraction (CALF) was only 2% less than the 5YA nationwide.

CropWatch estimates that crop conditions was moderate during the analysis period. The variation in CropWatch-estimated maize, rice, and wheat production was lower (-2.4%, -2.9% and -1.6%, respectively) compared to the previous season.

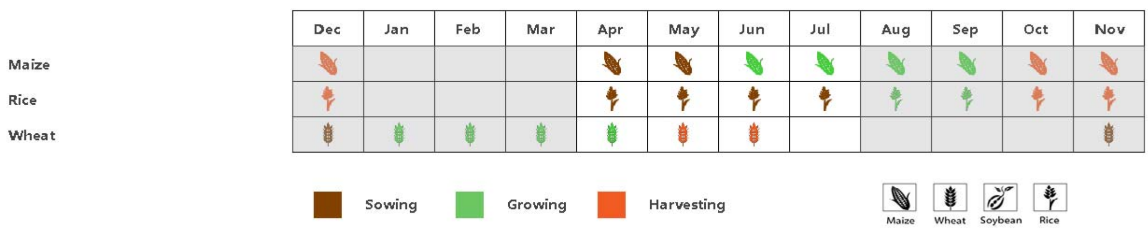
Regional analysis

Egypt can be subdivided into three agro-ecological zones (AEZ) based mostly on cropping systems, climatic zones, and topographic conditions. Only two of them are relevant for crops: the first zone is the **Nile Delta and Mediterranean coastal strip**, while the second zone is the **Nile Valley**.

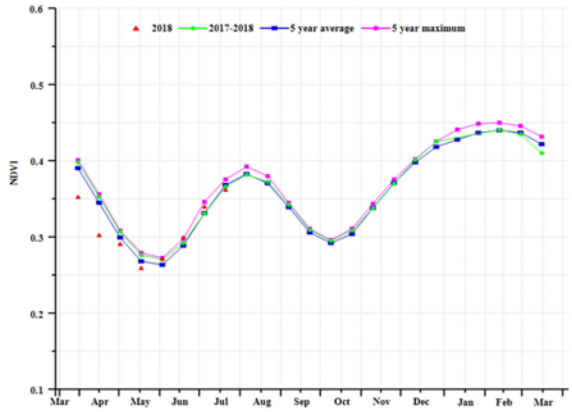
Rainfall was seasonally low in both AEZs (6 mm in the **Nile Delta and Mediterranean coastal strip** and 25 mm in the **Nile Valley**. Since virtually all Egyptian crop production is irrigated, rainfall makes little change in the outcome of the season, although additional water usually has a beneficial effect. RADPAR for both zones was (-3% and -4%, respectively) slightly below average; the BIOMSS index shows an increase (25% and 37% above the 5YA, respectively) for both zones.

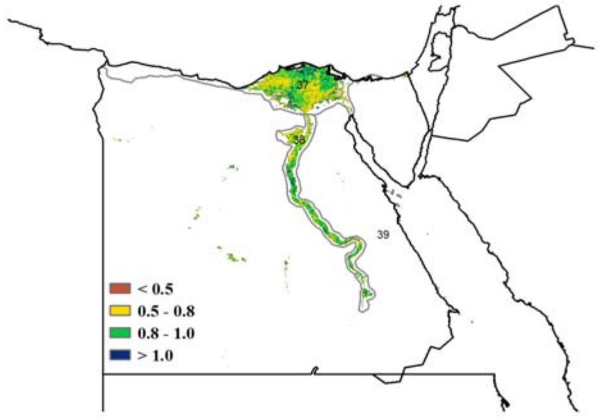
The NDVI-based Crop condition development graphs indicate below average conditions in the period from April to mid-May for both zones after which crop condition for the two zones returned to be close to or above average, especially in Nile Valley zone where the crop condition even exceded the last 5 years maximum after mid-May, in agreement with the VCIx values (0.7 and 0.8, respectively).

Figure 3.16. Egypt's crop condition, April -July 2018

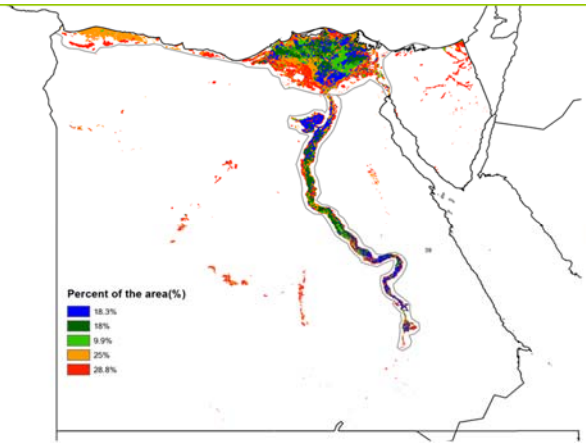


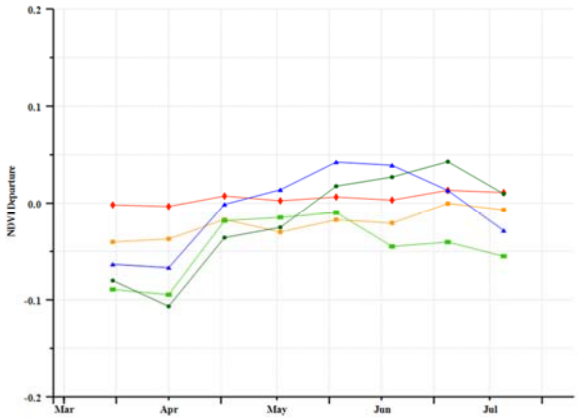
(a). Phenology of major crops



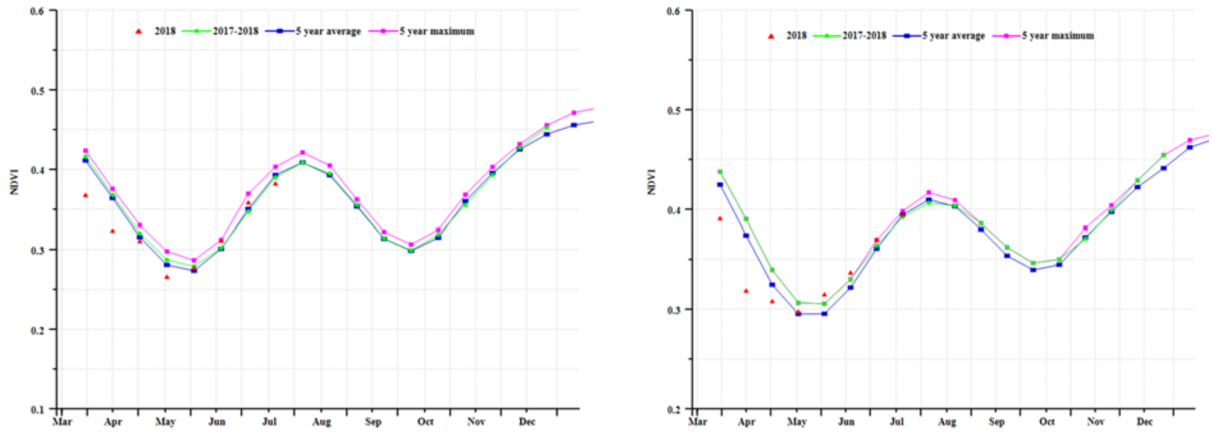


(b) Crop condition development graph based on NDVI (c) Maximum VCI





(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles



(f) Crop condition development graph based on NDVI (Nile Delta (left) and Nile Valley (right))

Table 3.28. Egypt’s agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

	RAIN		TEMP		RADPAR	
Region	**Current (mm)**	**Departure from 15YA (%)**	**Current (°C)**	**Departure from 15YA (°C)**	**Current (MJ/m2)**	**Departure from 15YA (%)**
Nile Delta and Mediterranean coastal strip	6	-5	24.7	0.5	1544	-3
Nile Valley	25	64	27.4	0.3	1573	-4

Table 3.29. Egypt's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

	BIOMSS		CALF		Maximum VCI
Region	**Current (gDM/m^2)**	**Departure from 5YA (%)**	**Current (%)**	**Departure from 5YA (%)**	**Current**
Nile Delta and Mediterranean coastal strip	48	25	1	0	0.7
Nile Valley	71	37	1	-2	0.8

Table 3.30. CropWatch-estimated maize, rice, and wheat production for Egypt in 2018 (thousand tons)

	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Maize	5918	-6.9%	4.8%	5774	-2.4%
Rice	6545	-6.5%	3.9%	6358	-2.9%
Wheat	10963	-6.6%	5.4%	10790	-1.6%

[ETH] Ethiopia

Ethiopia experiences two main agricultural seasons: Meher and Belg. Meher is the main crop season and farmers cultivate cereals like, wheat, teff, maize and barley. This reporting period corresponds to Belg harvesting time and Meher land preparation and planting (the season covers crops harvested from August to the end of December). Agroclimatic indicators were below average (RAIN - 9%, TEMP -0.4°C), and radiation (RADPAR) was stable, resulting in a minor BIOMSS potential drop of 2% compared to average. On average, VCIx was 0.87 with about half of cropped areas at values lower than 0.8. VCIx exceeding 1, indicating unusually favourable conditions was mostly distributed in small regions along eastern and central part Oromia and northern Tigray. National NDVI values were below average. According to spatial NDVI departure clusters areas with above average NDVI (about 24.5% of arable lands) are located in the central Oromia region, which is coincident with the high VCIx values. Generally, based on below average indicators the crop outlook was unfavorable. The production of wheat is estimated to decreased by 3.8 % and Maize decreased by 6.6% during the 2018 production year.

Regional analysis

Ethiopia can be subdivided into five agro-ecological zones: the semi-arid pastoral zone, southeastern highlands, southeastern mixed-maize zone, western mixed maize regions, and central-northern maize-teff highlands.

In the Western mixed maize zone, maize was the most cultivated crop during the Belg and early meher seasons. Agroclimatic variables were below average with RAIN -14%, TEMP -0.3°C and RADPAR -1%, which resulted in a BIOMSS drop of 7%. Overall,even though the maximum VCIx at 0.91% was good, the NDVI-based Crop condition development graphs was below average to that of past five years average.Base on the agreements of agronomic and Agro climatic indicators with addition to the NDVI based crop condition development over all the western maize zone there was no favorable condition. In general, during the reported period the crop Phenology of planting of Meher and harvest of Belg was Not conducive.

South-eastern Mendebo highlands

The southeastern Mendebo highlands are major maize and teff producing areas. It received 473 mm with slight above average of rainfall (RAIN, 1%). Hence the temperature was decreases by 0.6 oc from average. There was no reduction in RADPAR. Due to slight above average of rainfall The Cropped arable land fraction (CALF) dropped 3% below the recent five-year average. Even though during the reported period the AEZ had maximum VCIx at 0.97, the NDVI crop condition development graph still described the temporal difference: above average during April and May, and below average from Mid -May to end of July during the grain filing stage. Over all the NDVI crop condition graph was below the five years average. In this highland zone the crop condition was not favorable to harvest good yield and will not expect to get more yield than before during meher.

South-eastern mixed maize zone

The average rainfall was 497 mm (15% above average), the temperature was below average by 0.6. The RADPAR for both zones was about 1% below average and the BIOMSS index shows an increasing of 5% in central Oromia and eastern Amhara as The NDVI-based Crop condition development graphs indicate that from April it was rise up and drops in June as below average condition. In this zone there was also a maximum VCIx value at 0.92%. In general, based on the Agronomic and Agro Climatic indicators was Slightly increasing from average, but the NDVI profile was below average, therefore, the Crop condition was good based the agreement of the indicators

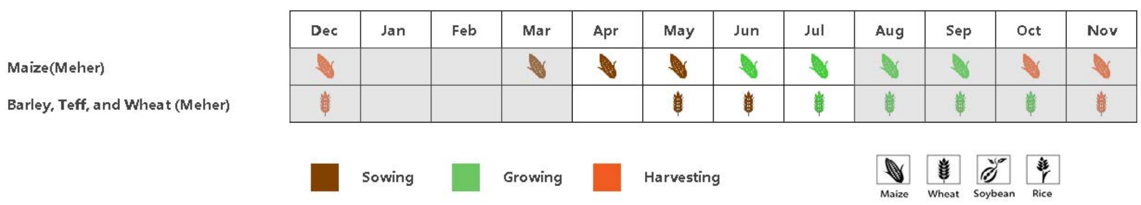
Semi-arid pastoral

The semi-arid pastoral zone commonly known by livestock production. Small semi-arid pastoral region suffered a drop-in rainfall and sunshine (RAIN -2% and TEMP -0.7°C), while The RADPAR did not register any changes compared to the Recent five-year average. The biomass in this region was increased by 2% and cropped arable land fraction (CALF) dropped by 3% below the recent five-year average. The maximum VCIx reached From the NDVI-based Crop condition development graphs, In this zone indicate below average conditions during the reported period, especially in the grain filling stage during the belg season. Over all The situation and the agreement of the agroclimatic, Agronomic indicators and the NDVI based crop condition development graph there was unfavorable condition.

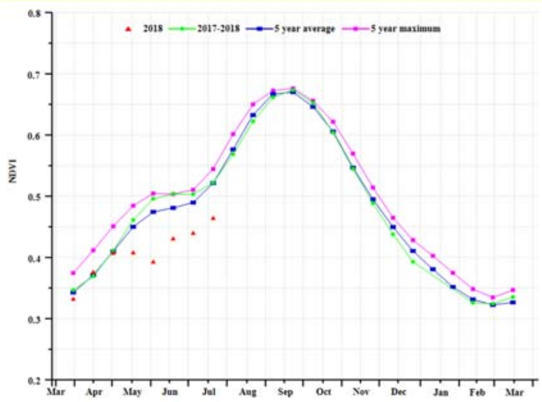
Central-northern maize-teff highlands

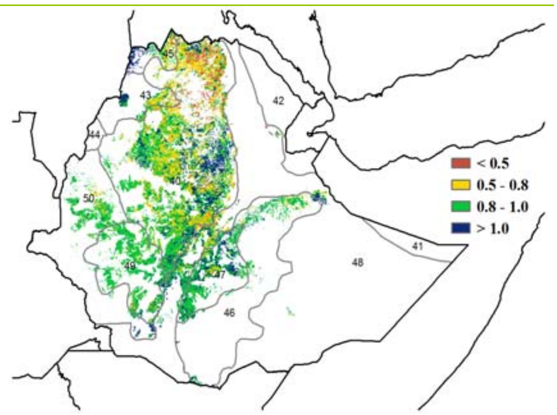
The main crops of this area in the central north highland as assigned as 40 in the VCIx map. In this zone the rainfall was below average by 10%. As a result of below average rainfall the BIOMSS production was dropped by 3%. And the Temperature was also below average (TEMP, -0.4oc) with remains constant of RADPAR. Crop condition was below average according to the NDVI development graph, an observation confirmed by the decrease of BIOMSS by -3% compared to average. Even though, this Central-northern maize-teff highlands was had maximum VCIx value at 0.84, based on the Agronomic and agro climatic indicators and the NDVI crop condition development graph over all the outlook was not conducive.

Figure 3.17. Ethiopia's crop condition, April -July 2018



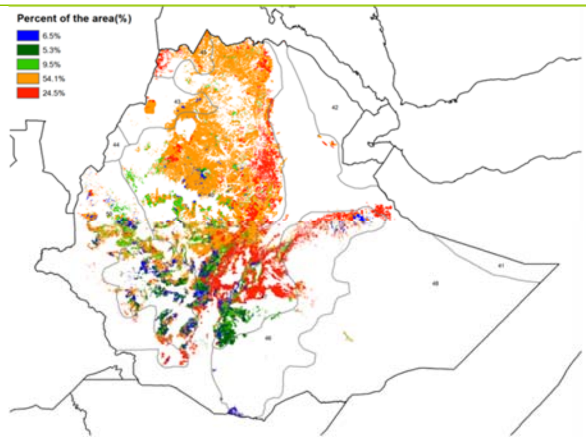
(a). Phenology of major crops

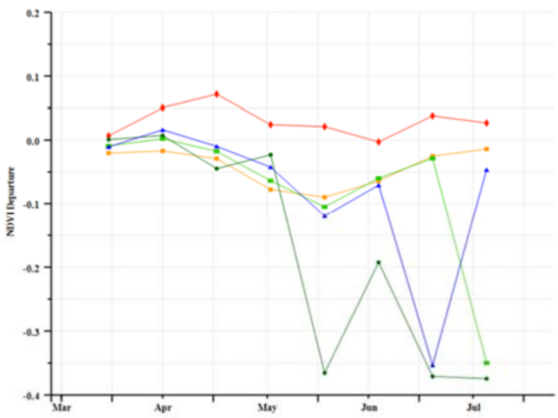




(b) Crop condition development graph based on NDVI

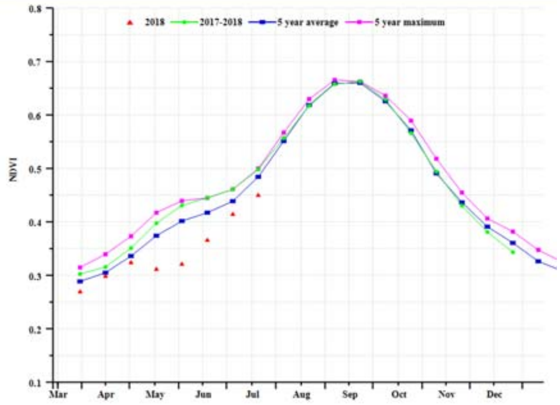
(c) Maximum VCI

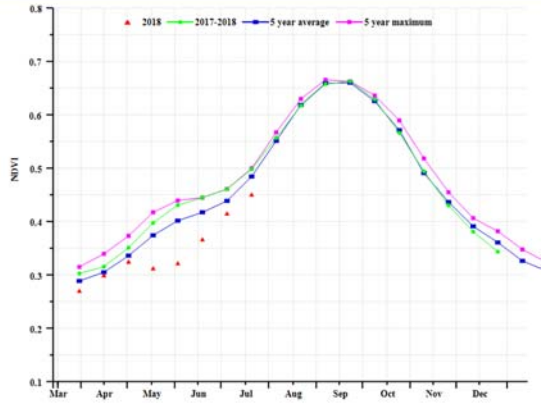




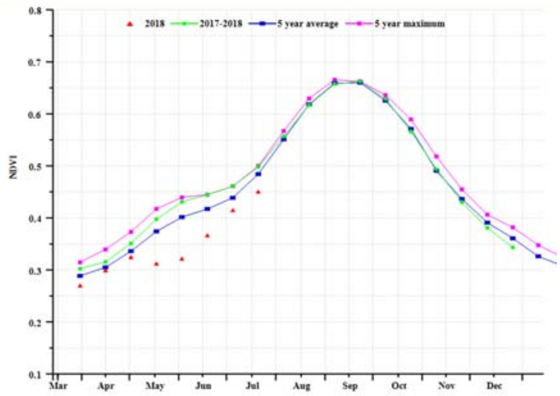
(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles





(f) Crop condition development graph based on NDVI (south-eastern mixed-maize (left) and western mixed maize zone (right))



(g) Crop condition development graph based on NDVI (Central-northern maize-teff highlands zone)

Table 3.31. Ethiopia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m2)	Departure from 15YA (%)
Central-northern maize-teff highlands	511	-10	20.6	-0.4	1203	0
South-eastern mixed maize zone	497	15	23.1	-0.6	1132	-1
South-eastern Mendebo highlands	473	1	17.9	-0.6	1103	-2
Semi-arid pastoral	416	-2	23.0	-0.7	1170	0
Western mixed maize zone	615	-14	24.5	-0.3	1113	0

Table 3.32. Ethiopia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Central-northern maize-teff	1441	-3	76	-8	0.84

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
highlands					
South-eastern mixed maize zone	1455	5	96	6	0.92
South-eastern Mendebo highlands	1504	2	99	2	0.97
Semi-arid pastoral	1344	2	77	-3	0.91
Western mixed maize zone	1739	-7	99	0	0.91

Table 3.33. CropWatch-estimated Wheat production for Ethiopia in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Maize	7154	-7.6	1	6079	-6.6
Wheat	4180	-3.9	0.1	4021	-3.8

AFG AGO ARG AUS BGD BLR BRA CAN DEU EGY ETH **FRA** GBR HUN IDN IND IRN ITA KAZ KEN KHM LKA MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[FRA] France

Over the monitoring period, the planting of spring wheat and maize were started from April, while winter wheat was harvested from June. Compared to average, CropWatch agroclimatic indicators show that the conditions were below normal.This includes a 1% drop in RAIN, about average RADPAR, and an increase in temperature at the national level. Also at the national level, crop condition was slightly below average,which is confirmed by a marginal decrease for the BIOMSS indicator (-3%), and the main crop production estimates (Wheat -4.5%,Maize -1.5%).

National NDVI values were mostly below those for 2017, but close to the five-year average from April to May. And the national NDVI values began to drop slightly below average from May, which is consistent with the abundant of rainfall during this period. The spatial NDVI patterns compared to the five-year average indicate that NDVI is above average in 79.1% of arable land, with below average values in the other regions. This spatial pattern is reflected by the maximum VCI (VCIx) in the different areas, with a VCIx of 0.95 and average CALF for France overall. Generally, due to the suitable rainfall, the agronomic indicators mentioned above show that the crop growing conditions were close average during the monitoring period.

Regional analysis

Considering cropping systems, climatic zones, and topographic conditions, additional sub-national detail is provided for eight agro-ecological zones. They are identified in the maps by the following numbers: (54) Northern barley region; (58) Mixed maize/barley and rapeseed zone from the Center to the Atlantic Ocean; (55) Maize, barley and livestock zone along the English Channel, (56) Rapeseed zone of eastern France;(51) Dry Massif Central zone; (57) Southwestern maize zone; (52) Eastern Alpes region and (53), the Mediterranean zone.

In the Northern barley region both RAIN and TEMP were below average (9% and 2.1°C, respectively), while RADPAR was 6% above. As a result of the shortage of rain, the BIOMSS indicator is 13% below the five-year average. High VCIx values, however, are observed, reflecting overall satisfactory crop condition.

The Mixed maize/barley and rapeseed zone from the Center to the Atlantic Ocean average rainfall (RAIN, -1%), temperature and RADPAR. According to the NDVI profile and VCIx map, crop condition was good in the region. Overall, the situation is considered to be close to average.

Mostly unfavorable climatic conditions dominated the Maize_barley and livestock zone along the English Channel over the reporting period. Rainfall was 16% below average (166 mm over four months).Temperature and radiation (RADPAR) was normal. The dry conditions have hampered crop growth, indicated also by a BIOMSS indicator 16% below average for the period.

The Rapeseed zone of eastern France recorded 270 mm of rainfall over four months (RAIN -10%). Temperature was average (TEMP 1.4°C) but RADPAR was 6% above. The drop in BIOMSS was 12% compared to the five-year average. The NDVI profile confirms the conditions of crop were close average.

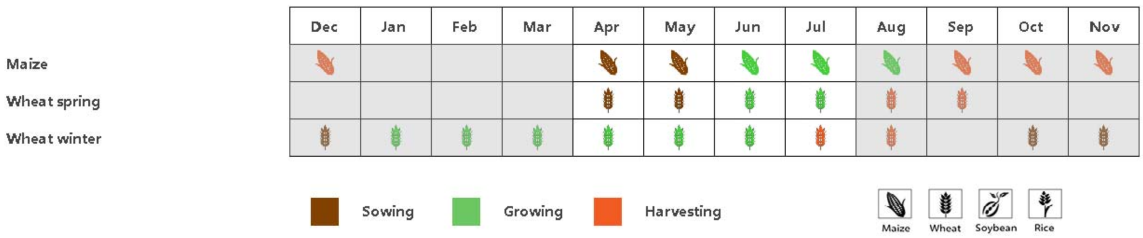
The Dry Massif Central zone a slight 10% rainfall deficit (RAIN -10%), with above average values for both RADPAR and TEMP. BIOMSS for the region is 6% below the five-year average, and a high VCIx value reflects the generally favorable crop condition. That overall crop condition is generally comparable with the previous five years, as confirmed by the crop condition development graph, in this minor agricultural region.

The Southwestern maize zone is one of the major irrigated maize regions in France. Rainfall dropped 12% below average, temperature was average, but radiation was below expectations (RADPAR -5%). Crop condition was below average according to the NDVI development graph, in spite of an observation confirmed by the increase of BIOMSS by 9% compared to average. The VCIx map, however, shows that the crop condition was unsatisfactory, in spite of a high VCIx value recorded for the region as a whole (0.95).

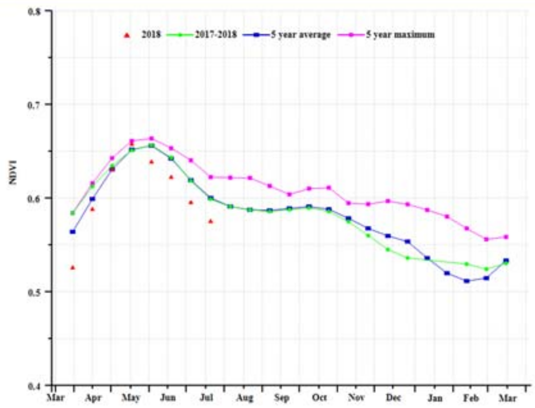
Generally, crop condition for the Eastern Alpes region is above average with the following agroclimatic indicator values: RAIN +14%, TEMP +1.5°C, and RADPAR, -1%. Almost all arable land in this region was cropped during the monitoring period, and the average VCIx is 0.95. The NDVI profile confirms the favorable conditions.

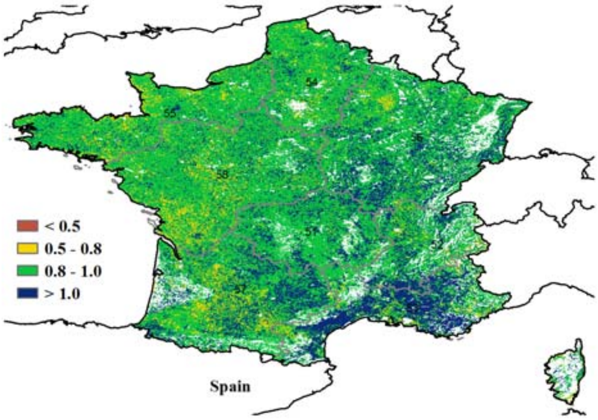
Finally, the best weather conditions were observed in the Mediterranean zone (RAIN +13%) even if other indicators remain close to average. According to the NDVI profiles, crop condition has been continuously deteriorating since June. BIOMSS is 18% above its five-year average, and the VCIx value of 1 for the region is the highest in the country.

Figure 3.18. France's crop condition, April -July 2018



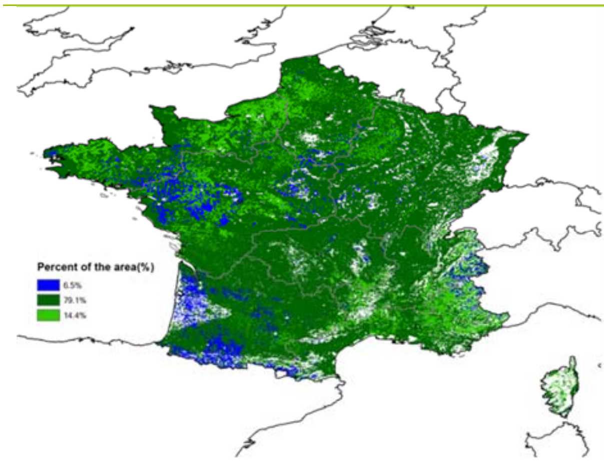
(a). Phenology of major crops

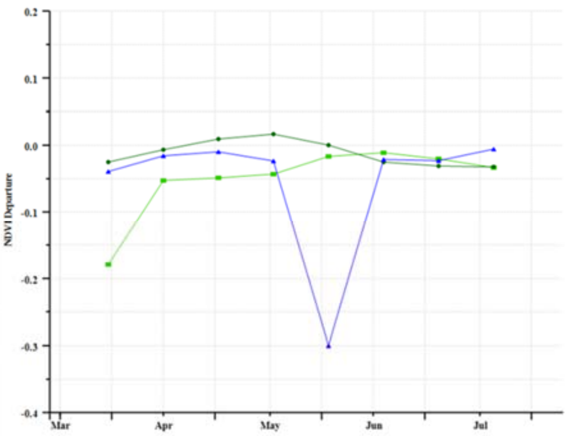




(b) Crop condition development graph based on NDVI

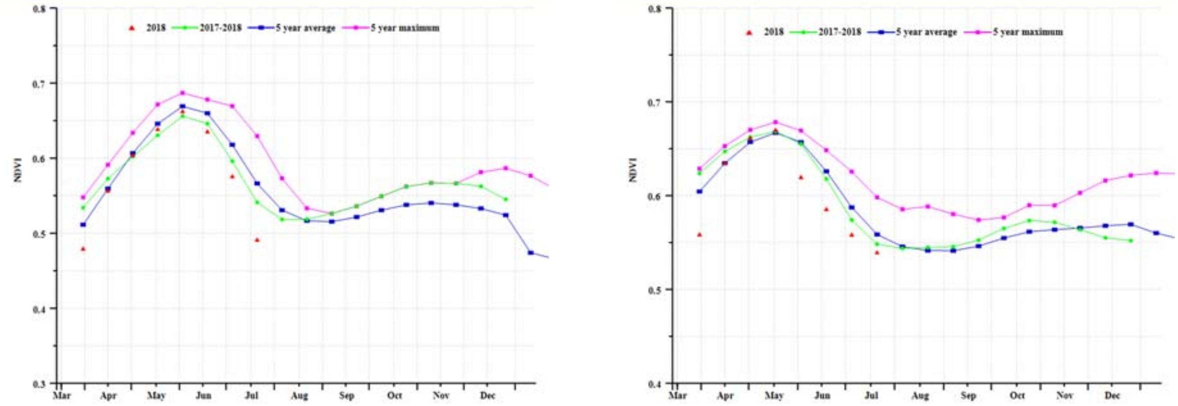
(c) Maximum VCI



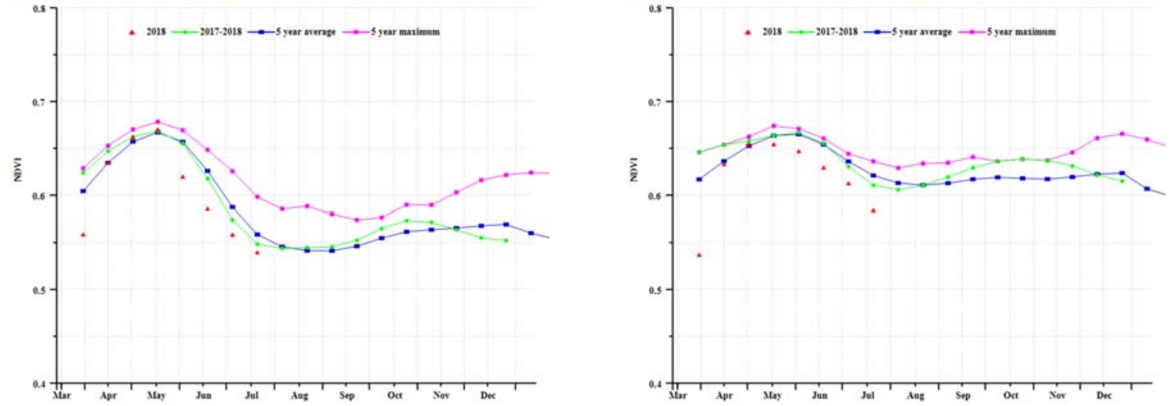


(d) Spatial NDVI patterns compared to 5YA

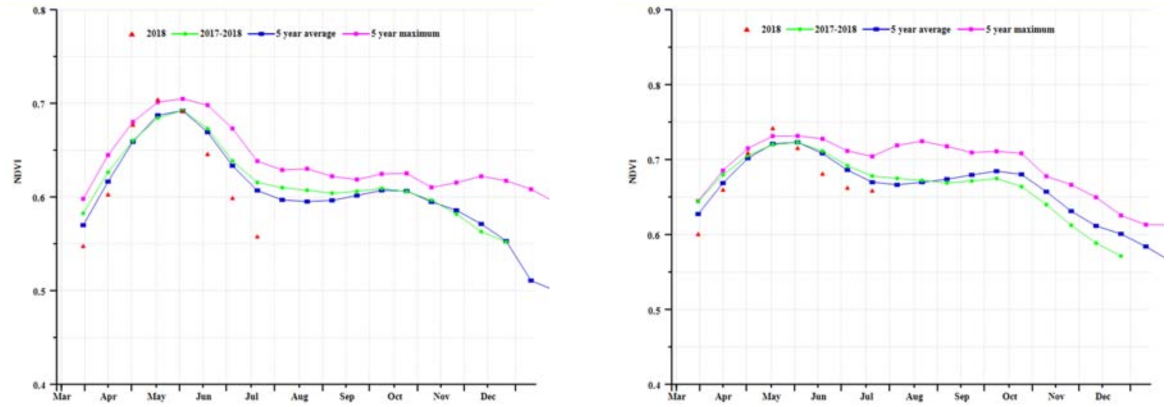
(e) NDVI profiles



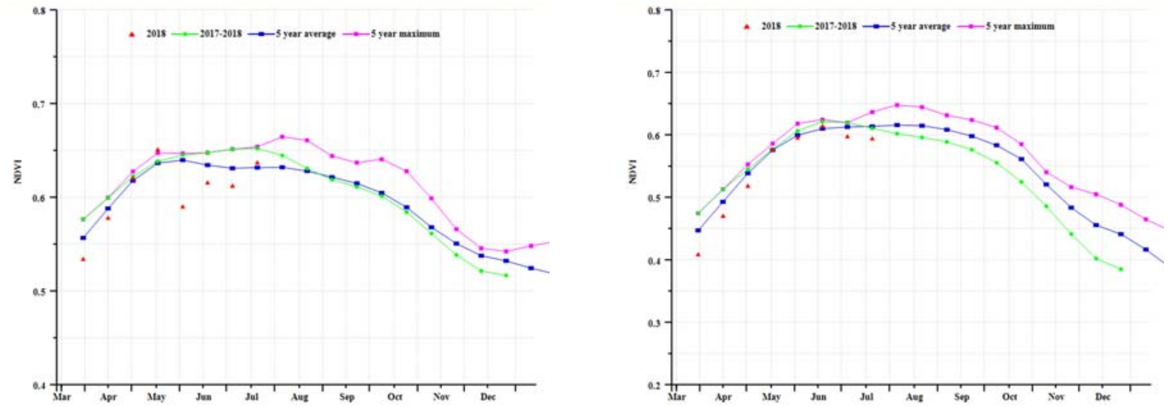
(f) Crop condition development graph based on NDVI (Northern barley region (left) and Mixed maize, Barley and Rapeseed zone (right))



(g) Crop condition development graph based on NDVI (Maize, barley and livestock zone (left) and Rapeseed zone (right))



(h) Crop condition development graph based on NDVI (Dry Massif Central zone (left) and Southwest maize zone (right))



(i) Crop condition development graph based on NDVI (Eastern Alpes region (left) and Mediterranean zone (right))

Table 3.34. France's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m2)	Departure from 15YA (%)
Northern barley zone (France)	211	-9	16	2.1	1187	6
Mixed maize/barley and rapeseed zone(France)	226	-1	17	2.1	1181	0.5
Maize, barley and livestock zone(France)	169	-16	15	1.6	1175	2
Rapeseed zone (France)	270	-10	16	1.4	1215	6
Dry Massif Central zone(France)	290	-10	15	2.0	1212	1
Southwest maize zone (France)	321	12	17	1.0	1179	-5
Eastern Alpes region (France)	403	14	15	1.5	1267	-1
Mediterranean zone (France)	260	13	16	1.3	1266	-7

Table 3.35. France's agronomic indicators by sub-national regions, current season's value and departure from 5YA, April -July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Northern Barley zone (France)	872	-13	100	0	0.92
Mixed maize/barley and rapeseed zone(France)	900	-3	100	0	0.91
Maize, barley and livestock zone(France)	741	-16	100	0	0.90
Rapeseed zone (France)	1037	-12	100	0	0.96
Dry Massif Central zone (France)	1126	-6	100	0	0.97
Southwest maize zone (France)	1174	9	99	0	0.95
Eastern Alpes region (France)	1253	7	97	0	0.96
Mediterranean zone (France)	1012	18	97	3	1

Table 3.36. CropWatch-estimated wheat and Maize production for France in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Wheat	38051	-3.5	-1.0	38333	Wheat
Maize	14577	-4.0	2.6	14359	Maize

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[GBR] United Kingdom

Crops showed unfavorable condition over the reporting period in the United Kingdom. Currently, most of the winter wheat and oats and all the winter barley and winter rape have been harvested, while spring barley is in the vegetative stage. Compared to average, rainfall decreased (RAIN -15.4%) with below average biomass (BIOMSS -13%). Both radiation and temperature were above average (RADPAR +4% and TEMP +1.6°C). 73.2% of arable land had below average NDVI, while slightly higher than average NDVI occurred from April to June in Norfolk,Essex, southern Cambridgeshire, Huntingdonshire, Northamptonshire and Rutland, Leicestershire, Dorset, Somerset, Gloucestershire and Worcestershire. Due to reduced rainfall, the national NDVI values dropped to below average from June to July. The national average of VCIx (0.91) was above average, and cropped arable land fraction remained unchanged compared with five-year average. CropWatch estimates wheat production to decrease 1.7% below 2017 values (yield down 2.6%, area up 1.0%).

Regional analysis

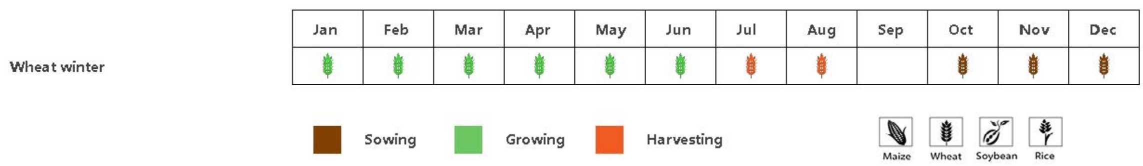
CropWatch has adopted three agro-ecological zones (AEZ) to provide a more detailed analysis for the country. They include the central sparse crop region (covering northern England, Wales, and northern Ireland), the northern barley region (Scotland and northern England), and the southern mixed wheat and barley region (southern England). All three regions are characterized by unchanged fractions of arable land (CALF) compared to average.

In the Main barley region, the NDVI was close to average from April to June, and below average from late June to July according to the crop condition graphs. Agroclimatic conditions include below average rainfall and biomass (RAIN -13% and BIOMSS -9%), and above average TEMP (+1.0°C) and radiation (+2.9%). The VCIx was generally good at 0.89.

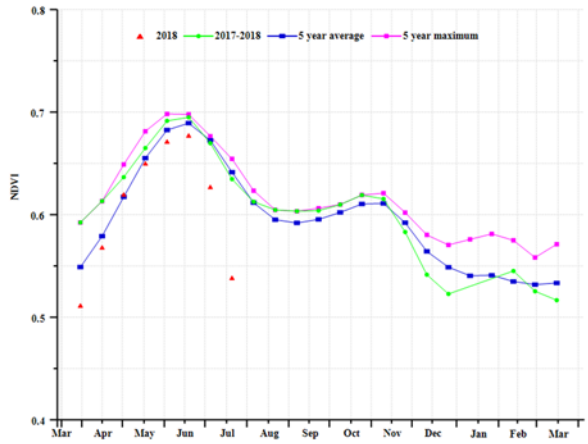
The Central sparse crop region is one of the country's major agricultural regions in terms production volume. NDVI values were close to average from April to May and below average between early June to July, according to the region's crop condition development graph. Agronomic conditions were below average for RAIN (-17%) and BIOMSS (-12%); TEMP and RADPAR were significantly above average (1.2°C and 3.5%). The VCIx (0.90) was well above average.

In the Southern mixed wheat and barley zone, NDVI was below average from late June to July and close to average April to June according to the crop condition graph. Rainfall and biomass fell by 17%, while temperature (TEMP, +2.2°C) and radiation (RADPAR +5%) were significantly above average. The region had above average VCIx (0.90).

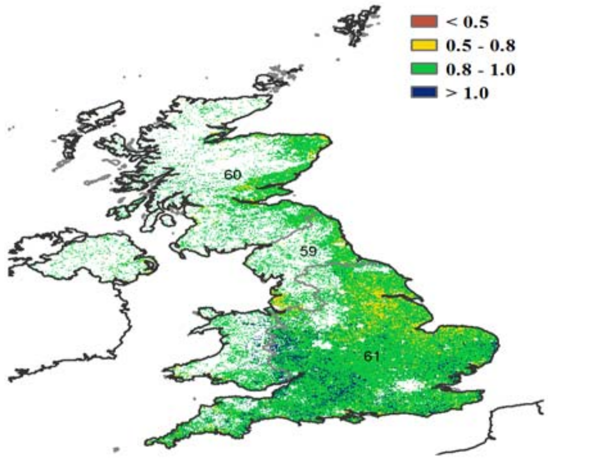
Figure 3.19. United Kingdom crop condition, April -July 2018



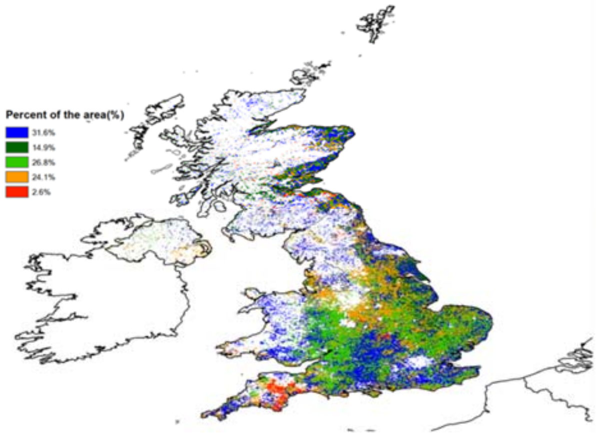
(a). Phenology of major crops



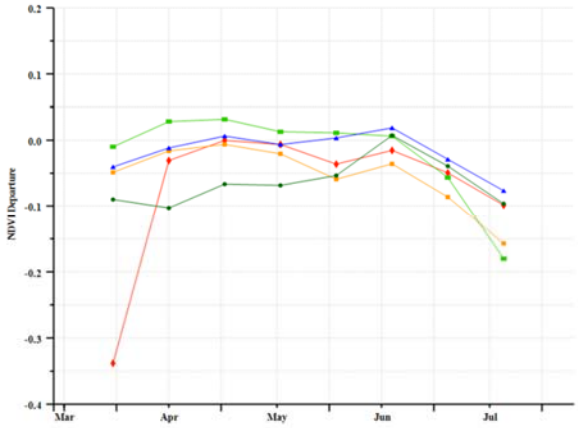
(b) Crop condition development graph based on NDVI



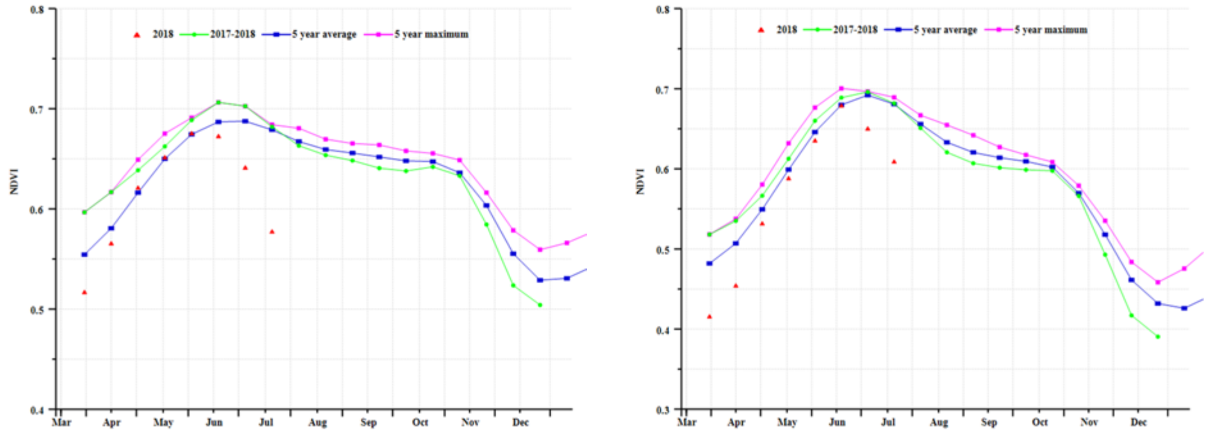
(c) Maximum VCI



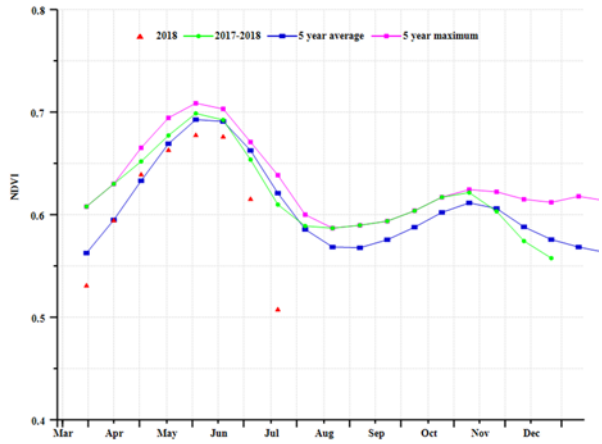
(d) Spatial NDVI patterns compared to 5YA



(e) NDVI profiles



(f) Crop condition development graph based on NDVI (Sparse crop area of N England, Wales and N. Ireland (left) and Northern Barley region (right))



(g) Crop condition development graph based on NDVI (Southern mixed wheat and Barley region)

Table 3.37. United Kingdom's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Northern Barley area (UK)	304	-13	11.2	1.0	981	2.9
Southern mixed wheat and Barley zone (UK)	207	-17	14.6	2.2	1103	5.5
Central sparse crop area (UK)	264	-17	12.7	1.2	1053	3.5

Table 3.38. United Kingdom's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Northern Barley area (UK)	1152	-9	99	0	0.89
Southern mixed wheat and Barley zone (UK)	863	-17	100	0	0.91
Central sparse crop area (UK)	1088	-12	99	0	0.90

Table 3.39. CropWatch-estimated wheat production for United Kingdom in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Wheat	14521	-2.6%	1.0%	14279	-1.7%

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[HUN] Hungary

Crops in Hungary showed favorable conditions during this reporting period. Winter wheat has been harvested in June and July. All agroclimatic indicators were above average: RAIN +21.3%, TEMP +1.3°C and RADPAR +2.9%. The favorable agroclimatic conditions resulted in increase in the BIOMSS index by 12.2% compared to the five-year average. According to nationwide NDVI graphs, crop condition was close to average during this period, with the maximum VCI value on the national level reaching 0.93 and the cropped arable land fraction (CALF) unchanged compared to the recent five-year average. Crop condition was below average throughout the reporting period in 28.4% of arable land in the Grea tPlain, and 54.5% was above average from April to early June. About 45.3% of arable land was below average from early June to late July. CropWatch estimates that wheat production will decrease by 4.1% below 2017 values (yield down 4.2% and area down 1.4%).

Regional analysis

Based on cropping systems, climatic zones, and to pographic conditions, Hungary is divided into four sub regions: North Hungary, Central Hungary, the Great Plain and Transdanubia. Specific observations for the reporting period are included for each region. All sub-regions are characterized by unchanged fractions of cultivated arable land (CALF) compared to average.

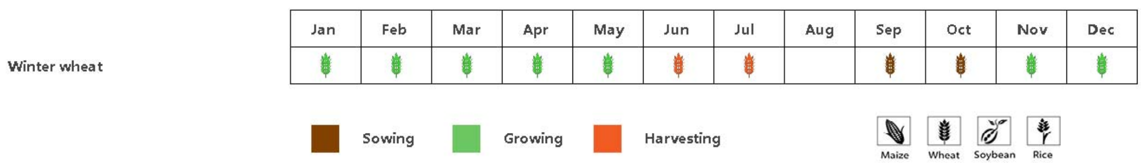
Central Hungary is one of its major agricultural regions in terms of crop production. About 5-8% of winter wheat, maize and sunflower are planted in this region. The NDVI was about average from April to May, lower than average from May to late June, and above average in July. Agroclimatic conditions were above average: rainfall was 343mm (+28% compared to average), TEMP 19.5°C (+1.3°C) and RADPAR of 1236 MJ/m2 was 2.5% above average. This resulted in above average BIOMASS (+17%).

The North Hungary region growth 5 to 8% of the national winter wheat, plus and sunflower and 1 to 4% of maize. NDVI values fluctuated compared to the 5YA: below average in April and May to June, above average late April and July. The accumulated rainfall (RAIN +1%), temperature (TEMP +1.3°C) and radiation (RADPAR +2.5%) were above average, resulting in the biomass production potential increase in this region (BIOMSS, +3%).

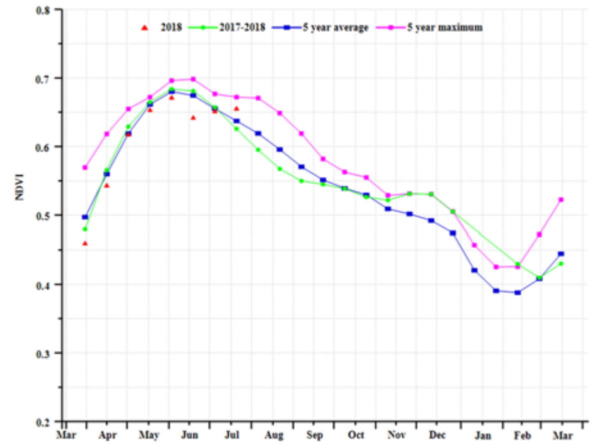
The Great Plain region grows mostly winter wheat, maize and sunflower especially in the counties of Jasz-Magykum-Szolnok and Bekes. According to crop condition graph, NDVI values were below average from April to late June, slightly higher than average in July. All agroclimatic indicators were above average in this period which is RAIN (+23%), TEMP (+1.3°C) and RADPAR (+3.0%), leading to a BIOMSS value of 1188 gDM/m2, up 11% above average. The maximum VCI did well (0.91).

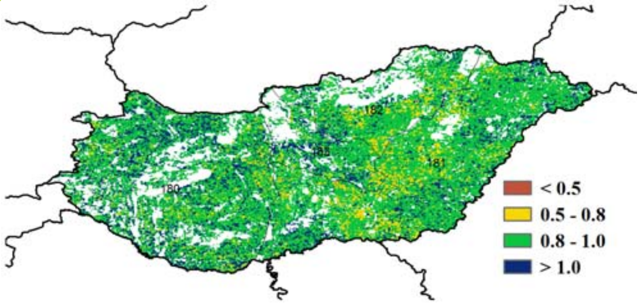
Southern Transdanubia cultivated 4 to 8 % of winter wheat, maize and sunflower seed, mostly in Somogy and Tolna counties while only 1 to 4% of main crops are planted in the northern Transdanubia. NDVI was above average. Compared to average, rainfall was up by 16%, temperature by 1.3°C and radiation by 2.9%. The biomass production potential rose 16%. The Transdanubia region's VCIx was well above average (0.95).

Figure.3.20. Hungary's crop condition, April - July 2018



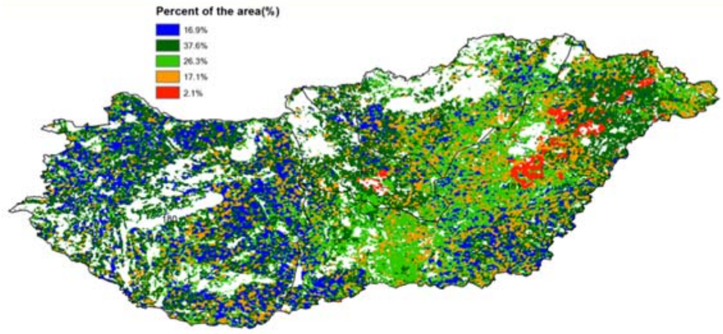
(a). Phenology of major crops

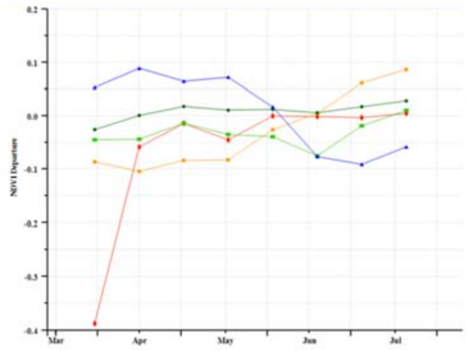




(b) Crop condition development graph based on NDVI

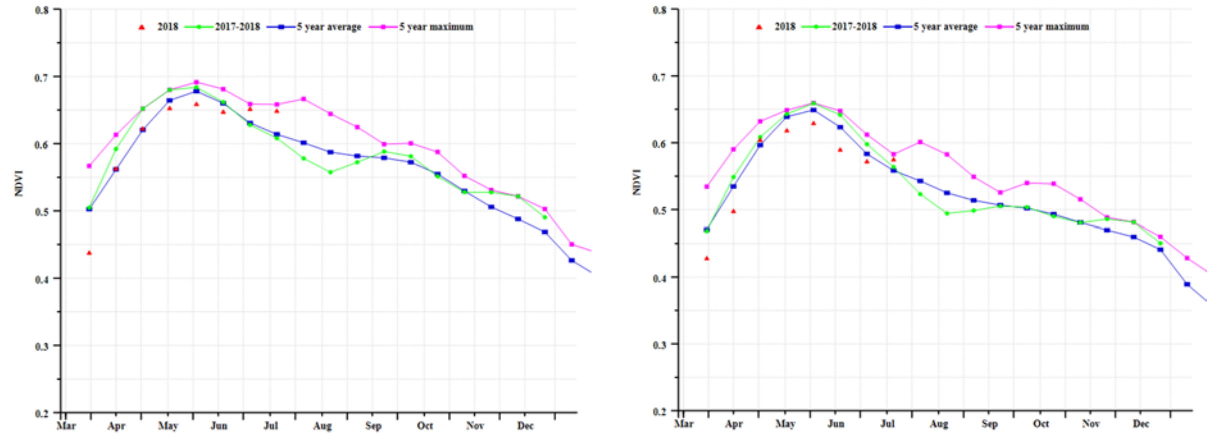
(c) Maximum VCI



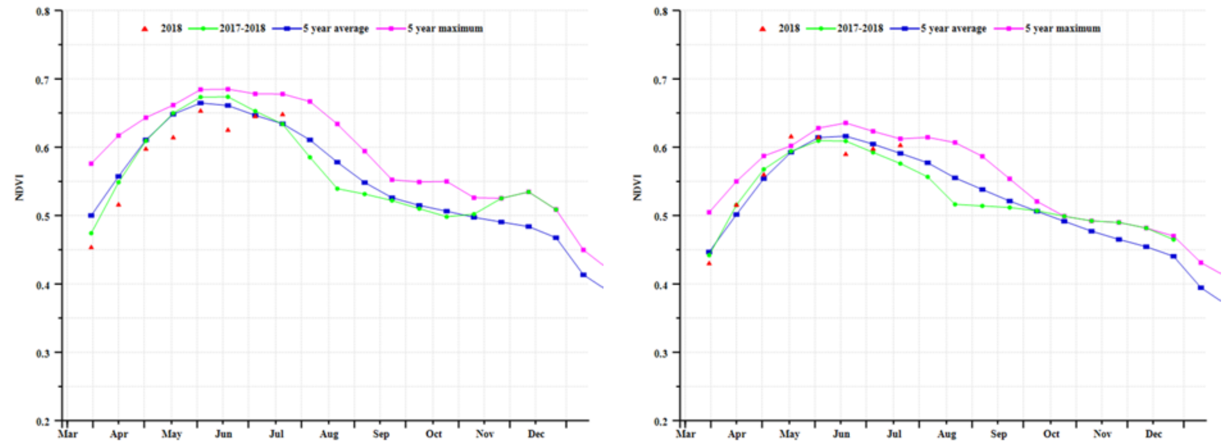


(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles



(f) Crop condition development graph based on NDVI (Central Hungary (left) and North Hungary (right))



(g) Crop condition development graph based on NDVI (Great Plain (left) and Western Transdanubia (right))

Table 3.40. Hungary's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m²)	Departure from 15YA (%)
Northern Barley area (UK)	304	-13	11.2	1.0	981	2.9
Central Hungary	343	28	19.5	1.3	1236	2.5
North Hungary	287	1	18.9	1.4	1216	2.5
Great Plain	333	23	19.8	1.3	1244	3.0
Transdanubia	372	26	19.2	1.3	1235	2.9

Table 3.41. Hungary's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m²)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Central Hungary	1234	17	100	0	0.94
North Hungary	1145	3	100	0	0.91
Great Plain	1188	11	100	0	0.91
Transdanubia	1313	16	100	0	0.95

Table 3.42. CropWatch-estimated wheat production for Hungary in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Wheat	5237	-2.8%	-1.4%	5022	-4.1%

[IDN] Indonesia

During the monitoring period, the harvest of the main rice and maize crops was completed, and the secondary rice is growing. The area of cropped arable land (CALF) in the country is comparable to the five-year average. All agroclimatic indicators were below average (RAIN - 10%, TEMP -0.6°C) and sunshine, expressed as RADPAR -2%, which brought about a decrease of crop production potential of 8%. This leads to unrealistically low values in the national NDVI development graph compared to the recent five-year average from April to July. According to NDVI profiles, crop condition in 54.5% of the arable land around the country was slightly below average. In 16.4% of the country (mostly in Sumatera Utara, Riau, Sumatera Barat and Jambi) NDVI deteriorated in the middle of this monitoring period and then slightly improved in July. In other areas, NDVI fluctuated over a large range, possibly due to cloudiness. Although the agroclimatic indicators showed somewhat unfavorable conditions, considering the favorable maximum VCIx value of 0.93, the national production is anticipated to be below but close to average in 2018.

Regional analysis

For more spatial detail, CropWatch also prepares a regional analysis for four agro-ecological zones within the country, namely Sumatra (64), Java (the main agricultural region in the country, 62), Kalimantan and Sulawesi (63) and West Papua (65), among which former three are relevant for crops cultivation. The numbers correspond to the labels in the VCIx and NDVI profile maps.

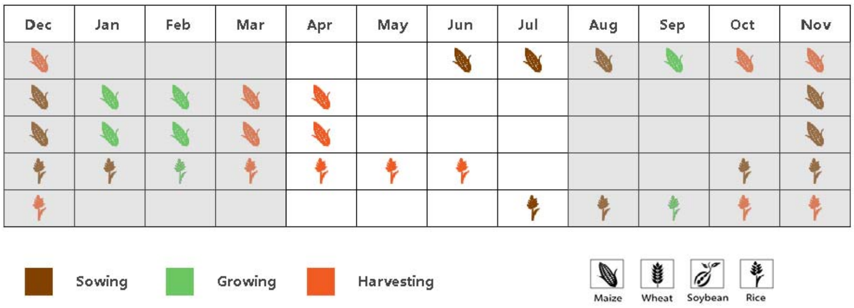
The weather of Java was exceptionally dry compared with average (RAIN, -58%), while, temperature (TEMP, -0.3℃) was slightly below average and radiation (RADPAR 5%) was well above average. Due to the deficit of rainfall, biomass production potential in this region suffered a significantly decreased of 47%. According to the NDVI development graph, crop condition was below the 5-year reference. Overall, the crop condition in Java was unfavorable.

The agroclimatic conditions of Sumatra follow the same patterns as the country as a whole: accumulated rainfall (RAIN -10%), temperature (TEMP -0.8℃) and radiation (RADPAR -6%) were all nbelow average, resulting in the biomass production potential decrease in this region (BIOMSS -7%). Overall, the crop condition in Sumatra was unfavorable.

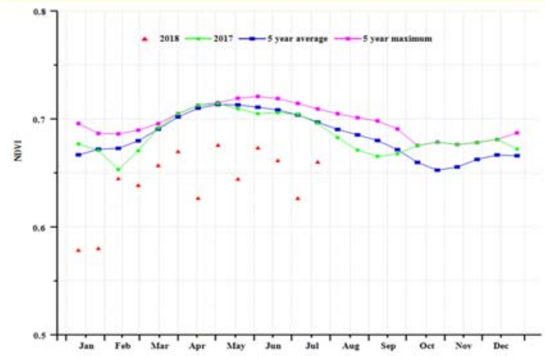
Kalimantan and Sulawesi experienced unfavorable agroclimatic conditions, with rainfall and radiation dropping 10% and 6%, repectively, which lead to a decrease of biomass production potential by 7% compared to the recent five-year average. Crop condition in Kalimantan and Sulawesi was unfavorable.

Considering that all the arable land was cultivated, CropWatch anticipates that the yield of maize and rice in Indonesia in 2018 will decrease by 0.1% and 2.5%, respectively.

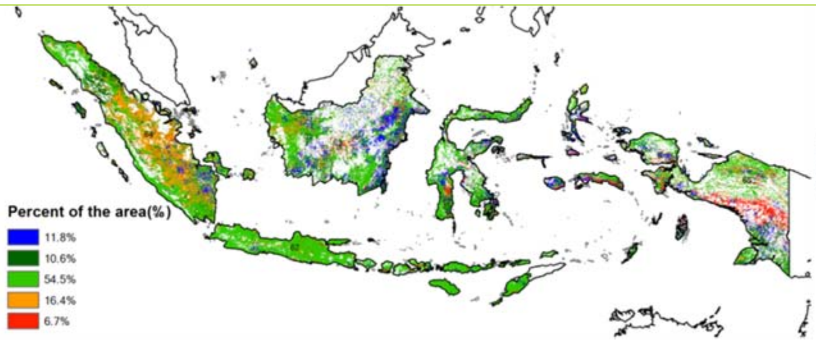
Figure 3.21. Indonesia's crop condition, April -July 2018

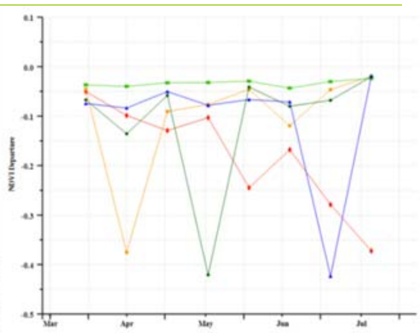


(a). Phenology of major crops

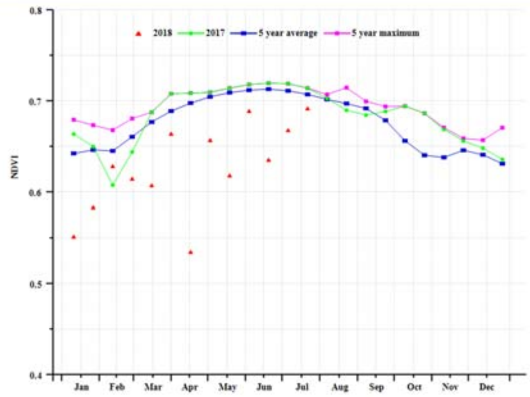


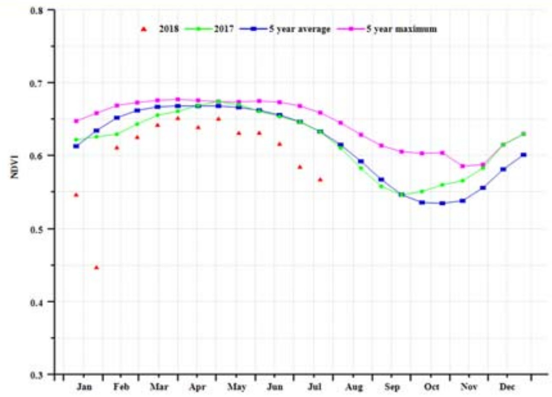
(b) Crop condition development graph based on NDVI (c) Maximum VCI



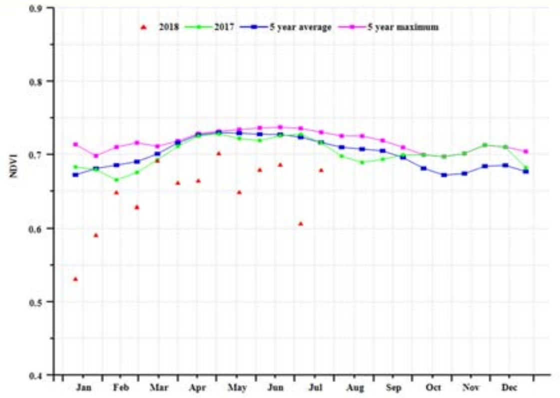


(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles





(f) Crop condition development graph based on NDVI (Sumatra (left) and Java (right))



(g) Crop condition development graph based on NDVI (Kalimantan-Sulawesi (left) and West Papua(right))

Table 3.43. Indonesia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure (%)	Current (°C)	Departure (%)	Current (MJ/m²)	Departure (%)
Java	219	-58	25.8	-0.3	1103	5
Kalimantan and Sulawesi	892	-10	26.1	-0.5	960	-1
Sumatra	724	-10	25.8	-0.8	968	-6
West Papua	1215	-2	24.7	-0.5	840	-1

Table 3.44. Indonesia's agronomic indicators by sub-national regions, current season's value and departure from 5YA, April -July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m²)	Departure (%)	Current (%)	Departure (%)	Current
Java	650	-47	99	-1	0.85
Kalimantan and Sulawesi	2014	-7	99	0	0.94
Sumatra	1838	-7	100	0	0.93
West Papua	2132	-1	100	0	0.95

Table 3.45. CropWatch-estimated maize and rice production for Indonesia in 2018 (thousands tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Maize	17791.0	-0.2%	0.1%	17769	-0.1%
Rice	68411.0	-2.6%	0.0%	66675	-2.5%

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[IND] India

Rice, wheat and maize, are the major grain crops in India. The Rabi (winter) rice and wheat crops were harvested during the reporting period (April- July). The Field preparation and planting of Kharif (Summer) rice and maize were completed.

On average, the country received "good" monsoon rains (RAIN, +17%). The departure from average ranged between 5% and 31%. The country TEMP was 0.4°C below average and RADPAR was 4% below average. BIOMSS increased 10% but CALF was 21 % below the 5YA with an average VCIx of 0.7.

National NDVI profiles indicate that crop condition was slightly lower than the average of the last 5 years and the same period of 2017. The pattern generally repeats itself in all sub-regions in the country. Three States recorded a sudden drop in NDVI in July: Chhattisgarh, Madhya Pradesh, and Gujarat. The same States as well as Uttar Pradesh, Delhi, and Haryana recorded VCIx between 0.5 and 0.8. Other states mostly recorded values of VCIx between 0.8 and 1.

Overall, the production of maize, wheat, and soybean was lower than the last year by 0.6%, 2.3%, and 5.3% respectively. Rice production increased by as much as 6 % over 2017 output.

Regional analysis

India has been divided into seven zones: the Deccan plateau, the Eastern coastal region, the Gangetic plains, the Northeastern region, the Western coastal region, the Northwestern dry region and the Western Himalayan region.

The Deccan Plateau region recorded 819mm of RAIN (+31% relative to average), 31.6°C TEMP (-0.2°C) and 1176 MJ/m² RADPAR (-2%). BIOMASS increased 15% in the region which also recorded low NDVI. The CALF fell as much as 40 % below 5YA and VCIx was 0.7.

The Eastern coastal region received rainfall 17% higher than the average and TEMP was 0.8℃ lower. The RADPAR of 1140 MJ/m² (3 % lower than the average) and BIOMASS of was 10% above 5YA. The region recorded 6% lower than average cropped area and a VCIx of 0.8 indicating moderate crop condition.

In the Gangetic region precipitation amount was 774mm (21% higher than 15YA). TEMP was cooler with 0.8°C and RADPAR was 6 % below average. The BIOMASS reached 1475 gDM/m2 and it was 10 % above the 5YA. The CALF was lower than 5YA (-24 %) and VCIx was high as 0.7.

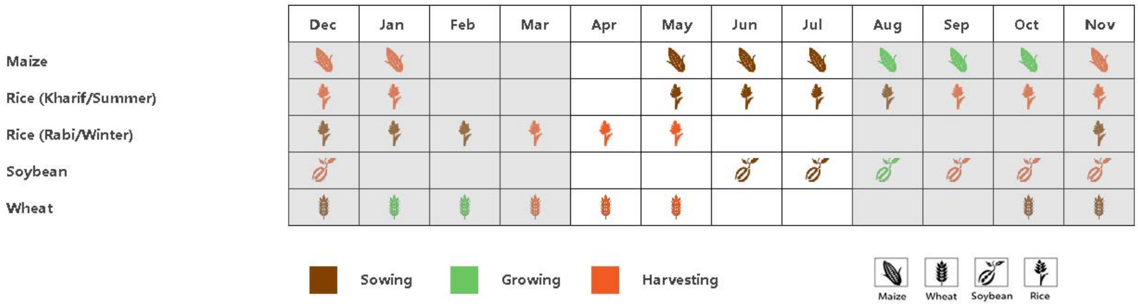
The Assam and Northeastern region recorded the highest precipitation in India (1749mm), an increase of 7% over the average, with slightly below average TEMP at 25.9°C (-0.3°C) and above average RADPAR of 966 MJ/m2 (1 %). The BIOMASS was slightly lower than the average (-2%) and CALF was the same as 5YA. Crop condition was good with VCIx at 0.9.

The Western coastal region received 6% higher than average rainfall, average TEMP (-0.5℃ compared to 5YA) and RADPAR of 1063 MJ/m² (-3%). This region had 12% higher than average BIOMASS. The CALF was 4% lower than 5YA but crop condition was satisfactory at 0.9 VCIx.

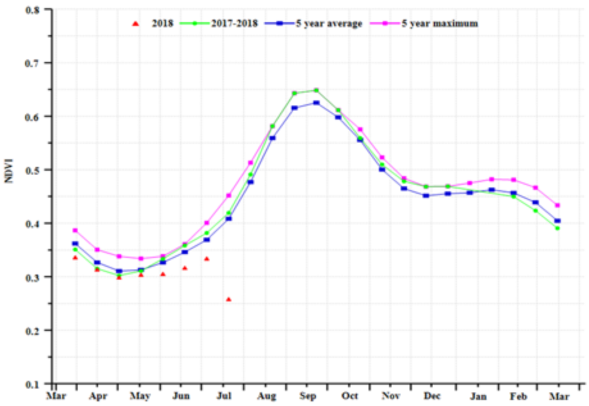
The Northwestern region recorded the lowest rainfall value in India (493mm, but higher than average by 30%) and near average TEMP and low RADPAR (-6%). The BIOMASS was higher than the average (11%). The CALF drop was very large (68% lower than 5YA) and crop condition with below average at 0.5 VCIx.

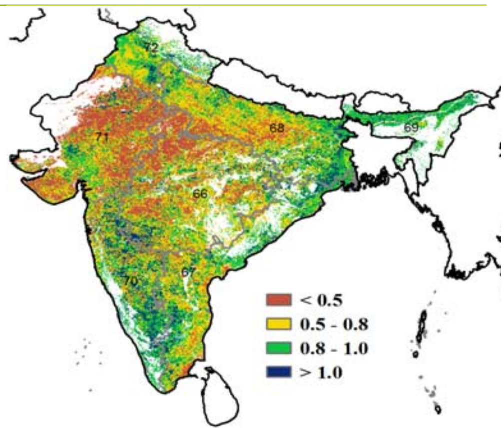
The Western Himalayan region received rainfall of 510mm (5% above average) and average TEMP was recorded. RADPAR reached 1249 MJ/m2 (-8.6%). The BIOMASS was higher than 5YA with 6%. The CALF at -2.5 % and VCIx at 0.8 indicate good production in general.

Figure 3.22. India's crop condition, April -July 2018



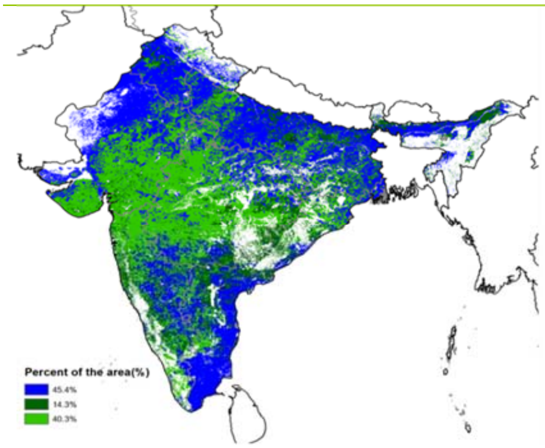
(a). Phenology of major crops

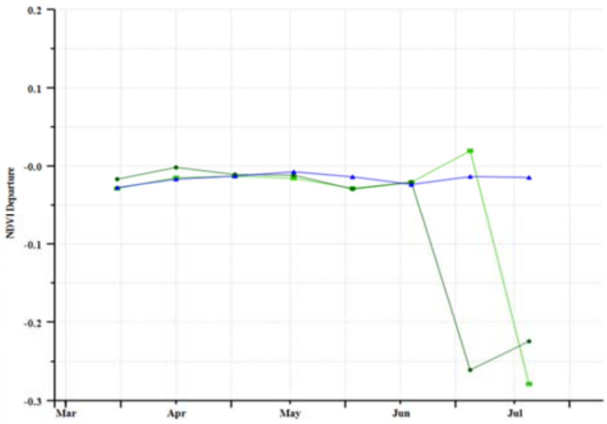




(b) Crop condition development graph based on NDVI

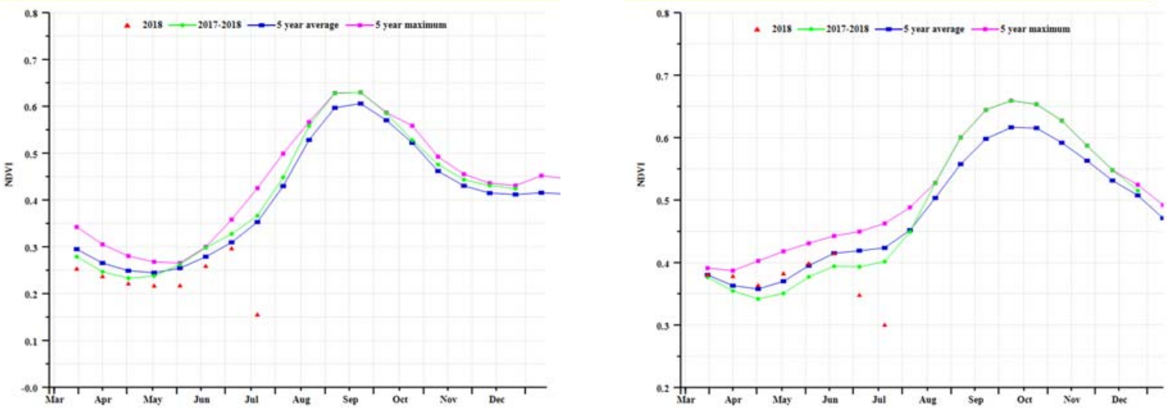
(c) Maximum VCI



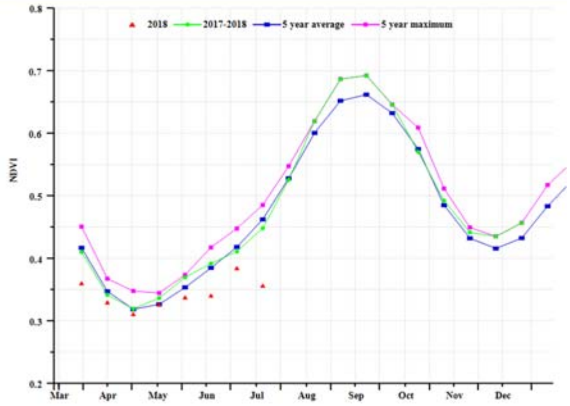


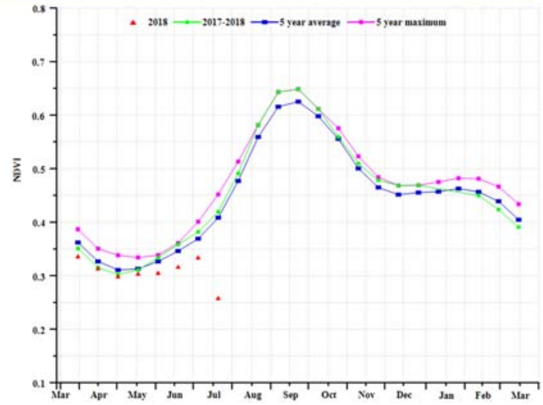
(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles

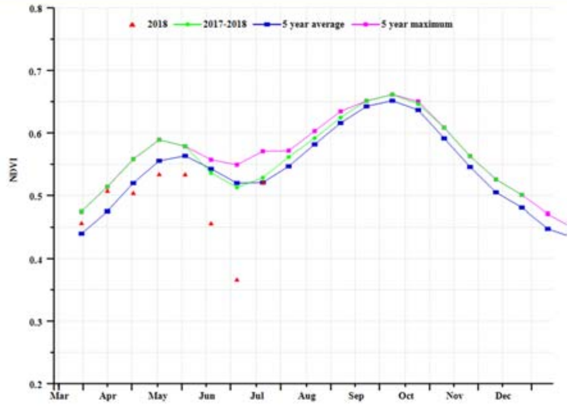


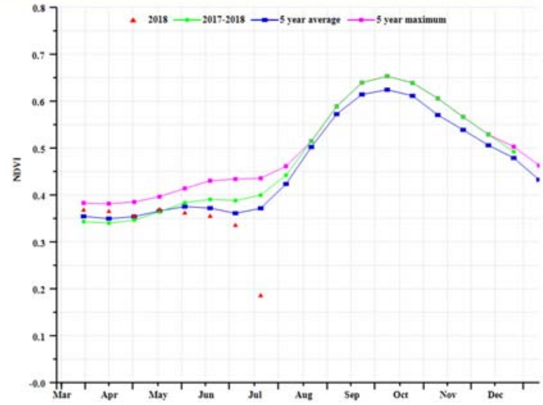
(f) Crop condition development graph based on NDVI (Deccan Plateau (left) and Eastern Coastal Region (right))



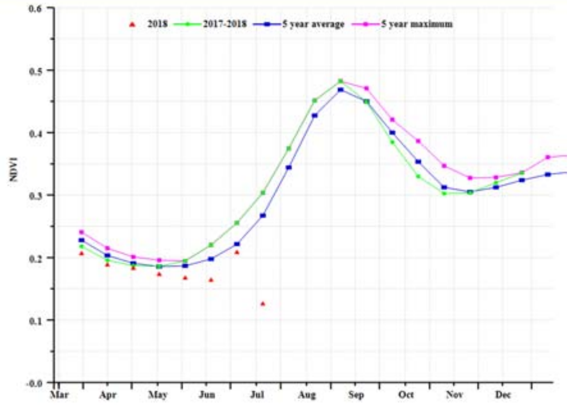


(g) Crop condition development graph based on NDVI (Gangatic Plains (left) and North Eastern Region (right))





(h) Crop condition development graph based on NDVI (Western Coastal Region (left) and Western Dry Region (right))



(i) Crop condition development graph based on NDVI (Western Himalayan Region)

Table 3.46. India’s agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m2)	Departure from 15YA (%)
Deccan Plateau (India)	819	31	31.6	-0.2	1177	-2
Eastern coastal region (India)	608	17	30	-0.8	1140	-3
Gangatic plain (India)	774	21	31	-0.8	1167	-6
Assam and north-eastern regions (India)	1749	7	25.9	-0.3	966	1

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m2)	Departure from 15YA (%)
Western coastal region (India)	821	6	27.1	-0.5	1063	-3
North-western dry region or Rajastan and Gujarat (India)	493	30	32.5	-0.1	1251	-6
Western Himalayan region (India)	510	5	22.6	0	1249	-9

Table 3.47. India's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Deccan Plateau (India)	1402	15	40	-40	0.7
Eastern coastal region (India)	1421	10	60	-6	0.8
Gangatic plain (India)	1475	10	60	-24	0.7
Assam and north-eastern regions (India)	2274	-2	100	-0.3	0.9
Western coastal region (India)	1536	12	50	-4	0.9
North-western dry region or Rajasthan and Gujarat (India)	885	11	10	-68	0.5
Western Himalayan region (India)	1158	6	90	-2	0.8

Table 3.48. CropWatch-estimated rice, Maize, Soybean and wheat production for India in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Maize	19034	-2%	1%	18920	-1%
Rice	163146	1%	5%	173270	6%
Wheat	93496	-2%	-1%	91374	-2%
Soybean	12159	-4%	-1%	11514	-5%

[IRN] Iran

Crop condition from April to July 2018 was generally above average in Iran. During the report period, winter wheat was harvested from June to July, and the summer crops (potato and rice) were planted from April. Accumulated rainfall (RAIN, -10%), temperature (TEMP, -0.4°C) and radiation (RADPAR, -5%) were below average during the monitoring period. The unfavorable agro-climatic conditions resulted in a decrease in the BIOMSS index by 2% compared to the five-year average. The national average of maximum VCI index was 0.73, but the Cropped Arable Land Fraction (CALF) increased by 27% compared to the recent five-year average.

According to the national NDVI development graphs, crop condition was above or close to average throughout the monitoring period in about 31.4% of croplands, mainly in Kurdistan, Zanjan, East and West Azerbaijan provinces of the north-western region. Crop condition in about 17.1% of arable land, particularly in Ardabil and Golestan provinces, was above average from March to May and then dropped to below average. About 51.5% of arable land experienced unfavorable crop condition from April to July.

Overall, crop condition was fair in Iran during the monitoring season. The increase of both wheat area (+1.3%) and yield (+7.4%) resulted in an increase production by 8.8% compared to last year. The rice production in 2018 was forecast to increase slightly by 2.9% than 2017 due to the increase of rice area (+5.0%).

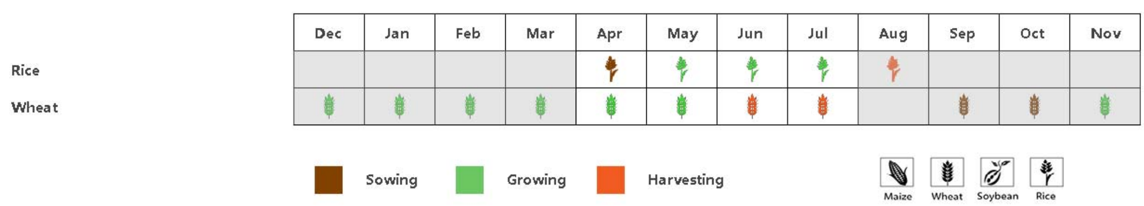
Regional analysis

Based on cropping systems, climatic zones, and topographic conditions, three sub-national agro-ecological regions can be distinguished for Iran, among which two are relevant for crop cultivation. The two regions are referred to as the Semi-arid to sub-tropical hills of the west and north, and the Arid Red Sea coastal low hills and plains.

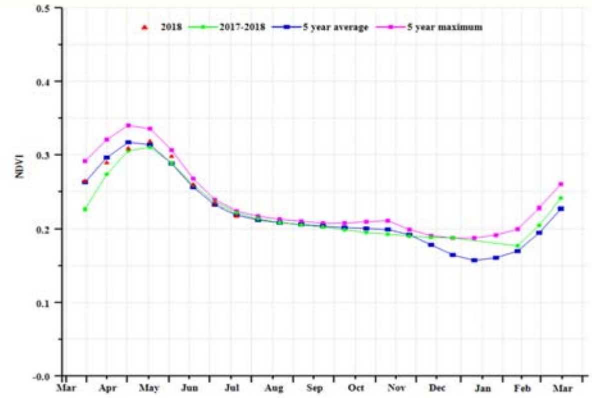
In the Semi-arid to sub-tropical hills of the west and north region, the accumulated rainfall was 85mm, which is 17% below average. Temperature (TEMP -0.3°C) and radiation (RADPAR -5%) were below average as well. The unfavorable weather conditions resulted in a decrease of BIOMSS by 5% compared to the recent five years average. The CALF increased by 30%. According to the NDVI profiles, the crop condition was close to or above average during the monitoring period. The national maximum VCI (VCIx) with 0.83 also indicates favorable crop condition. The outcome for winter and summer crops of this season was favorable in this region.

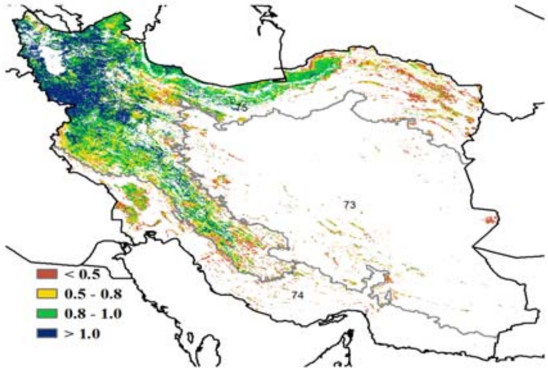
Crop condition in the Arid Red Sea coastal low hills and plains region was far below average. The region received only 62 mm rainfall during this report period. The CALF was 5% and decreased by 35% compared to five-year average, and the national VCIx (0.37) was lower. Therefore, the outcome for winter and summer crops of this region was very poor.

Figure 3.23. Iran's crop condition, April -July 2018

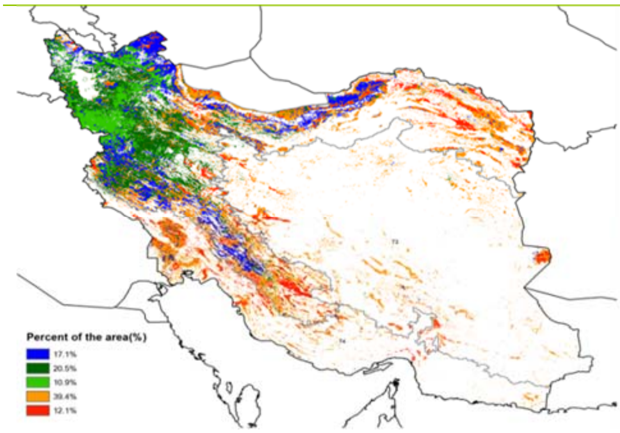


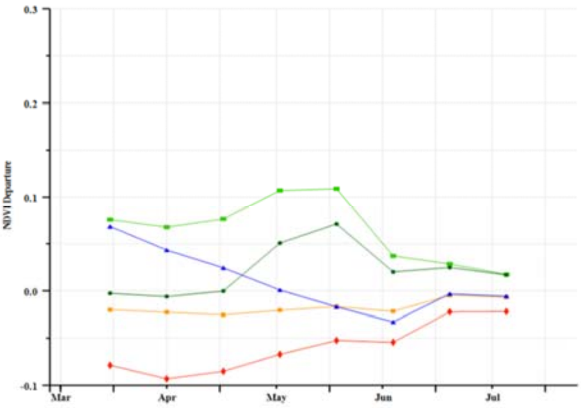
(a) Phenology of major crops



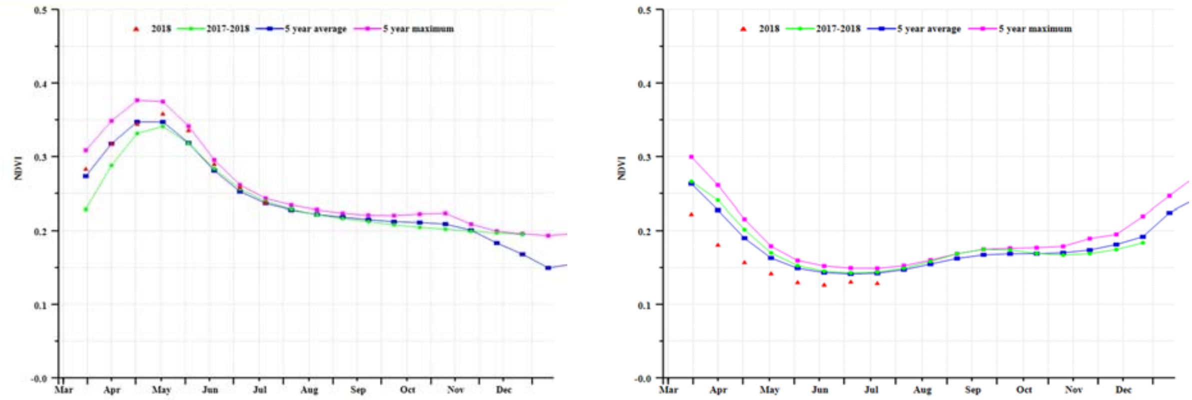


(b) Crop condition development graph based on NDVI (c) Maximum VCI





(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles



(f) Crop condition development graph based on NDVI (Semi-arid to sub-tropical hills of the west and north region (left) and Arid Red Sea coastal low hills and plains region (right))

Table 3.49. Iran's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Semi-arid to sub-tropical hills of the west and north	85	-17	19.5	-0.3	1398	-5
Arid Red Sea coastal low hills and plains	62	99	29.8	-0.3	1490	-4

Table 3.50. Iran's agronomic indicators by sub-national regions, current season's value and departure from 5YA, April -July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Semi-arid to sub-tropical hills of the west and north	367	-11	36	30	0.83
Arid Red Sea coastal low hills and plains	261	95	5	-35	0.37

Table 3.51. CropWatch-estimated wheat production for Iran in 2018 (thousands tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Rice	2272	-2.0	5.0	2338	2.9
Wheat	12735	7.4	1.3	13851	8.8

AFG AGO ARG AUS BGD BLR BRA CAN DEU EGY ETH FRA GBR HUN IDN IND IRN **ITA** KAZ KEN KHM LKA MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[ITA] Italy

Winter wheat is growing during the early summer months and is harvested in June and July. Generally, according to the crop condition development graphs, the NDVI values were above the average of the past five years and especially over the maximum of the past five years in May. After May, NDVI values first increased and thereafter gradually decreased. CropWatch agroclimatic indicators show that Rainfall (287 mm) was above the average (16%), the temperature (19°C) was about the average (+0.5°C); RADPAR (1269 MJ/m²) was 4% below the 5YA as a result, with the CALF of 0.99. BIOMSS increased 11% and VCIx was high (0.94). Overall crop condition in the country is satisfactory.

Regional analysis

Based on cropping systems, climatic zones, and topography, four sub-national regions can be distinguished for Italy, among which three are relevant for crops cultivation. These four regions are Eastern Italy, Northern Italy, Southern Italy and Western Italy.

In spite of high RAIN (+20%), TEMP (+0.6°C above average) and a somewhat low RADPAR (-3%), the overall condition of wheat in Eastern Italy was above; BIOMSS increased by 14.7% compared with the averages (5YA). VCIx was 0.93 with a high CALF of 0.99. The crop condition development graph of NDVI exceeded the 5 years average except in April. According to agroclimatic indicators, above average output is expected.

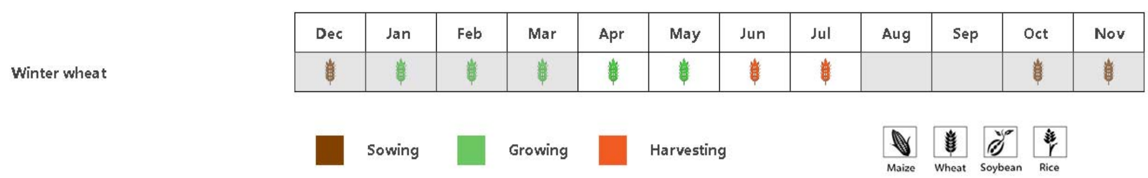
In Northern Italy, the situation and expected impact on crop production is almost identical with Eastern Italy with the exception of more rainfall, temperature and a low RADPAR, resulting high biomass production potential: RAIN +20% relative to average, TEMP -0.6°C, RADPAR -6%, BIOMSS +18%, VCIx 0.97 and CALF 0.99. The NDVI development graph exceeded the 5 years maximum in May. Based on agroclimatic indicators, above average output is expected.

Overall condition of wheat in Southern Italy was above the average as the expected BIOMSS increased by 20.9% compared with the averages (5YA), while VCIx was 0.91 and CALF reached 0.98. The situation results from abundant RAIN (20% above average), average TEMP (0.3°C below average) and lower RADPAR (-2%), The NDVI curves reached the average of 5 years except in May and June. Generally, above average output is expected.

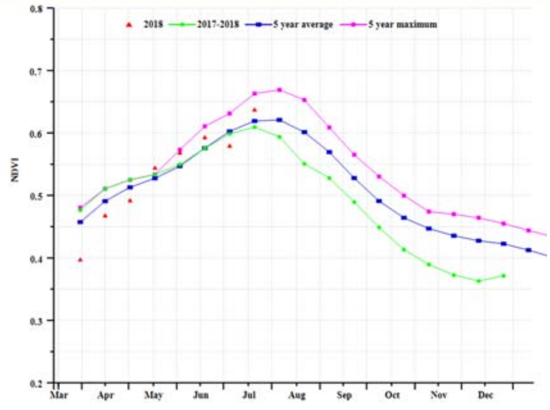
Compared to average, the situation in Western Italy does not differ much from the North of the country: RADPAR (-4%), TEMP (+0.4°C), VCIx (0.94) and CALF (0.99) while a small increase in RAIN (+9.6%) led to a minor BIOMSS increase of 4%. NDVI values were close to the maximum of 5 years. CropWatch expects above average production.

With the mentioned situations, crop prospects are generally excellent due to favorable rainfall. Production of winter wheat is likely above the average.

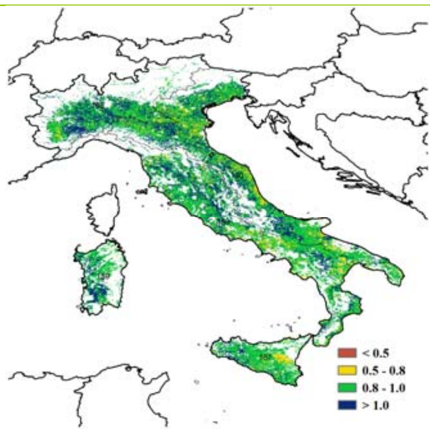
Figure 3.24. Italy's crop condition, April - July 2018.



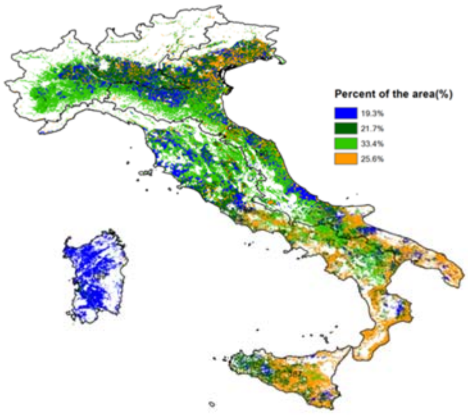
(a). Phenology of major crops



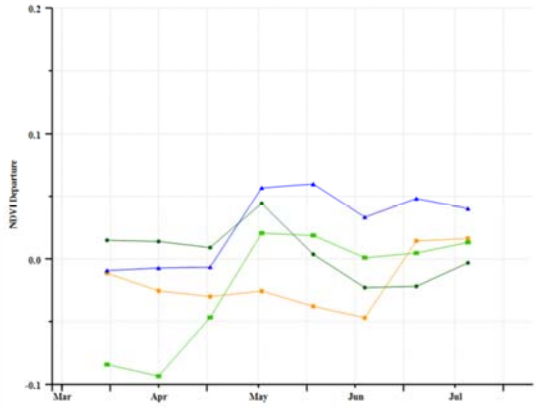
(b) Crop condition development graph based on NDVI



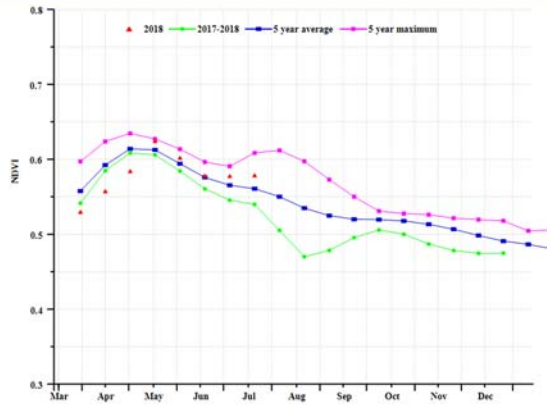
(c) Maximum VCI



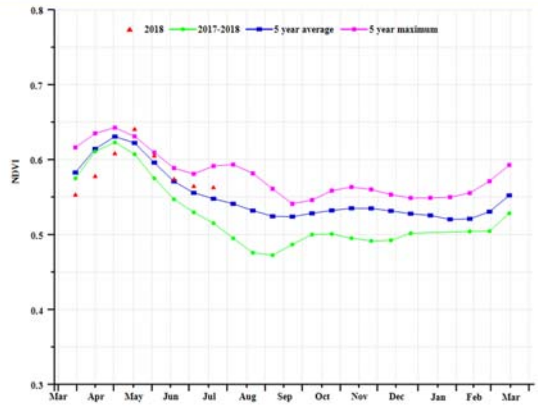
(d) Spatial NDVI patterns compared to 5YA



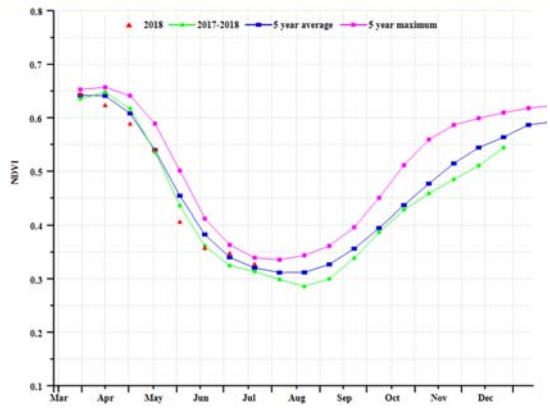
(e) NDVI profiles

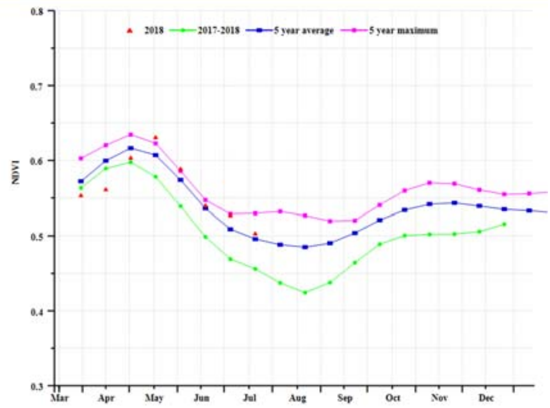


(f) Eastern Italy (Italy) crop condition development graph based on NDVI



(g) Northern Italy (Italy) crop condition development graph based on NDVI





(h) Southern Italy (Italy) crop condition development graph based on NDVI	(i). Western Italy (Italy) crop condition development graph based on NDVI

Table 3.52. Italy's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Eastern Italy	313	20	20.5	0.6	1257	-3
Northern Italy	435	20	17.9	0.6	1181	-6
Southern Italy	108	11	19.8	-0.3	1437	-2
Western Italy	212	10	19.2	0.4	1302	-4

Table 3.53. Italy's agronomic indicators by sub-national regions, current season's value and departure from 5YA, April -July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Eastern Italy	1108	15	99		0.94
Northern Italy	1423	18	99		0.97
Southern Italy	508	21	98		0.91
Western Italy	804	4	99		0.94

Table 3.54. CropWatch-estimated wheat production for Italy **in 2018 (thousands tons)**

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Wheat	7200	6.0%	-4.4%	7295	1.3%

[KAZ] Kazakhstan

The monitoring period covers spring wheat, barley, and other cereals, which were sowed before June in Kazakhstan. During the reporting period, crop condition in the country was generally favorable. The national average VCIx was 0.87 and the Cropped Arable Land Fraction decreased by 4% compared to the five-year average. Among the CropWatch agroclimatic indicators, RAIN and BIOMSS were above average (+10% and +8%), while TEMP and RADPAR were below average (-1.6°C and -3%). As shown by the NDVI development graph, crop condition was below average from April to June and above from the beginning of July. The spatial NDVI pattern and profile show that the crop condition in 57.5% of the cropped areas was above average in the north part of West Kazakhstan, Aktobe and Pavlodar, most parts of Qostanay, North Kazakhstan, Akmola, Kostanay, East Kazakhstan, Almaty provinces and some parts of South Kazakhstan, Zhambyl, and Qyzylorda provinces from late June to July. CropWatch wheat production estimates are 1.9% below last year's output because of the decrease of a wheat area by 5.3%.

Regional analysis

For the regional analysis, additional details are provided for four agro-ecological zones in the country: Northern region, Eastern plateau and southeastern region, South region and Central and non-agriculture region. The following are crop condition analyses for these regions.

In the Northern region crop condition was below the five-year average from April to June and above from July. RAIN was above average (+7%), and TEMP and RADPAR were below average (-1.9°C and -4%, respectively). BIOMSS increased by 7% in this zone. The maximum VCI index was 0.87, and the Cropped Arable Land Fraction increased by 5% compared to the recent five-year average. Overall, the outcome for the crops will be favorable in this region.

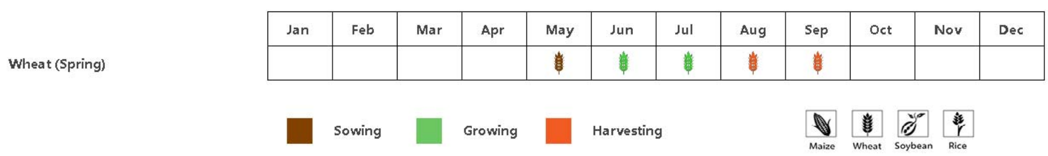
NDVI was generally below the five-year average from April to July in the Eastern plateau and southeastern region. RAIN was 15% above average, but TEMP and RADPAR were below average (-1.0°C and -2%). The agroclimatic indicators also resulted in an increase of the BIOMSS index by 10%. The maximum VCI index was 0.89, while the cropped area increased by 2% compared to the five-year average. Overall crop prospects are fair.

In the Southern region, NDVI was generally below the five-year average from April to June but close to average from late June to July. RAIN was above average (+13%), while TEMP and RADPAR were below (-1.1°C and -1%). The agroclimatic conditions resulted in a BIOMSS increase of 14%. VCIx reached 0.80, and the fraction of cropped arable land (CALF) decreased by 1% compared to the five-year average. Overall crop prospects for this region are normal and below 2017.

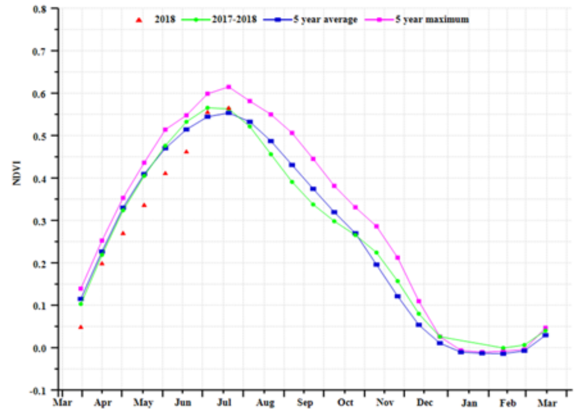
Central non-agriculture region

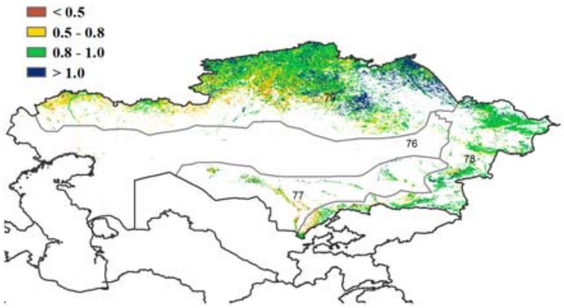
In this region, NDVI was below the five-year average during a reporting period. RAIN and TEMP were below average (-2% and -0.9°C) and RADPAR was above (+2%); BIOMSS decreased by 1%. The maximum VCI index was 0.67, and the Cropped Arable Land Fraction decreased by 16% compared to the recent five-year average. Overall, the outcome for the crops will be unfavorable in this region of limited agricultural importance.

Figure 3.25. Kazakhstan's crop condition, April -July 2018



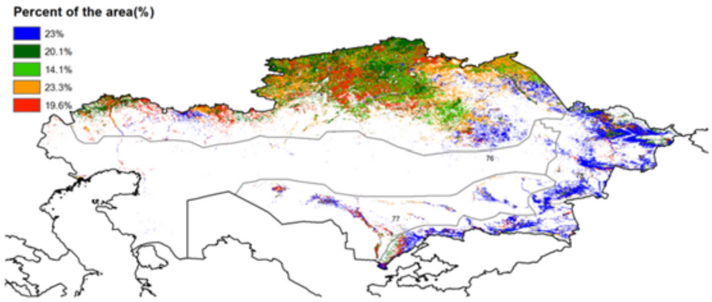
(a). Phenology of major crops

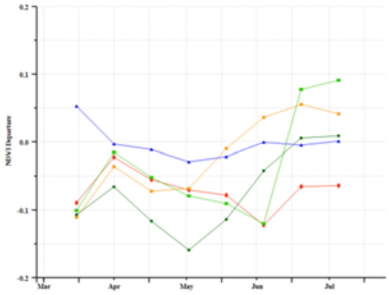




(b) Crop condition development graph based on NDVI

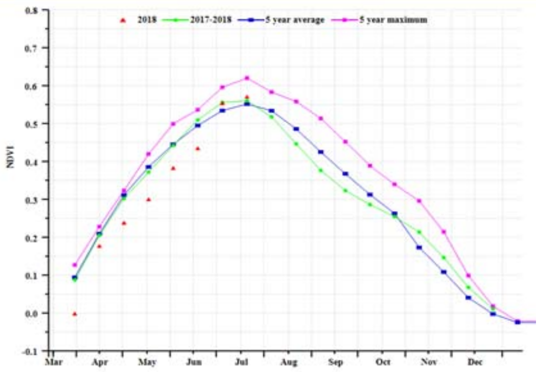
(c) Maximum VCI

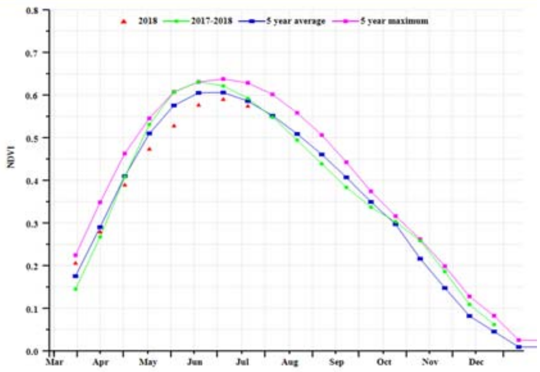




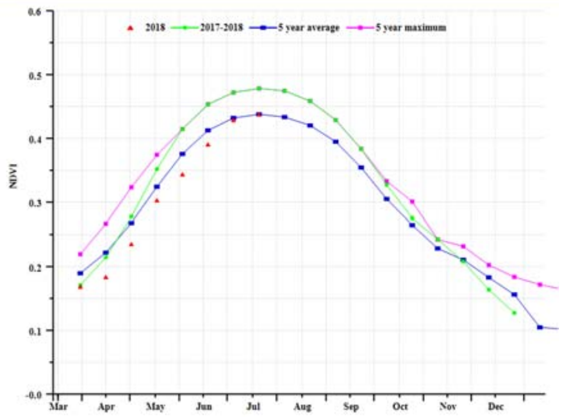
(d) Spatial NDVI patterns compared to 5YA

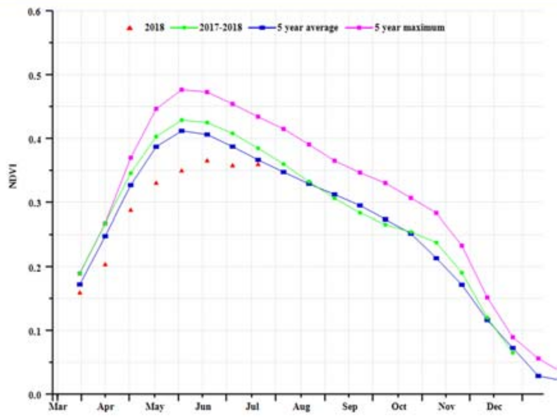
(e) NDVI profiles





(f) Crop condition development graph based on NDVI in Northern region (left) Eastern plateau and southeastern region (right))





(g)Crop condition development graph based on NDVI in South region(left) and Central non-agricultural region (right)

Table 3.55. Kazakhstan's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN	TEMP	RADPAR

	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m²)	Departure from 15YA (%)
Northern region	175	7	14.0	-1.9	1172	-4
Eastern plateau and southeastern region	257	15	14.9	-1.0	1317	-2
South region	113	13	20.9	-1.1	1395	-1
Central non-agriculture region	115	-2	17.1	-0.9	1311	2

Table 3.56. Kazakhstan's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m²)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Northern region	785	7	93	5	0.87
Eastern plateau and southeastern region	972	10	94	2	0.89
South region	488	14	56	-1	0.80
Central non-agriculture region	540	-1	47	-16	0.67

Table 3.57. CropWatch-estimated Wheat production for Kazakhstan in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Wheat	16595	3.6	-5.3	16287	-1.9

AFG AGO ARG AUS BGD BLR BRA CAN DEU EGY ETH FRA GBR HUN IDN IND IRN ITA KAZ **KEN** KHM LKA MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[KEN] Kenya

The country has a "short rains" and a "long rains" season. The long grain crops (mostly maize and wheat) are planted from March to April (late sowing windows) to be harvested in October and November. For the short rains, crops are planted in December and harvested in February and March.

The current analysis covers early stages of long grain crops. RAINS increased 48% above average and BIOMSS is up 20% over the 5YA. Temperature and RADPAR dropped significantly by 1.2℃ and by 5 %, respectively.

Based on NDVI curves, crop condition was better than during 2017 and the five-year average in 88.9% of cropland. This pattern is reflected by the maximum VCIx in the different areas, with the maximum value of VCIx at 1.03, indicating exceptionally good crops. The production of maize is estimated to increase by 16.1 % during the 2018 production year.

Regional analysis

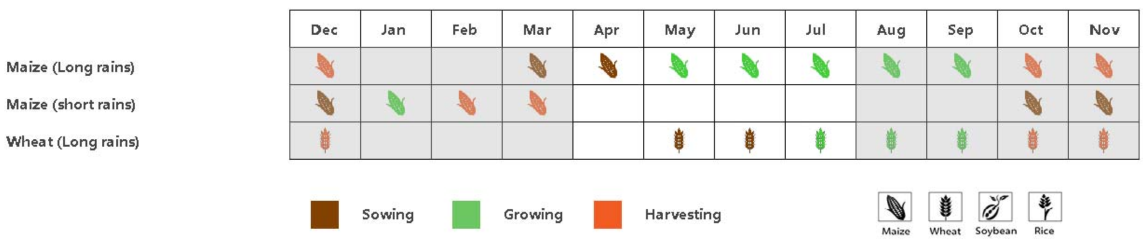
Based on the cropping systems, climatic zones and topographic conditions we divided this country into three Agroecological regions: the Eastern Coastal Area, the Northern region with sparse vegetation and Southwest Kenya.

The northern region with sparse vegetation is a mostly pastoral region; it recorded low rainfall compared to the other two regions: 377mm fell on average over Turkana, Samburu, West Pokot and Baringo, a 93 % increase over average. BIOMASS surged by 47%. Temperature and radiation were both below average (TEMP -1.1℃, RADPAR -3%). The NDVI-based Crop condition development shows that the NDVI profile was above the five years average with the maximum VCI value at 0.92. Moreover, large parts of the arable land in this region have high VCIx values (0.92 for the region), indicating good crop condition. Overall the outlook in the region indicates that there was a favorable condition for rangeland production in the Northern region with sparse vegetation.

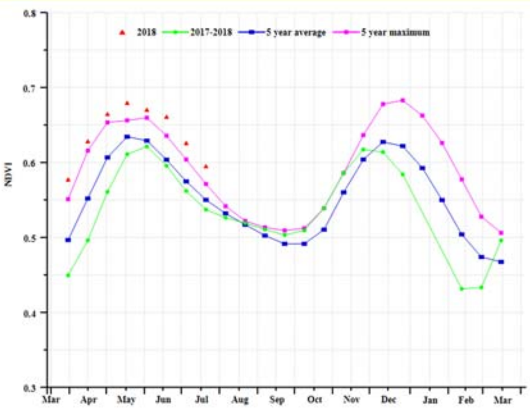
The Eastern Coastal Area include Mandera, Wajir and Isiolo. The counties are areas of low production compared to the southwest of Kenya. Rainfall and BIOMSS in the Eastern coastal areas rose 67% and 49%, respectively, compared to average. RADPAR dropped 3% and TEMP was 0.8℃ average. NDVI profiles were above their five-year average throughout the reporting period and maximum VCIx was 0.99, indicating very favorable crop condition. Production is expected to exceed 2017 values.

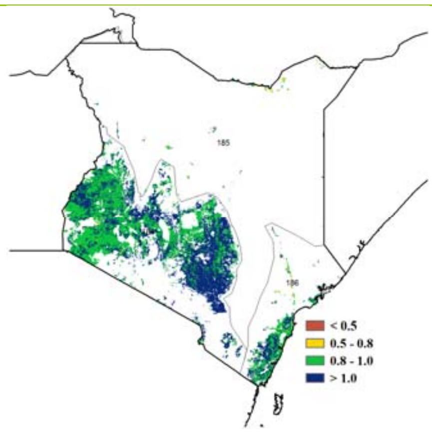
The counties of Narok, Kajiado, Kisumu, Nakuru and Embu make up the Southwest Kenyan AEZ. They include many high elevation areas and constitute major producers of wheat and maize. The AEZ recorded 532 mm of RAIN, 44% above average. However, due to low sunshine (RADPAR -6%) and cool temperature (TEMP, -1.3℃), BIOMSS is up only 15%. NDVI profiles above their reference values and VCIx at 1.03agree in depicting crop prospects as was very favorable.

Figure 3.26. Kenya's crop condition, April - July 2018.



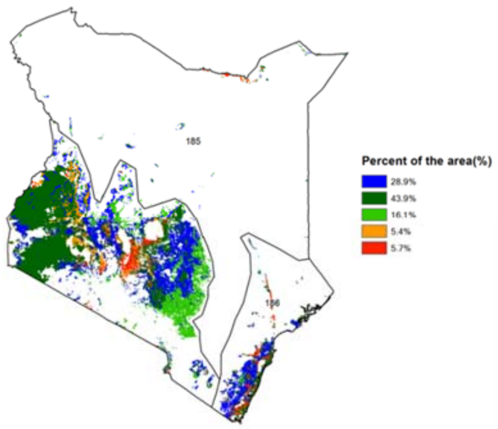
(a). Phenology of major crops

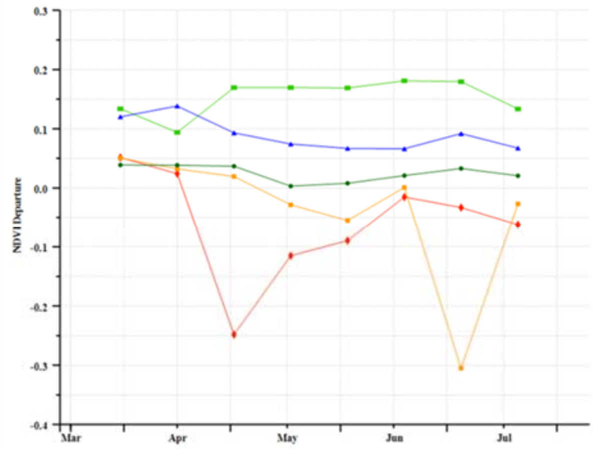




(b) Crop condition development graph based on NDVI

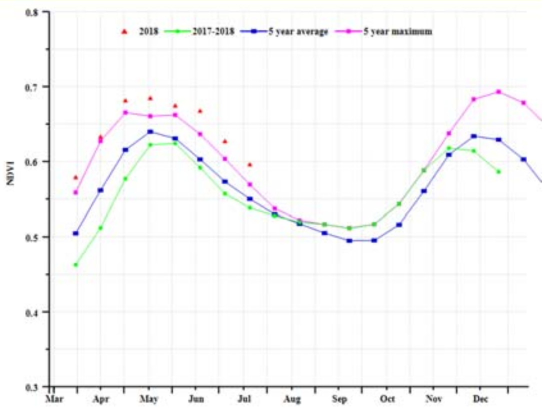
(c) Maximum VCI

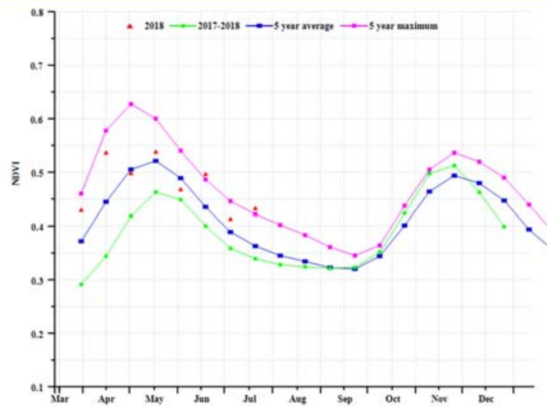




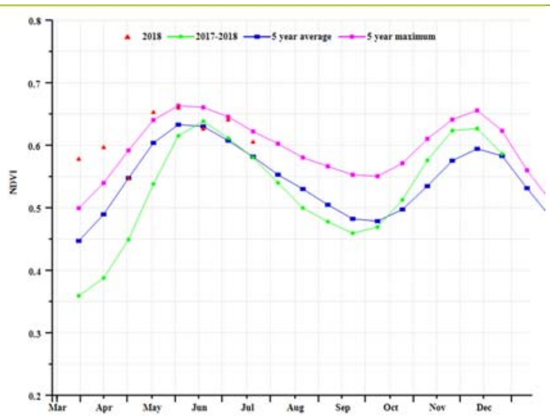
(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles





(f) Crop condition development graph based on NDVI (Southwest of kenya, and (g) Northern region with sparse vegetation



(g) Crop condition development graph based on NDVI, Eastern Coastal area

Table 3.58. Kenya's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Eastern Coastal Area	412	67	26.9	-0.8	1004	-3
Northern region with sparse vegetation	377	93	25.3	-1.1	1092	-3
Southwest of Kenya	532	44	19.5	-1.3	1060	-6

Table 3.59. Kenya's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Eastern Coastal Area	1093	49	98	2	0.99
Northern region with sparse vegetation	965	47	91	23	0.92
Southwest of Kenya	1236	15	99	4	1.03

Table 3.60. CropWatch-estimated Maize production for Kenya **in 2018 (thousand tons)**

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Maize	3000	11.4	4.2	3483	16.1

AFG AGO ARG AUS BGD BLR BRA CAN DEU EGY ETH FRA GBR HUN IDN IND IRN ITA KAZ KEN **KHM** LKA MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[KHM] Cambodia

The Current monitoring period covers the planting of maize and the main rice crop as well as the end of harvest of the dry season rice. CropWatch agro-climatic indicators show the air temperature was significantly below average (-1.4°C), which is consistent with low solar radiation (-5.5%). Precipitation decreased below average (-8.5%), which caused a -1.5% drop in BIOMSS. Nation-wide VCIx (0.89) is fair, indicating that propects remain favorable for the crops currently in the field.

Most regions in the country experienced favourable VCIx values above 0.8, except some provinces near Tonle Sap, such as Siem Reap, Kampong Thom, Kampong Chhnang, Pursat and Battambang. NDVI clusters shows that most areas had slightly above average crop condition, with the exception of 18% of arable lands in the south of the country. The abnormal NDVI signal in late July is presumably caused by cloud contamination of remote sensing images. The cool and drier than average weather did not significantly influence crop condition.

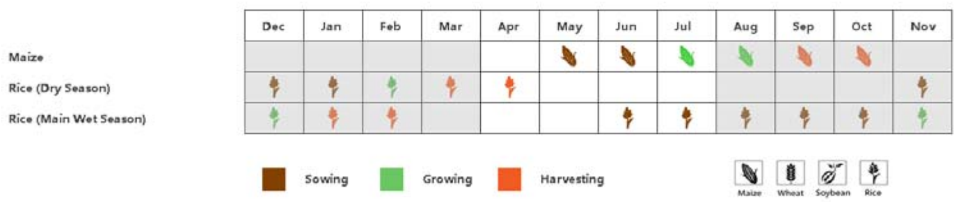
Based mostly on climate differences, two agro-ecological regions can be distinguished. Weather in the Tonle Sap lake area (especially rainfall and temperature) is mainly influenced by the lake itself. The second area, referred to as the "main crop area" covers areas outside the Tonle Sap basin along the border with Thailand and Laos in the north and Vietnam in the east.

Most of the Tonle Sap plain region recorded above average rainfall (+6%). Mild drought occurred in some areas along the plain, causing a drop in BIOMSS (-2%), However, the maximum VCIx in this area is satisfied (0.89).

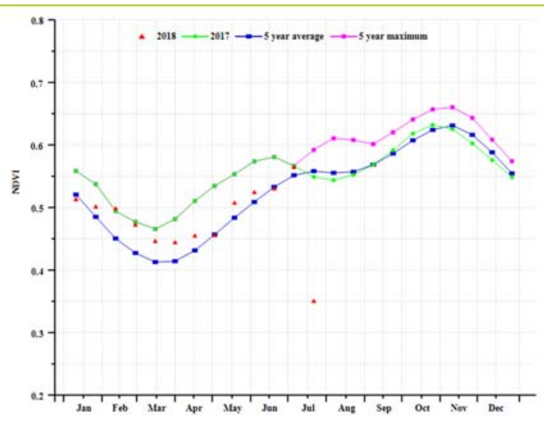
In the Main Crop Area weather was cold (-1.3°C) and drier (-11%), which causes a -1% decreasing in BIOMSS.

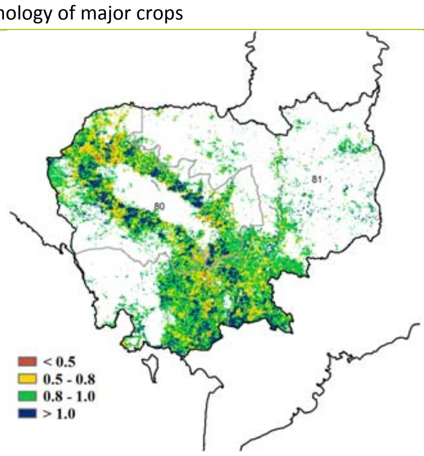
Both regions experienced a CALF slightly above average (+3%). According to the analysis given above and CropWatch yield forecast, rice yield is expected to exceed 2017 output by 3.4%.

Figure 3.27. Cambodia's crop condition, April -July 2018

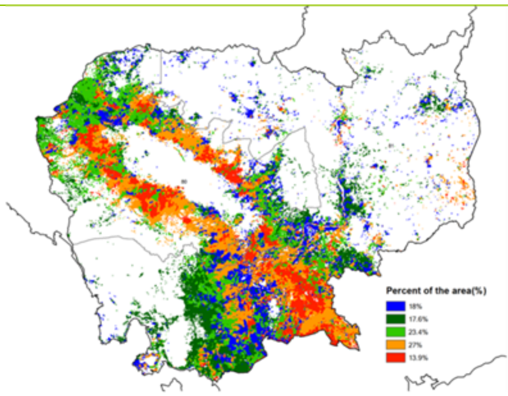


(a). Phenology of major crops

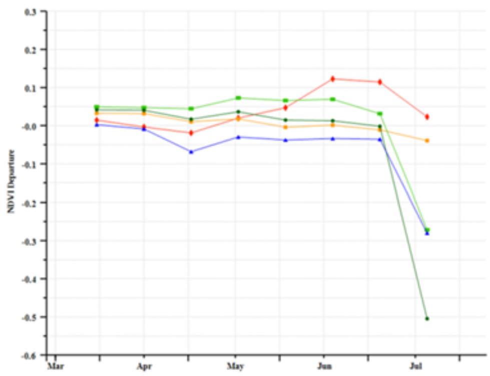




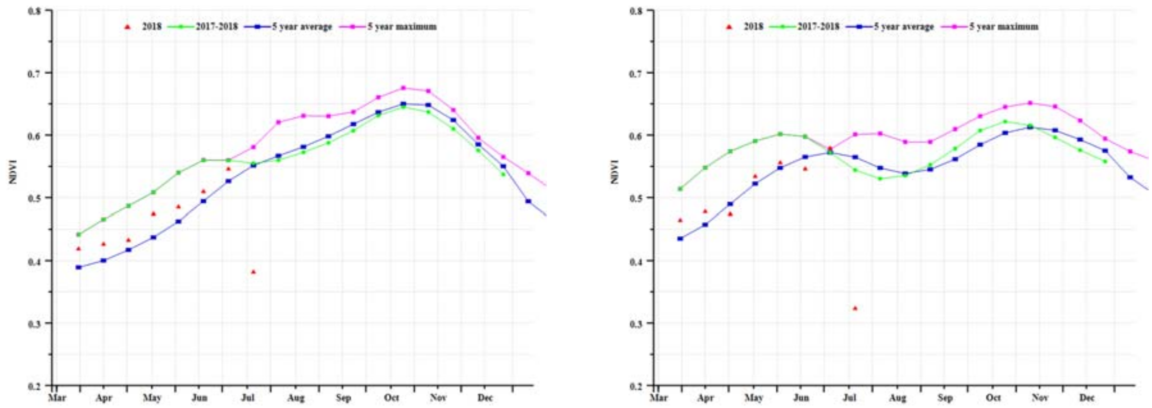
(b) Crop condition development graph based on NDVI (c) Maximum VCI



(d) Spatial NDVI patterns compared to 5YA



(e) NDVI profiles



(f) Crop condition development graph based on NDVI_Central Tonle-Sap plain (left) a and Upland areas (right))

Table 3.61. Cambodia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m2)	Departure from 15YA (%)
Main cropping area (Cambodia)	949	-11	28.4	-1.3	1042	-6
Lake plains (Cambodia)	727	6	28.4	-1.6	1069	-5

Table 3.62. Cambodia's agronomic indicators by sub-national regions, current season's value and departure from 5YA, April -July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Main cropping area (Cambodia)	2103	-1	92	3	0.90
Lake plains (Cambodia)	2002	-2	91	3	0.89

Table 3.63. CropWatch-estimated wheat production for Cambodia in 2018 (thousands tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Rice	8792	0.5	2.9	9093	3.4

AFG AGO ARG AUS BGD BLR BRA CAN DEU EGY ETH FRA GBR HUN IDN IND IRN ITA KAZ KEN KHM **LKA** MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[LKA] Sri Lanka

Sri Lanka cultivates maize and rice as its two main crops and two growing periods are rotated in one year for every kind of crop. The main Maha season lasts from October to March while the remaining months belong to the second Yala season. The reporting period covers the entire sowing and growing season of Yala rice and maize. According to the CropWatch indicators, crop condition is assessed as roughly up to May, it dropped sharply bas as much as 0.2 NDVI units after mid-June.

The interpretation which assigns the NDVI drop to persistent cloudiness is not incompatible with the prevailing below average RADPAR (4% below average, nationwide), abundant rainfall (+45% compared with average) and relatively cool weather (TEMP 0.9°C below average). The fraction of cropped arable land (CALF) remained stable compared with the five-year average. Except for the effects of cloud in late monitoring period, crop production performed well under the abundant precipitation, with BIOMASS increasing 18% compared to the five-year average.

There were some spatial differences according to NDVI profile clusters and map. The whole country suffered a minor departure from average in April. Thereafter, crop condition fluctuated around the average in northern and eastern Sri Lanka while all other regions experienced departures from average to different extent. The North-western Province suffered bad conditions since May, especially in mid-May and mid-June. In the south-east of the country, the crops did unsatisfactorily since May and recovered to average in July in the Western Province. VCIx patterns tend to disagree with NDVI profiles, with low values distributed over the eastern and northern coast, and high values occurring throughout the country. The average VCIx value for Sri Lanka is rather high at 0.93.

Regional analysis

Based on the cropping system, climatic zones, and topographic conditions, three sub-national, agro-ecological regions can be distinguished for Sri Lanka. They are the Dry zone, the Wet zone, and the Intermediate zone.

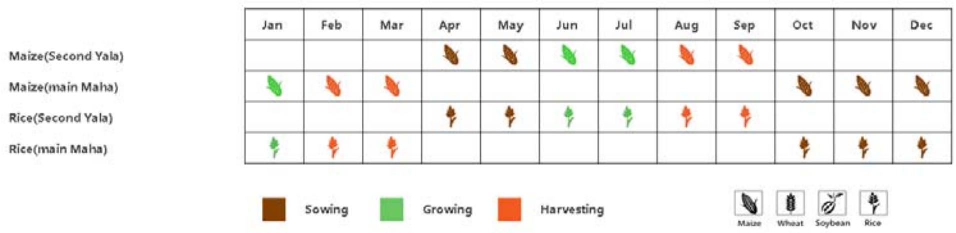
The Dry zone shows the most favorable agroclimatic and crop conditions for the country. The crop condition was slightly below average in April and above average after that. The agroclimatic indices show that rainfall was markedly over average (RAIN +51%) while temperature and radiation was poor (TEMP -0.9°C, RADPAR -4%).

The Wet zone (the northeast of the country) shows the least favorable values among the three sub-national regions discussed here. The crop condition was below average all the time and reached its lowest value in May and June. Less precipitation excess (RAIN +34%) compared with other two sub-national regions and constant cloud cover may substantially impacted the second maize and rice.

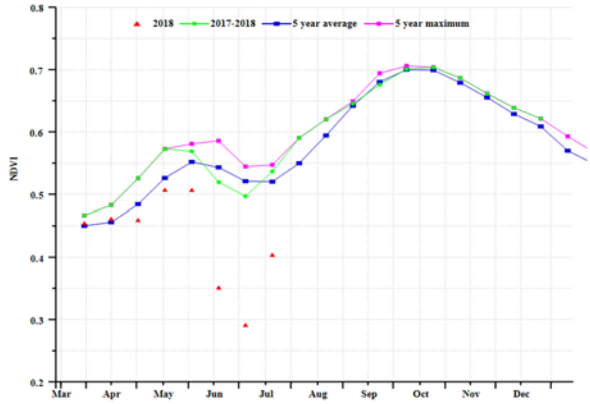
The Intermediate zone is located between the Dry and Wet zones, and therefore has the most comfortable weather condition over Sri Lanka. Temperature and radiation anomalies were close to those in the Dry zone (TEMP -0.9°C, RADPAR -4%) but rainfall was relatively more abundant (RAIN +57%). According to the NDVI development graphs, this region suffered below average crop condition but recovered to above average in July.

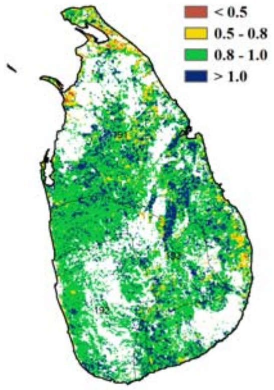
CropWatch puts the production of maize and rice during 2018 slightly below those of 2017.

Figure 3.28. Sri Lanka's crop condition, April - July 2018



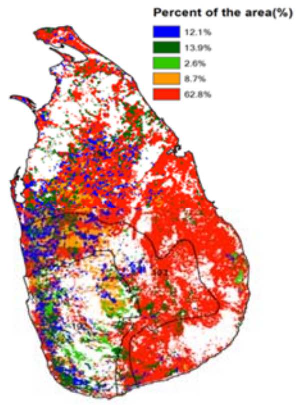
(a). Phenology of major crops

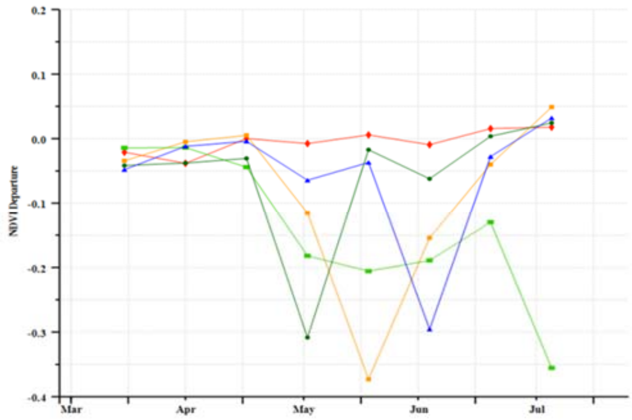




(b) Crop condition development graph based on NDVI

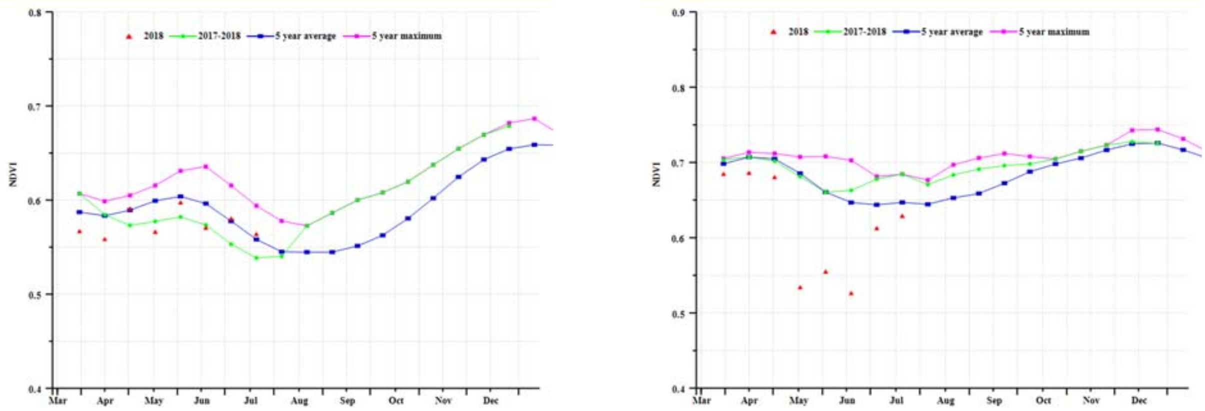
(c) Maximum VCI



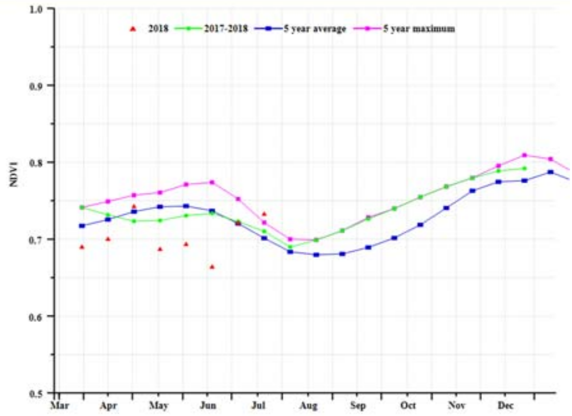


(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles



(f) Crop condition development graph based on NDVI(Dry zone (left) and Wet zone (right))



(g) Crop condition development graph based on NDVI (Intermediate zone)

Table 3.64. Sri Lanka's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m²)	Departure from 15YA (%)
Dry zone	484	51	29.0	-0.9	1161	-4
Wet zone	1119	34	24.7	-1.0	949	-3
Intermediate zone	817	57	27.6	-0.9	1103	-4

Table 3.65. Sri Lanka's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m²)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Dry zone	1113	24	98	0	0.92
Wet zone	2039	10	100	0	0.95
Intermediate zone	1653	19	100	0	0.95

Table 3.66. CropWatch-estimated Rice production for Sri Lanka in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Rice	2499	-0.3	0.1	2494	-0.2

AFG AGO ARG AUS BGD BLR BRA CAN DEU EGY ETH FRA GBR HUN IDN IND IRN ITA KAZ KEN KHM LKA **MAR** MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[MAR] Morocco

During the AMJJ period, Morocco produces mostly maize and wheat. Farmers planted wheat during November and December so as to harvest May and June. Maize was planted in February and harvested in June and July.

As shown by the Crop Watch agroclimatic indices, compared to average, rainfall increased by 22%, and the average temperature was as much as 2.3℃ below average. Nationwide, the fraction of cropped arable land (CALF) showed an increase of 34%. The biomass production potential is 11% above the average of the previous 5 years.

Based on the VCIx indicator, favorable crop condition prevailed as the value mostly exceeded 0.92. NDVI-based crop condition development graphs show that there the situation was above the five-year average. The spatial NDVI patterns indicate that NDVI was above average by 64.2% of cropland. Altogether, CropWatch estimates that 2018 wheat production will remain below the output of 2017.

Regional analysis

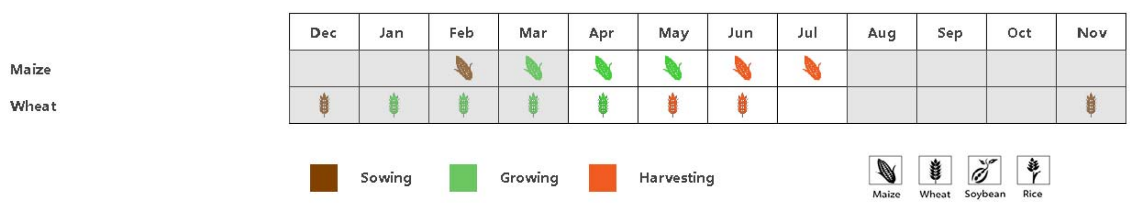
The reported period covers mainly cereal, wheat producing areas of warm semi-arid zones, warm subhumid and cool sub-humid of Morocco

The warm semiarid zone recorded 60 mm of rainfall over four months, which is an increase over average of 11%. Temperature and RADPAR were below average by 2.3°C and 7%, respectively, two rather significant values! Even though the rainfall increased BIOMSS dropped 4 % below the five-year average. In addition, the NDVI profile was above the five years average, and the maximum VCIx value was at 0.98. Overall the outlook was favorable for crop production.

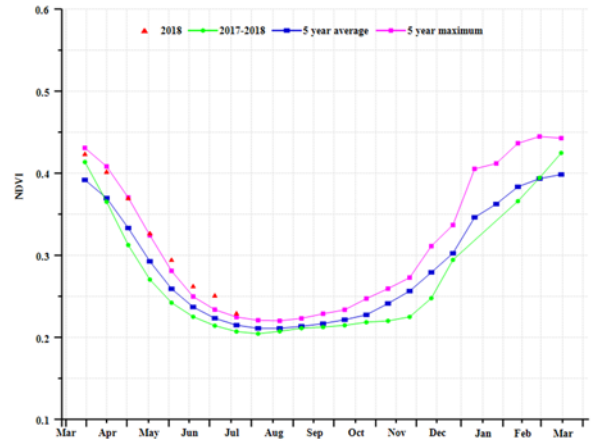
In the Warm sub-humid zone, rainfall increased by 32% above average with a decreased temperature of 2.4℃ and RADPAR 9% below reference values. VCIx reached 0.89. In general, based on the NDVI crop condition development graphs and the indicators, crop condition was favorable.

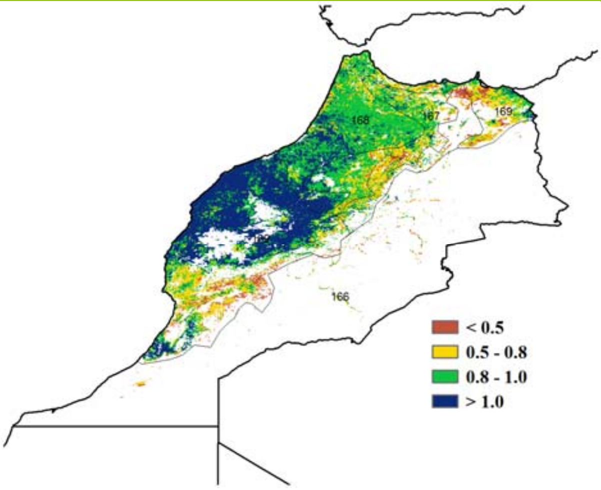
The Cool subhumid zone is very suitable for wheat cultivation. Rainfall increased over the fifteen years average (RAIN +21%) and BIOMSS followed with +19% output potential compared with the last five years. Similar to the other AEZs, RADPAR fell 9% and cool weather prevailed (TEMP -2.3°C). NDVI profiles stayed above the five-year average. VCIx reached 0.83). The available indicators generally concur to assess the situation as favorable.

Figure 3.29. Morocco's crop condition, April-July 2018



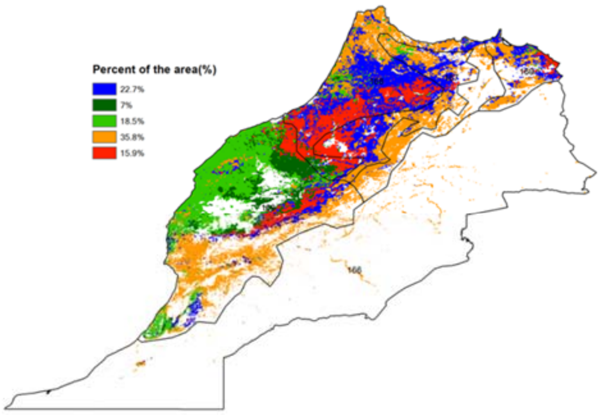
(a). Phenology of major crops

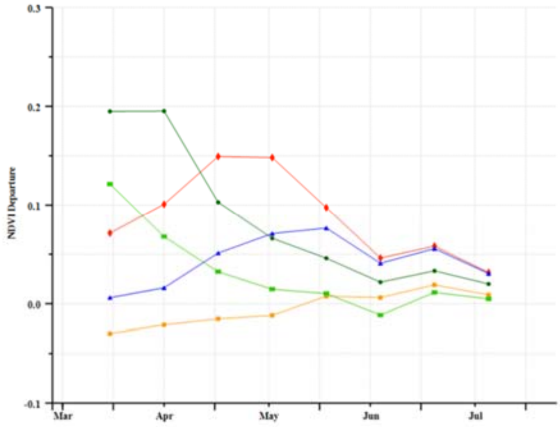




(b) Crop condition development graph based on NDVI

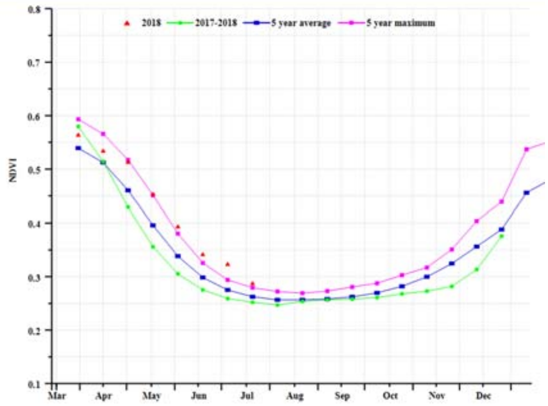
(c) Maximum VCI

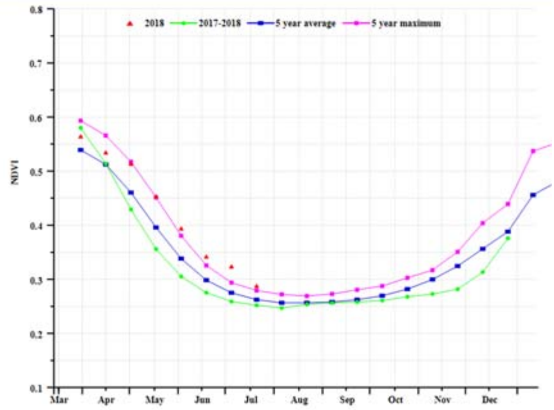




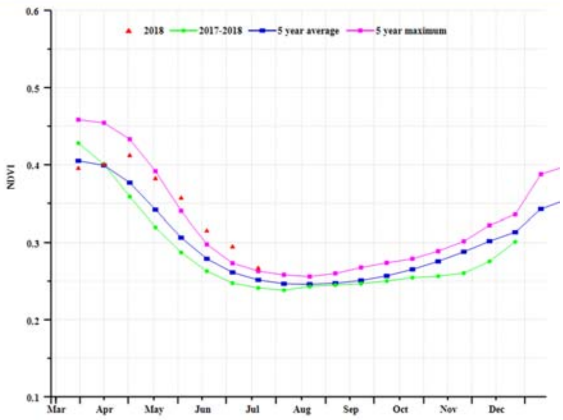
(d) Spatial NDVI patterns compared to 5YA

€ NDVI profiles





(f). Crop condition development graph based on NDVI (warm semiarid zones).and (g). warm sub humid zones)



(h) . crop condition development graph based on NDVI, Cool subhumid zone.

Table 3.67. Morocco’s agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m²)	Departure from 15YA (%)
Warm semiarid zones	60	11	17.7	-2.3	1455	-7
Warm sub-humid zones	114	32	18.7	-2.4	1381	-9
Cool sub-humid zones	119	21	16.9	-2.3	1390	-9

Table 3.68. Morocco’s agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m²)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Warm semiarid zones	228	-4	45	91	0.98
Warm sub-humid zones	456	26	81	13	0.89
Cool sub-humid zones	489	19	69	14	0.82

Table 3.69. CropWatch-estimated Wheat production for Morocco in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
wheat	7100	2.8	-3.5	7043	-0.8

[MEX] Mexico

During this monitoring period (April through July), maize in northwest Mexico was out of season while in other regions the crop was between sowing and growing time. Wheat was at the harvesting stage. Rice and soybean were at sowing period. Overall, crop condition was slightly below average but equal to the last year's level (Figure 3.30a).

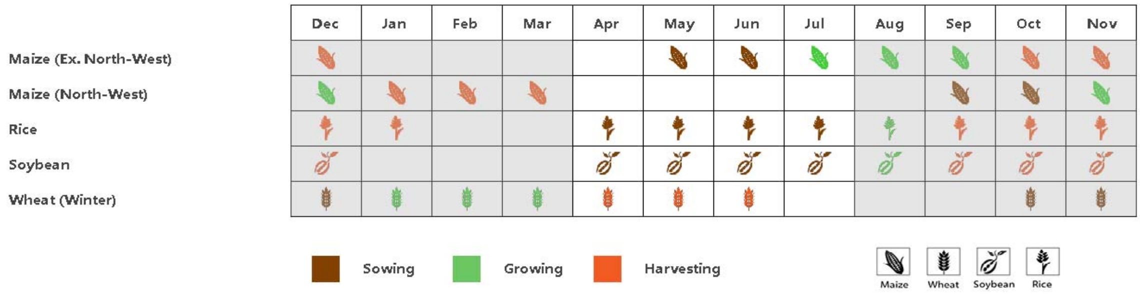
All CropWatch agrolimatic indicators were slightly below average: rainfall -9%, temperature -0.4°C and RADPAR -2% indicating moderately unfavorable weather. The biomass production potential BIOMSS and CALF were 3% and 1% below average, respectively. The maximum VCI was 0.81, with low values occurring in Sonora, Chihuahua and Coahuila and more favorable ones in Nayarit, Jalisco, Colima and Michoacan (Figure 3.30c). As shown by the spatial NDVI pattern and corresponding NDVI profiles, about 15.4% of cropped areas were continuously below average condition, mostly in Baja California, Sinaloa, and Tamaulipas. In contrast, 15.1% of crops were continuously above average in Oaxaca, Chiapas, Veracruz, Yucatan and Quintana Roo. This pattern is consistent with spatial VCIx variations. CropWatch estimates that the yield of maize will decrease by 0.5% compared with the previous season while wheat yield is up 0.6%.

Regional analysis

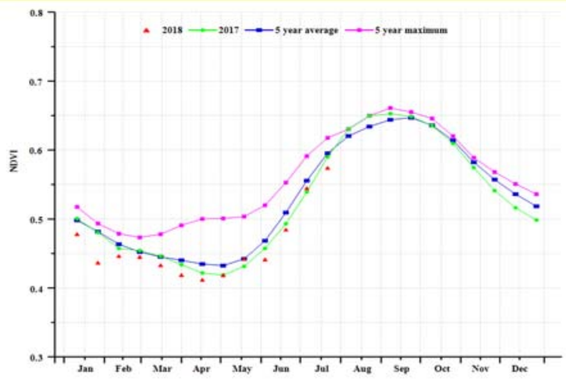
During April through July, crop condition in the Arid and semi-arid region was below average up to late June but got better to be above average from early July. Crop condition in the Humid tropics with summer rainfall was below average in early April but above average from late April to early May, and below average again since late June. Crop condition in the Sub-humid temperate region with summer rains and Sub-humid hot tropics with summer rains was generally below average but equal to last year's level during April through July.

The CropWatch agrolimatic indicators show that rainfall and RADPAR for all the four regions decreased compared to average with the departures between 4% and 14% (for rainfall), and 1% and 3% (for RADPAR). Temperature dropped slightly (around 0.5°C) in the the Humid tropics with summer rainfall, Sub-humid temperate region with summer rains and Sub-humid hot tropics with summer rains while it was just average in the Arid and semi-arid regions. BIOMSS were near average or average in Arid and semi-arid regions and Humid tropics with summer rainfall but below average in Sub-humid temperate region with summer rains (-7%) and Sub-humid hot tropics with summer rains (-5%). CALF were average in Humid tropics with summer rainfall and Sub-humid temperate region with summer rains but below average in Arid and semi-arid regions and Sub-humid hot tropics with summer rains, decreased by 5% and 1% respectively. Maximum VCI in Arid and semi-arid regions, Humid tropics with summer rainfall, Sub-humid temperate region with summer rains and Sub-humid hot tropics with summer rains were between 0.73 and 0.87.

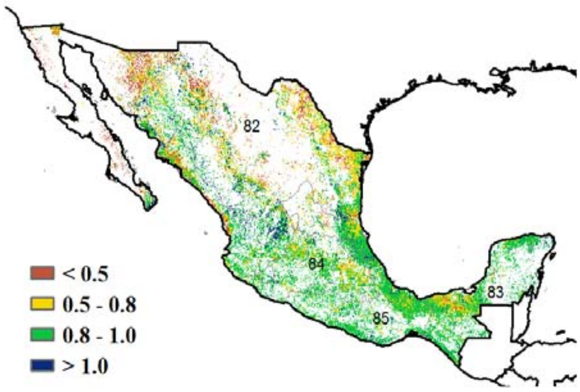
Figure 3.30. Mexico's crop condition, April -July 2018



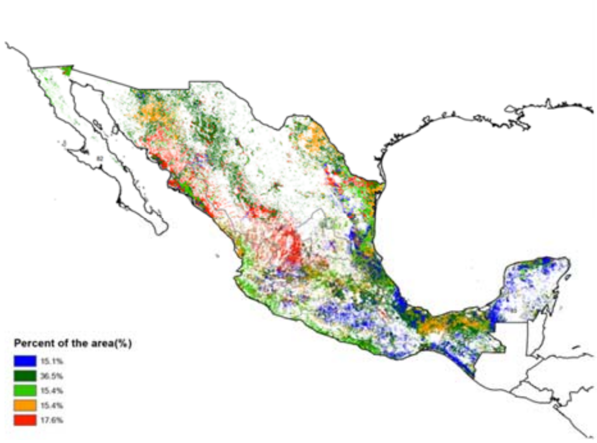
(a). Phenology of major crops



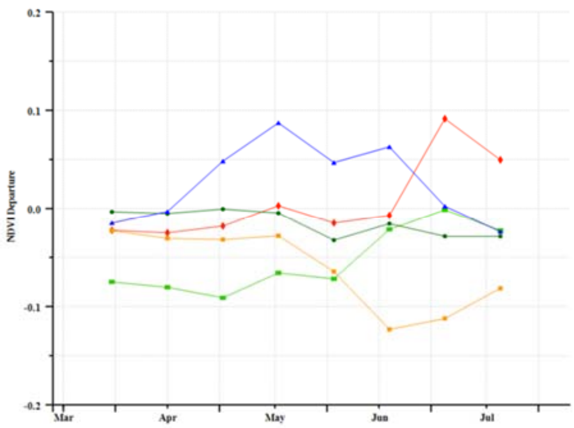
(b) Crop condition development graph based on NDVI



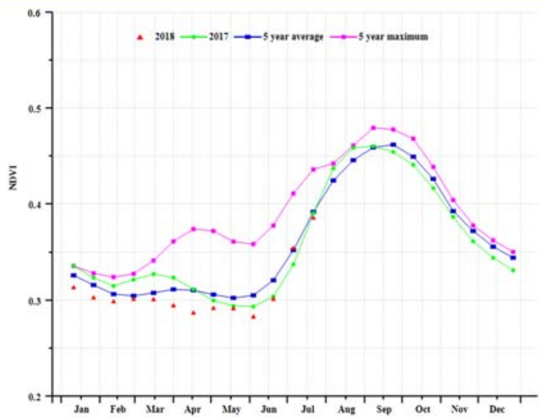
(c) Maximum VCI

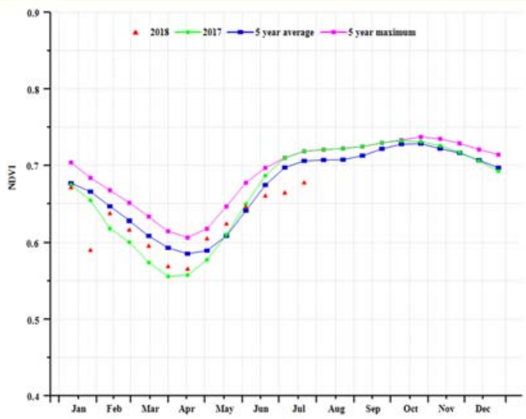


(d) Spatial NDVI patterns compared to 5YA

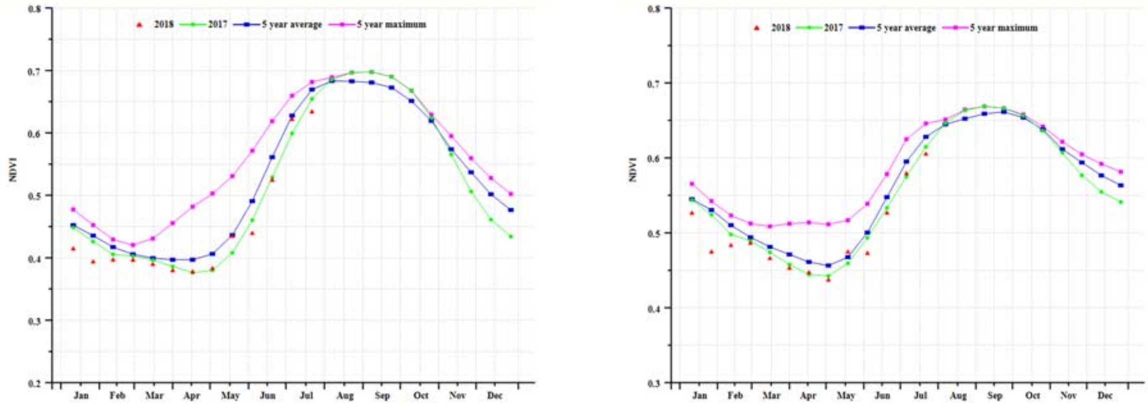


(e) NDVI profiles





(f) Crop condition development graph based on NDVI (Arid and semi-arid regions (left) and Humid tropics with summer rainfall (right))



(g) Crop condition development graph based on NDVI (Sub-humid temperate region with summer rains (left) and Sub-humid hot tropics with summer rains (right))

Table 3.70. Mexico's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m²)	Departure from 15YA (%)
Arid and semi-arid regions	231	-4	24.4	0.0	1482	-2
Humid tropics with summer rainfall	658	-5	27.3	-0.6	1258	-1
Sub-humid temperate region						

Table 3.71. Mexico's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m²)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Arid and semi-arid regions	697	-1	1	-5	0.73
Humid tropics with summer rainfall	1614	0	1	0	0.87
Sub-humid temperate region with summer rains	1139	-7	1	0	0.86
Sub-humid hot tropics with summer rains	1208	-5	1	-1	0.87

Table 3.72. CropWatch-estimated maize and wheat production for Mexico in 2018 (thousands tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Maize	23858	-0.5%	2.4%	24315	1.9%
Wheat	3283	0.6%	8.7%	3589	9.3%

[MMR] Myanmar

Maize is distributed mainly in the Hills region of Muyanmar, while wheat and rice are planted across the country. The reporting period covers the harvest of maize in the Hills region (completed in early April), of wheat (completed early May) and the second rice crop (completed mid-June). The main rice crop started growing in early July. According to the CropWatch monitoring results, crop condition is considered to have been generally average from April to May, after which it dropped sharply starting in early June and remained far below average thereafter.

CropWatch agroclimatic indices show a marked increase in rainfall above average (RAIN +20%), but a drop in temperature (TEMP -0.8°C) and radiation (RADPAR, -5%). The fraction of cropped arable land (CALF) underwent a slight decrease of 2%. Sufficient precipitation offset the influence of temperature and radiation, resulting a favorable behavior for biomass (+5%) compared to 5YA. The crop condition development graph based on NDVI shows an average situation in April and May but fell markedly below average in June and July. The abnormally low values since June over the whole country may be related to the poor condition of main rice and cloud cover over Myanmar during this period.

Regarding spatial variations, cropland across the country displayed unfavorable condition for almost the whole country during the monitoring period. All areas of Mandalay and Magwe and south of Sagaing remained average during April and May but deteriorated after June. Ayeyarwady,Yangon, Bago, Kayin and Mon displayed the lowest NDVI departures, a behavior similar to Mandalay, but reached very low values in mid-June. The spatial distribution of crop condition shows that the central plain experienced better climatic condition than the Hills and Coastal regions, which is consistent with the agroclimatic condition of sub-national regions. The maximum VCI map also displays this pattern: high values in central part of the central plain and low value in other regions. Country-wide, the maximum VCI value was 0.83.

Regional analysis

Based on the cropping system, climatic zones, and topographic conditions, three sub-national, agro-ecological regions can be distinguished for Myanmar: the Coastal region, the Central plain, and the Hills.

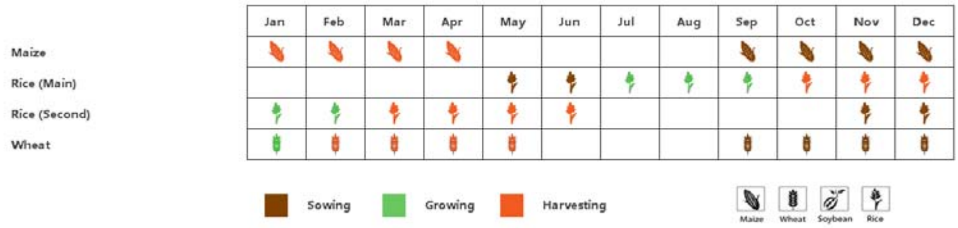
Agroclimatic and crop conditions in the Coastal region follow the same pattern as the whole country, with crop condition was above average before June and deteriorating thereafter. The unfavorable crop condition of this sub-national region may reflect the situation of main rice. Rainfall was above average (RAIN 21%) while temperature and radiation dropped by 0.6°C and 6% respectively.

The Central plain is the main agricultural region of the country and includes most of Mandalay and Magwe, which both show satisfactory values for the CropWatch indicators, as mentioned above. More rainfall (RAIN, +22%) than the other two regions resulted in good crop growth, confirmed by a high VCIx value (0.84).

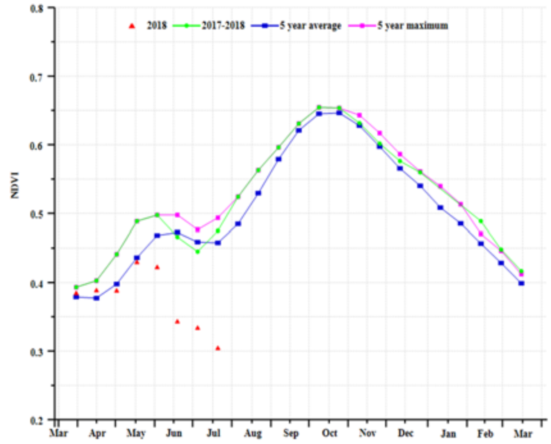
The Hills region is the major maize producing area of the country but also includes some rice. Agroclimatic indicators were close to the national values and other two sub-national regions. As NDVI development graphs show, crop condition was mostly below average except for mid-April.

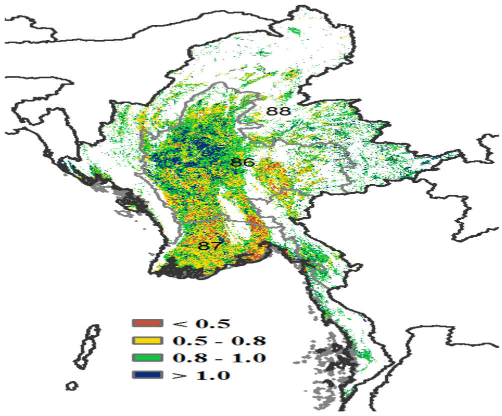
Overall for Myanmar, crop condition is generally below average due to the lower temperature and poor radiation. The NDVI values during April and May are average, meaning that there is no influence for the harvesting of maize, wheat and second rice, but the crop condition and production of main rice may have suffered adverse conditions in June and July. The Cropped Arable Land Fraction (CALF) for the country and the three regions also shows a slight decrease compared to average, which may contribute to reduce crop production. CropWatch puts the production of maize and second rice during 2018 slightly below those of 2017.

Figure 3.31. Myanmar's crop condition, April -July 2018

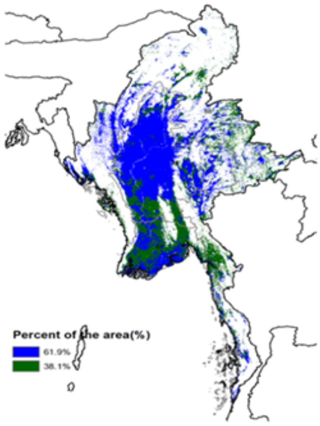


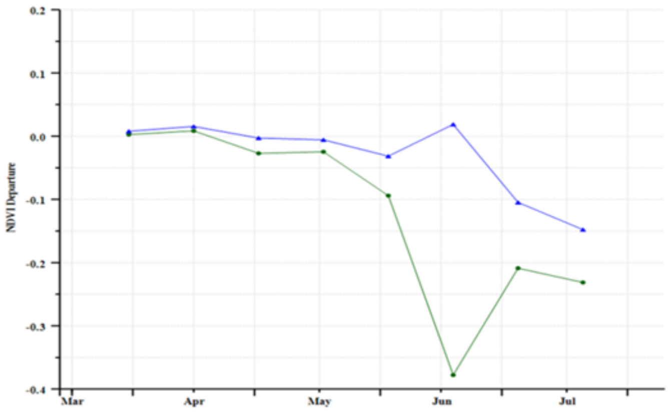
(a). Phenology of major crops



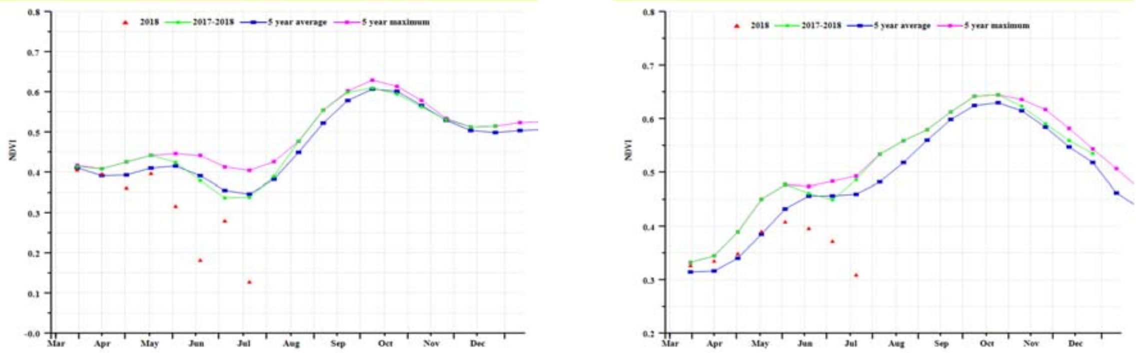


(b) Crop condition development graph based on NDVI (c) Maximum VCI

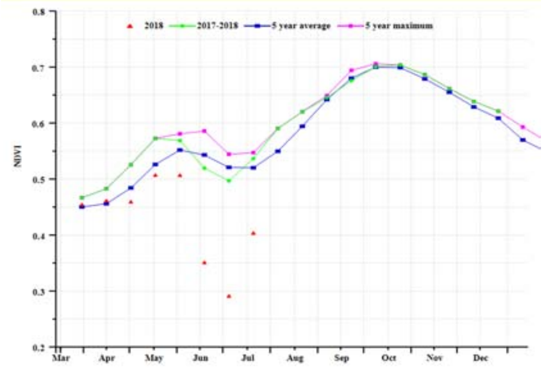




(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles



(f) Crop condition development graph based on NDVI (Coastal region (left) and Central plain (right))



(g) Crop condition development graph based on NDVI (Hill region)

Table 3.73. Myanmar's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Coastal region	1807	21	28.5	-0.6	937	-6
Central plain	853	22	27.8	-0.9	1048	-5
Hill region	1268	18	24.9	-0.9	950	-5

Table 3.74. Myanmar's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Coastal region	2161	2	64	-20	0.76
Central plain	1813	8	82	2	0.84
Hill region	2030	3	94	-1	0.86

Table 3.75. CropWatch-estimated rice and Maize production for Myanmar in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Rice	25407	-2.0	0.3	24987	-1.7
Maize	1702	-2.4	0.0	1661	-2.4

[MNG] Mongolia

The monitoring period covers spring wheat and other cereals currently in the field; they were sowed before June. During the reporting period, the crop condition in the country was favorable. The national average VCIx was 0.90 and the Cropped Arable Land Fraction increased by 2% compared to the five-year average. Among the CropWatch agroclimatic indicators, RAIN was above average (+40%), TEMP was about average (+0.5°C departure), while RADPAR was below 5%. The combination of factors resulted in high BIOMSS (+18%) compared to average. As shown by the NDVI development graph, crop condition was generally close to average from April to June and above average in July. NDVI cluster graphs and profiles show that 42.7% of arable lands were consistently above average since June, mostly in Khentii, Bulgan, Selenge and east Hovsgol provinces; 16% were consistently below average, mainly in Tov and patches in Arkhangai and south Bulgan, and south-west Hovsgol provinces. Variable NDVI with low values around May (23, 5%) occurred in east Dornod, Uvs, Bulgan and patches in Hovsgol and Khentii provinces. CropWatch expects an increase of 11.6% in wheat production compared with last year, while the production area of wheat is estimated to increase by 1.3%. Overall, the agroclimatic variables indicate favorable conditions for crops.

Regional analysis

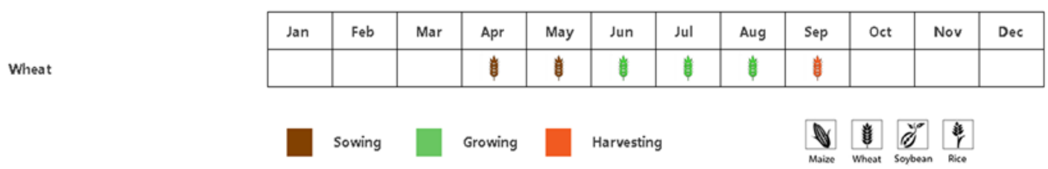
In the Khangai Khuvsgul region, NDVI was slightly below the five-year average from late April to late June and about average in July. The RAIN and TEMP were above average (+32% and +0.5°C) and RADPAR was below average (-2%). The combination of the factors resulted in high BIOMSS (+12%) compared to the five-year average. The maximum VCI index was 0.89, while the cropped area decreased by 1% compared to the five-year average. Overall crop prospects are favorable.

The Selenge-Onon region, Crop condition was above the five years average from May to July. Accumulated rainfall was above average during the monitoring period (RAIN 43%), BIOMSS and TEMP were above average (21% and 0.5°C). The RADPAR index decreased by 6% compared to the five-year average. The maximum VCI index was 0.91, while the cropped arable land increased by 4%. Overall crop prospects are favorable.

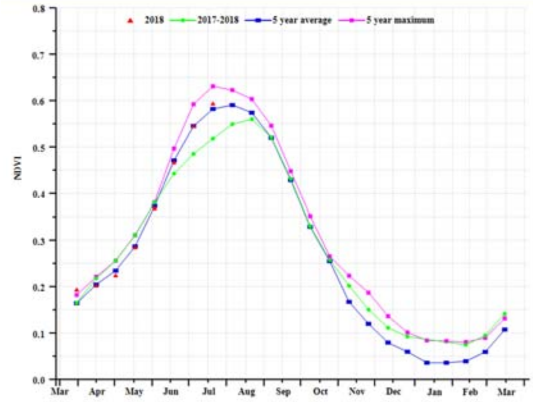
The Central and Eastern Steppe Region, According to the NDVI development graph, crop condition in this region was below average from April to June and close to average from late June to July. RAIN and TEMP were above average (+53% and +0.8°C, respectively), while RADPAR was below average (-6%). BIOMSS was up 38%, while the Cropped Arable Land Fraction increased by 5% compared to the five-year average. The maximum VCI index was 0.87. In general, the region experienced favorable weather conditions for crop growth during the current season.

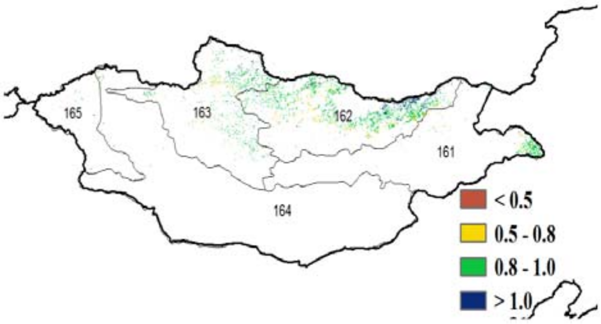
Remaining regions (Altai and Gobi) play a minor role in crop production. Conditions were nevertheless favourable to rangeland development.

Figure 3.32. Mongolia's crop condition, April -July 2018



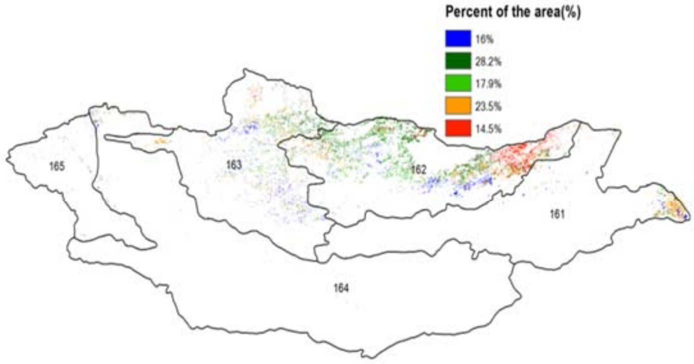
(a). Phenology of major crops

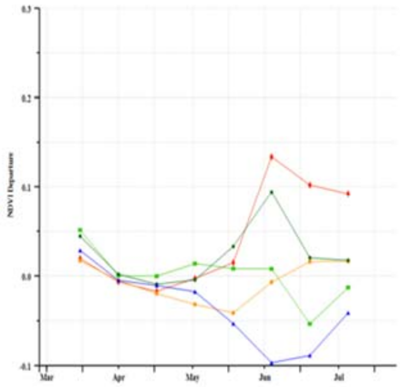




(b) Crop condition development graph based on NDVI

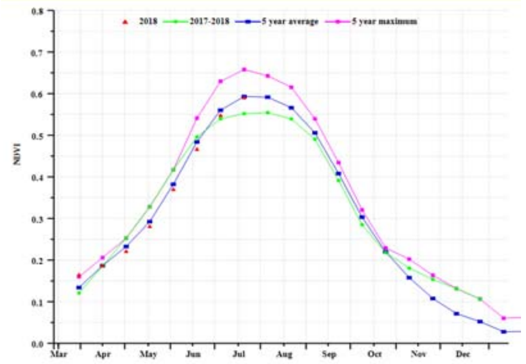
(c) Maximum VCI

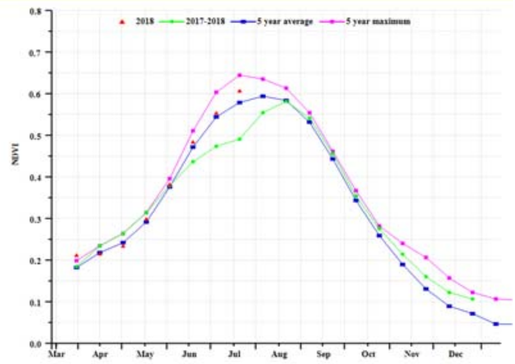




(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles





(f) Crop condition development graph based on NDVI Hangai Khuvsgul Region (left) (g) Selenge-Onon Region (right))

Table 3.76. Mongolia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Coastal region	1807	21	28.5	-0.6	937	-6
Central plain	853	22	27.8	-0.9	1048	-5
Hill region	1268	18	24.9	-0.9	950	-5

Table 3.77. Mongolia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Coastal region	2161	2	64	-20	0.76
Central plain	1813	8	82	2	0.84
Hill region	2030	3	94	-1	0.86

Table 3.78. CropWatch-estimated rice and Maize production for Mongolia **in 2018 (thousand tons)**

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Rice	25407	-2.0	0.3	24987	-1.7
Maize	1702	-2.4	0.0	1661	-2.4

[MOZ] Mozambique

Considered to be the wet season in Mozambique, the April-July the monitoring period covers the final stage of growing season of Maize and Rice as well as harvesting season in the North region, while in the central area, Rice and Maize were harvesting in early April. The growing and harvesting stage characterised the wheat during this period. The agroclimatic indicators for Mozambique show an increase in rainfall (RAIN=+61%) and a decrease in both temperature and radiation (TEMP = -0.6ºC and RADPAR=-2.1%). The behaviours verified on agroclimatic indicators led to favourable condition on all agronomic indicators, where the biomass rose by 31%over the past five years average. The recorded cropped arable land fraction (CALF) and maximum vegetation condition index (VCIx) was 0.06% and 0.91respectively. An increase in Maize production of about 2.2% is expected.

The crop condition development graph based on NDVI for the entire country, indicate crop conditions above the average of past five years during almost the whole monitoring period, but below the values of the of the same monitoring period of 2017 as well as five years maximum. At the same time, the maximum VCIx map shows that poor crop conditions were observed in south part of Gaza Province with VCIx values below 0.5, while the coastal areas of Inhambane and Nampula and part of the central region of Zambezia Province registered better crop conditions with values of VCIx higher than 1. NDVI departure was above the average throughout the reporting period in most parts of the country representing 50.2% of the cropped area.

With few exceptions, crop conditions can be deemed favourable in Mozeambique.

Regional Analysis

Taking consideration of the climate, vegetation, altitude, soil and farming systems, Mozambique is divided into ten (10) agro-ecological zones (AEZ): Inland of Maputo and Southern Gaza,Coastal areas and South of Save, North and Central Gaza and Western Inhambane,Central medium altitude areas, Low altitude areas of Sofala and Zambezia, Dry areas of Zambezia and Southern Tete, North Coastal areas, High altitude areas,Mid-altitude areas and Northern hinterland of Cabo Delgado.

Inland of Maputo and southern Gaza region RAIN was 17% below average but TEMP and RADPAR were about average. BIOMSS rose 4% and cropped arable land fraction was up 3.3%. The maximum VCIx for this region was 0.90. Crop condition for this region was above the past five years' average.

Crop conditions above the average of past five years were recorded in Coastal areas and South of Save. Rain and temperature decreased by 26% and 0.3ºC respectively below average. BIOMSS registered a decrease of 5% while the cropped arable land fraction remained stable and VCIx of about 0.90 was observed.

RAIN in the North and Central Gaza and Western Inhambane region marginally increased by 5% while the temperature and radiation were average. Although BIOMASS increased by 22%, VCIx (0.77) was just average and CALF was reduced by 6.4%. All these elements combined, surprisingly resulted in crop conditions above the average of past five years, above the same monitoring period of 2017 as well but below the five years maximum.

With crop condition above the average of the past 5YA during almost all the monitoring period, the Central medium altitude areas registered a maximum vegetation condition index (VCIx) of 0.95. In this region the rainfall increased by 22%, the temperature dropped by 1.0ºC, and the radiation decreased by 2%. These elements led to a slight increase in Biomass while the CALF was about average.

In the Low altitude areas of Sofala and Zambezia, the agroclimatic indicators show an increase in rainfall (+47%) and a slight drop in temperature and sunshine (TEMP -0.6, RADPAR-2%). CALF was stable and BIOMSS increased by 23%. The maximum VCIx for this region was 0.92 and crop conditions were above the average of past 5YA.

About average crop conditions were observed in the Dry areas of Zambezia and Southern Tete. This region verified an increase in rainfall (+24%), a reduction in temperature (-0.8ºC) and a decrease in radiation (-3%). CALF increased by 0.9%, BIOMSS was average and regional VCIx 0.90.

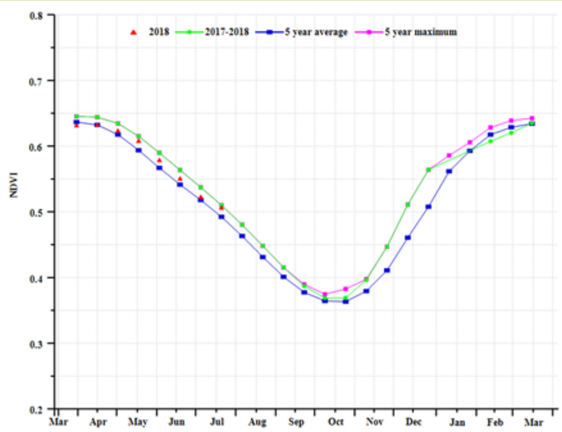
The Northen coastal areas was characterised mainly by a large increase in rainfall (RAIN+70%) and BIOMSS (+43 %.) Other variables, including crop condition, were favourable as well.

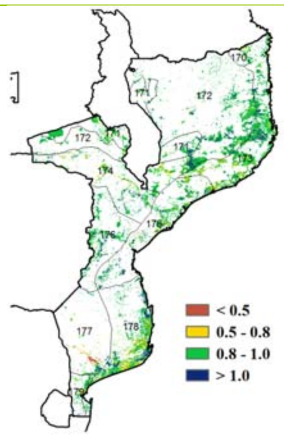
Better crop conditions were also verified in High-altitude and mid-altitude areas where the rainfall more than doubled compared with average. Excellent agronomic indicators (VCIx 0.91 and 0.93, respectively and CALF unchanged) confirm goo crop prospects.

In the Northern hinterland of Cabo Delgado, below average crop condition were observed from the beginning of the monitoring period up to mid-June; Rain was average but temperature was unusually cool (1.1ºC below average). CALF was about average, BIOMSS dropped 7% and VCIx nevertheless reached 0.92.

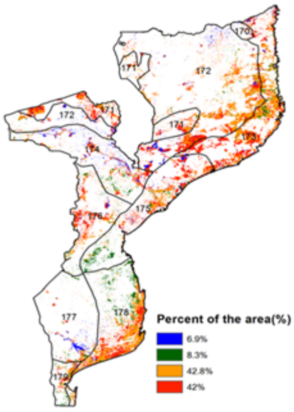
Figure 3.33. Mozambique's crop condition, April -July 2018

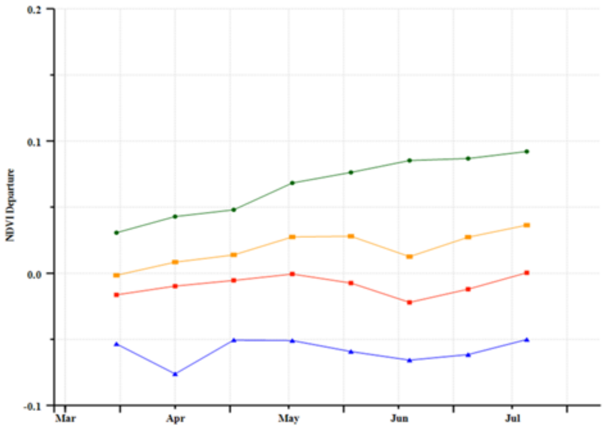
(a). Phenology of major crops



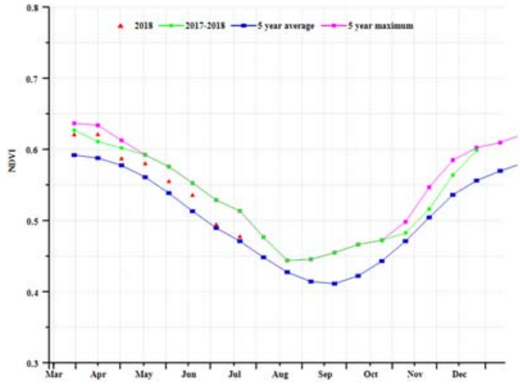


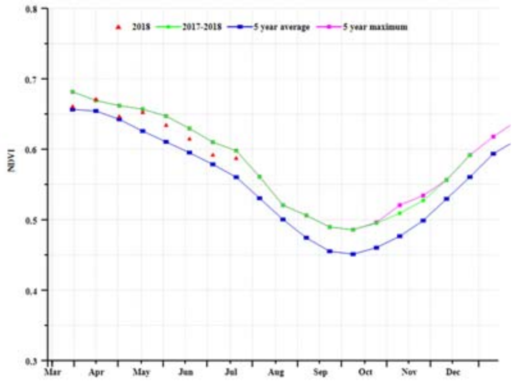
(b) Crop condition development graph based on NDVI (c) Maximum VCI



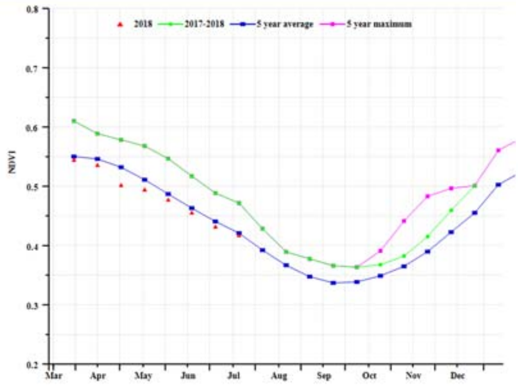


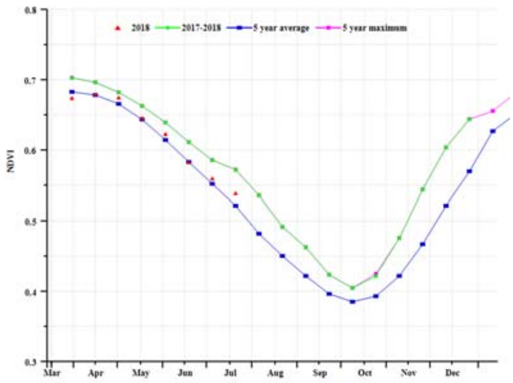
(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles



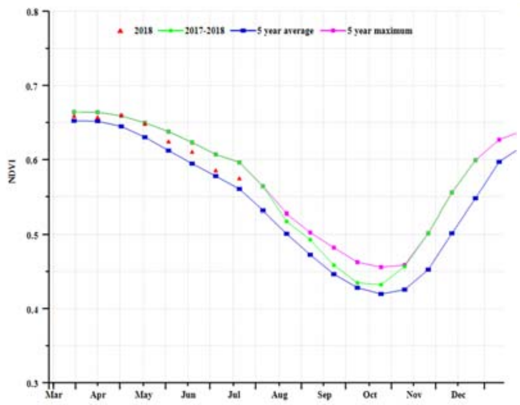


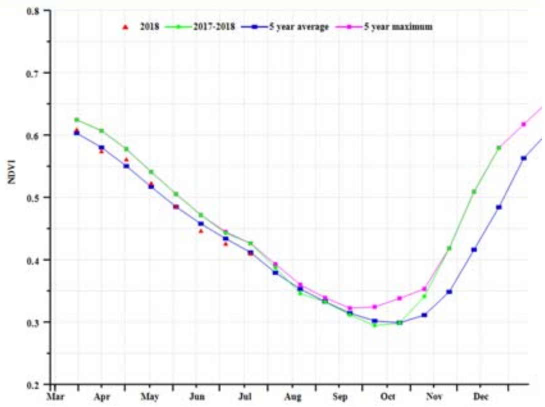
(f) Crop condition development graph based on NDVI (left: Zambézia, right: Nampula)





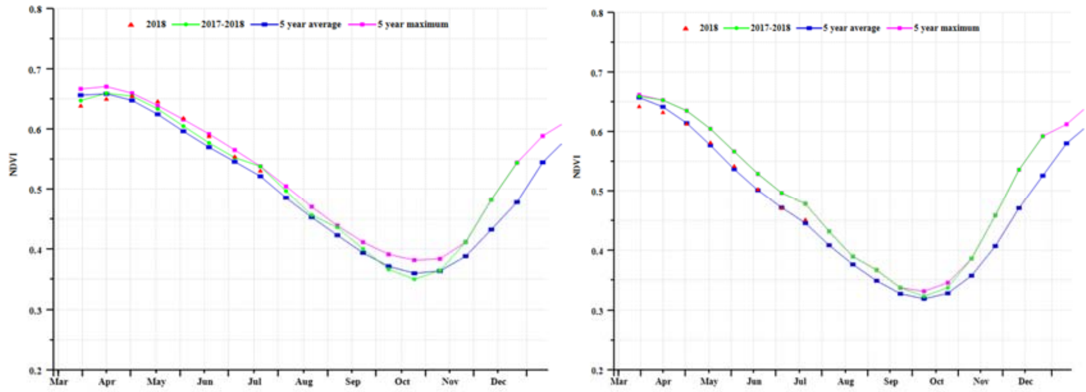
(g) Crop condition development graph based on NDVI (left) North and Central Gaza and Western Inhambane (right) Central medium altitude areas.



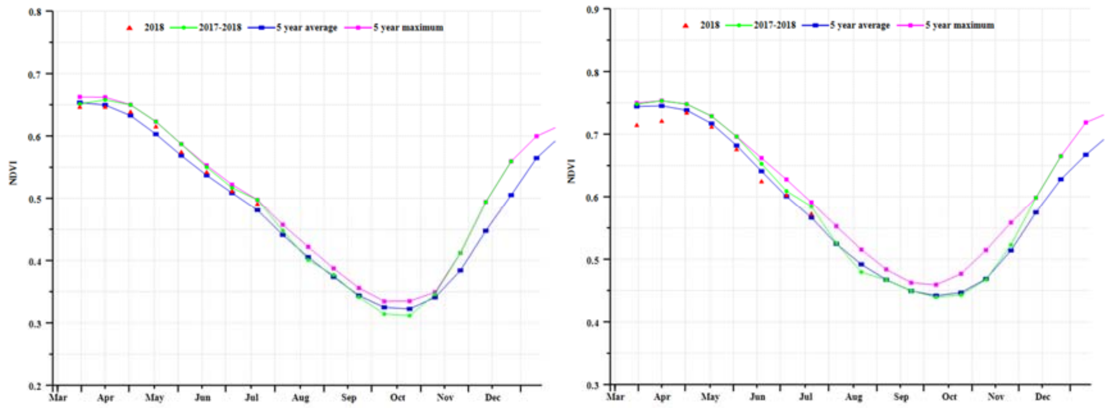


(h) Crop condition development graph based on NDVI (left) Low altitude areas of Sofala and Zambezia (right) Dry areas of Zambezia and

Southern Tete.



(i) Crop condition development graph based on NDVI (left) Northern coastal areas (right) High-altitude areas.



(j) Crop condition development graph based on NDVI (left) Mid-altitude areas (right) Northern hinterland of Cabo Delgado.

Table 3.79. Mozambique's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Maputo	85	-17	21.5	-0.2	809	-1
Gaza	83	-26	22.8	-0.3	854	0
Inhambane	84	5	22.0	-0.2	835	-2
Sofala	112	22	21.5	-1.0	929	-2
Manica	169	47	23.6	-0.6	868	-2
Tete	63	15	23.9	-0.8	941	-3
Zambézia	230	70	24.6	-0.9	936	-2
Nampula	171	104	19.7	-0.6	989	-4
Cabo Delegado	213	119	22.8	-0.6	966	-3
Niassa	151	-2	22.7	-1.1	1029	-2

Table 3.80. Mozambique's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Maputo	1141	8	97	5	0.89
Gaza	409	4	99	3.37	0.90
Inhambane	379	-5	99	0.51	0.91
Sofala	369	22	88	-6.44	0.78
Manica	336	3	100	0.02	0.95
Tete	490	23	99	-0.05	0.92
Zambézia	215	0	96	0.88	0.90
Nampula	582	43	99	0.01	0.90
Cabo Delegado	498	64	700	0.00	0.91
Niassa	495	53	100	0.08	0.93

Table 3.81. CropWatch-estimated Maize production for Mozambique in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Maize	2040	0.00%	2.30%	2085	2.2%

[NGA] Nigeria

The monitoring period covers the sowing and growing season of main Maize in the South and in the North as well as the planting of irrigated and non-irrigated rice. Compared with average, the agroclimatic indicators show an increase in rainfall (RAIN +10%) and a drop in both temperature and radiation (TEMP -0.8ºC and RADPAR -8%). With a maximum vegetation condition index of 0.90 and a reduction on the cropped arable land fraction by 1%, the biomass production potential registered an increase of 6%. The country recorded below average crop conditions during the entire monitoring period. The NDVI profiles over the nation reveal below average crop conditions from April to June. Thereafter, however, about 35% of the country registered crop conditions above the average, especially in Borno, Katsina, Zamfana and Sokoto states. Altogether, CropWatch expects a decrease in the production of maize and rice by 3.8% and 3.2% respectively.

Regional analysis

Considering the cropping systems, climatic zones, and topographic conditions, Nigeria is divided into four agro-ecological zones (AEZ). They are referred to (from north to south and by increasing rainfall) as Sudano-Sahelian, Guinean savanna, Derived savanna and Humid forest zone.

Seasonally dry weather prevailed in the Sudano Sahelian until the beginning of the rainy season in July, when this region experienced favourable crop conditions. VCIx reached 0.91. An increase in rainfall of about 26% above average and a decrease in both temperature and sunshine (TEMP -0.9ºC and RADPAR -6%), led to an increase in biomass index by 18%. CALF dropped 5% compared with the five previous seasons.

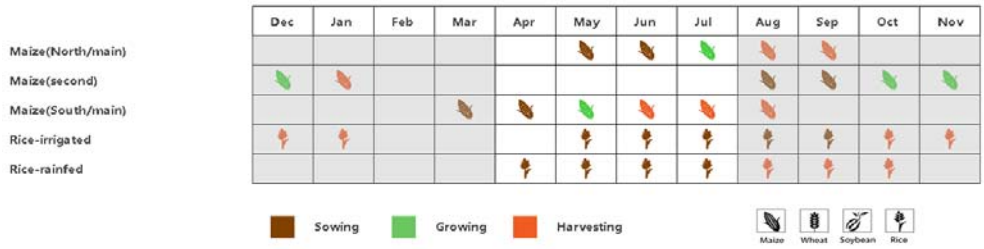
Contrary to Derived Savanna, the Guinean Savanna region, registered a reduction in all agroclimatic indicators (RAIN -1%, TEMP -0.8ºC and RADPAR -9%). With CALF reduced by 5.43%, the biomass registered a slight increase of 1%. The NDVI graph indicates crop condition about the average in early April, and unfavourable crop conditions from May to the end of the monitoring period. The maximum VCI for this region was 0.85, and a proportion of about 50% showed VCI values below 0.8.

The average VCI for the Derived Savanna (0.94) results from values between 0.8 and 1 and above, athough the crop condition development graph based on NDVI shows that the situation was unfavourable during the entire monitoring period. Relative to average, a slight increase in rainfall (RAIN +9%) was accompanied by a drop in temperature and radiation (-0.9ºC and -7%, respectively). Both CALF (+0.18%) and BIOMSS (+4%) were close to average.

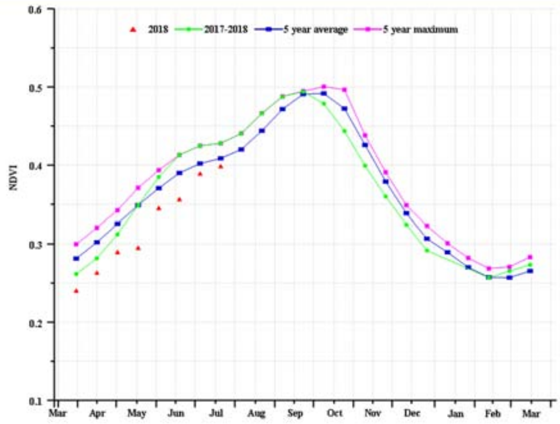
The maximum VCI of 0.91 suggests favourable crop conditions in the Humid Forest zone. However, the NDVI graph indicates poor crop conditions during the entire monitoring period. Similar to the Guinean Savanna, this region also registered a slight decrease in CALF (-0.5%). The Biomass increased by 3% when compared to past 5YA. The agroclimatic indicators show an increase in rainfall by 12% but both temperature and radiation decrease by 9ºC and 6% respectively.

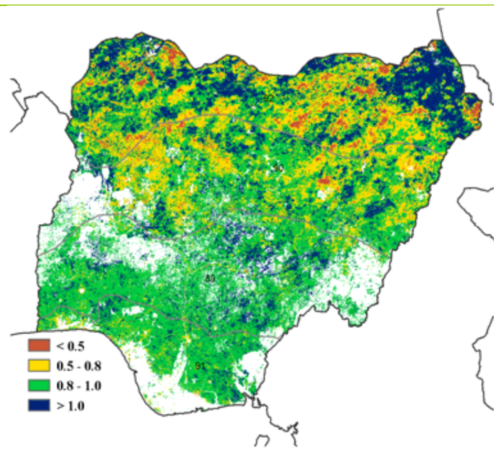
In general, the crop conditions reported during this period indicates that in nationwide, the crop conditions were unfavourable, which can justify the decrease in the production of maize and rice registered.

Figure 3.34. Nigeria’s crop condition, April -July 2018

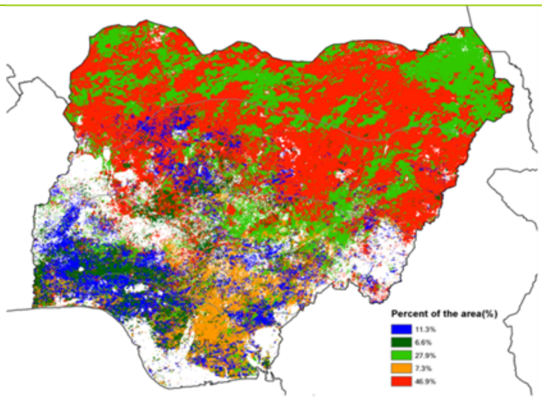


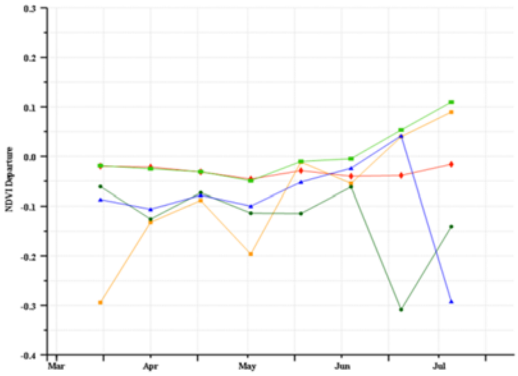
(a) Phenology of major crops



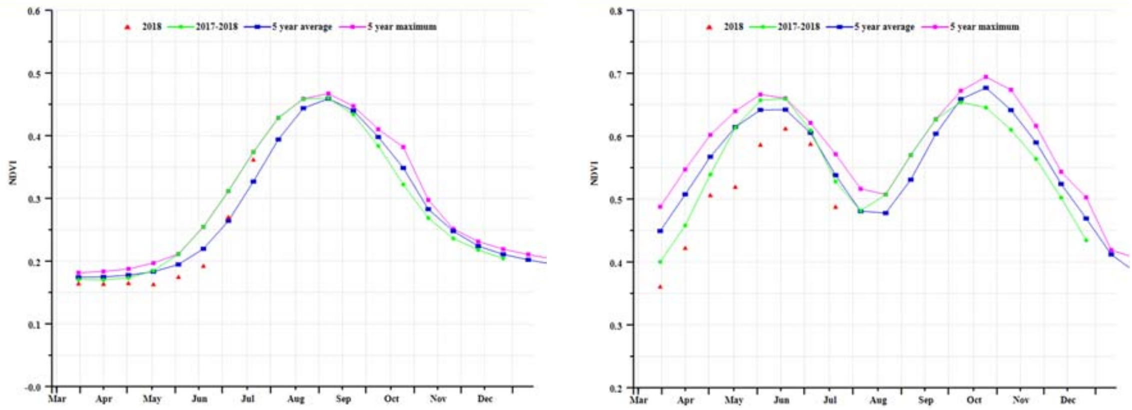


(b) Crop condition development graph based on NDVI (c) Maximum VCI

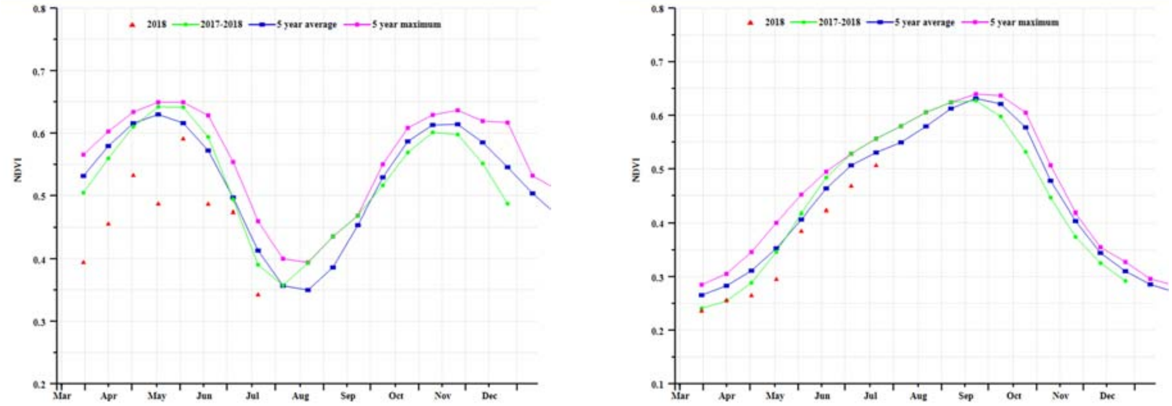




(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles



(f) Crop condition development graph based on NDVI (Soudano-sahelian region (left) and Derived savanna zone region (right))



(g) Crop condition development graph based on NDVI (Humid forest zone region (left) and Guinean savanna region (right))

Table 3.82. Nigeria's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Sudano Sahelian	721	9	27.5	-0.9	988	-7
Derived Savana	524	-1	28.5	-0.8	1132	-9
Humid Forest Zone	1113	12	27.1	-0.9	864	-6
Guinean Savanna	456	26	31.1	-0.7	1270	-9

Table 3.83. Nigeria's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMASS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Sudano Sahelian	1909	4	99	0.18	0.94
Derived Savana	1605	1	87	-5.43	0.85
Humid Forest Zone	2319	3	98	-0.51	0.91
Guinean Savanna	1332	18	50	-4.96	0.91

Table 3.84. CropWatch-estimated maize and Rice production for Nigeria in 2018 (thousands tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Maize	11165	-3.60%	-0.30%	10736	-3.80%
Rice	4684	-3.20%	-0.10%	4532	-3.20%

AFG AGO ARG AUS BGD BLR BRA CAN DEU EGY ETH FRA GBR HUN IDN IND IRN ITA KAZ KEN KHM LKA MAR MEX MMR MNG MOZ NGA **PAK** PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[PAK] Pakistan

The reporting period corresponds to the sowing of summer maize and the planting of rice crops in the country, as well as to the harvesting of winter wheat. Rainfall (RAIN, 240mm) was 5% above average. TEMP at 27.9°C was -0.6°C lower than average and RADPAR was near average. BIOMASS accumulation was expected to be 593 gDM/m2, 2% higher than average. NDVI was lower than average throughout the reporting period in most of the country. The Cropped Arable Land Fraction decreased to 0.3, 16.4% lower than average. The VCIx is average.

Regional analysis

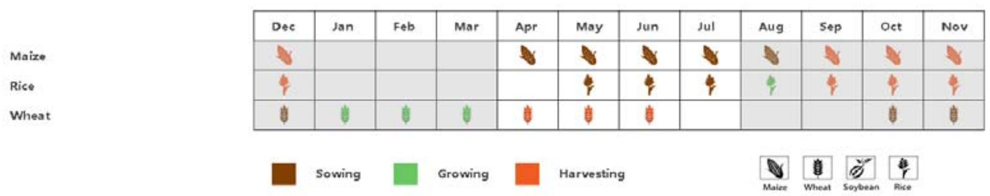
Due to the country's large diversity of natural environmental conditions (topography, soil and weather etc.), Pakistan can be divided into four agro-ecological regions (AEZ), namely Balochistan, Lower Indus river basin, Northern Highlands, and Northern Punjab. Only a small proportion of land is cultivated in Balochistan, and only the other three AEZs are described below.

All the regions received more rainfall than average while temperature marginally decreased (-0.6% ~ -1.1%). The proportion of rainfall increased most in the Lower Indus river basin (20% above average, against 5% in other areas) and the highest rainfall among the regions was recorded in the Northern Highlands (339 mm). The three regions received less RADPAR than expected: between 7 and 10%, which is significant.

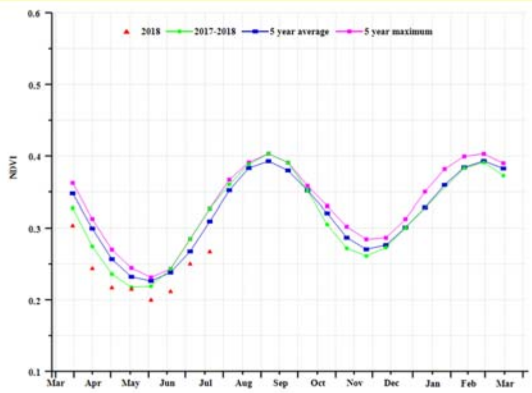
BIOMASS accumulation in the Northern highlands slightly reduced (-5%) while other regions increased (the Lower Indus river basin 23%, the Northern Punjab 10%). All the regions had persistently lower than average NDVI, with patches of low as well as high VCIx for an average around 0.64.

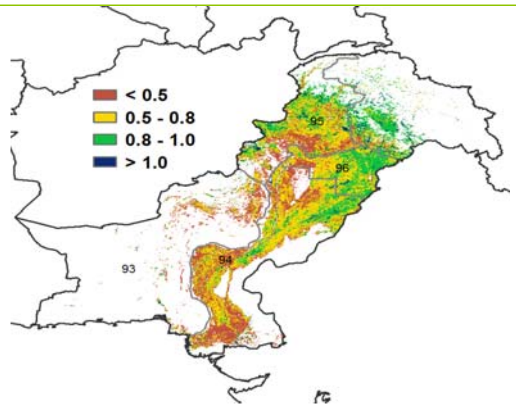
Cropped arable and ranged between 33% (the Lower Indus river basin) and 59% (Northern Punjab), and the CALF was off average between -20% (the Lower Indus river basin) to -15% (the northern highlands).

Figure 3.35. Pakistan's crop condition, April -July 2018



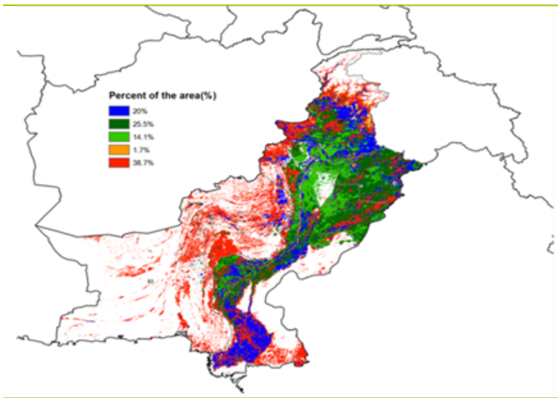
(a). Phenology of major crops

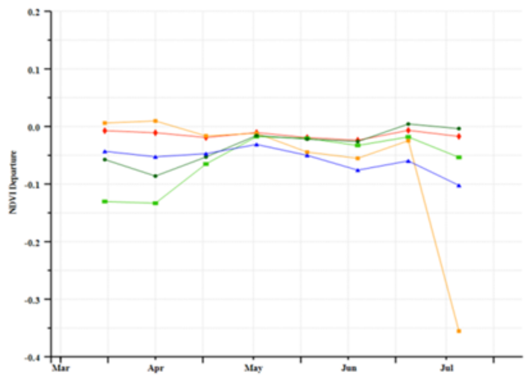




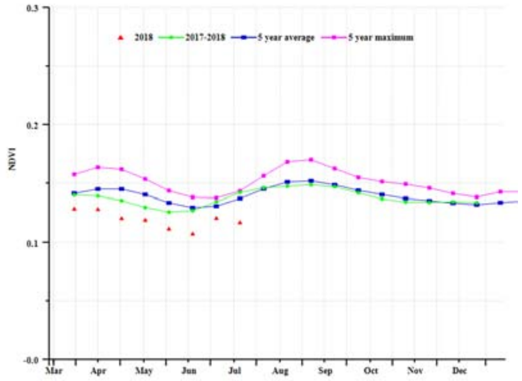
(b) Crop condition development graph based on NDVI

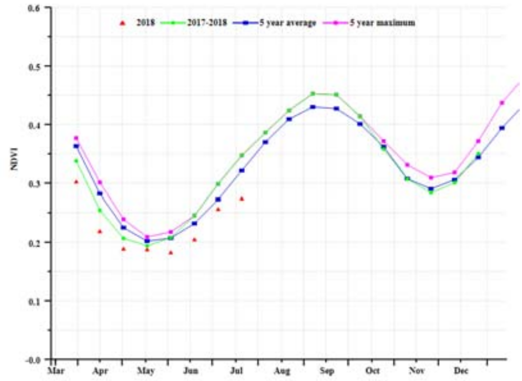
(c) Maximum VCI



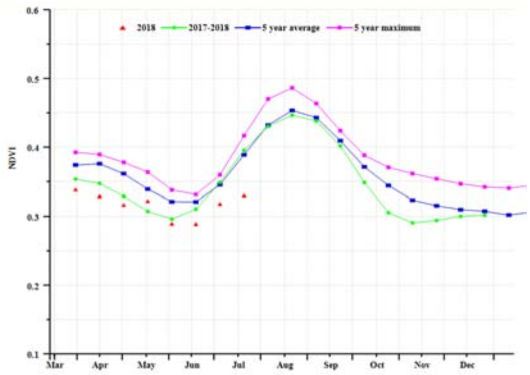


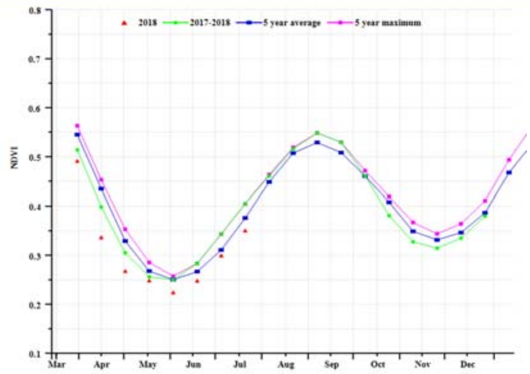
(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles





(f) Crop condition development graph based on NDVI (Balochistan Region (left) and Lower Indus river basin in south Punjab and SindRegion (right))





(g) Crop condition development graph based on NDVI (Northern Highland (left) and Northern Punjab (right))

Table 3.85. Pakistan's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m²)	Departure from 15YA (%)
Balochistan	177	20	33.1	-0.6	1338	-7
Lower Indus river basin in south Punjab and Sind	339	5	23.2	-0.7	1323	-8
Northern highlands	310	3	30.6	-1.1	1235	-10

Table 3.86. Pakistan's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Balochistan	562	23	33	-20	0.54
Lower Indus river basin in south Punjab and Sind	953	-5	44	-15	0.64
Northern highlands	1022	10	59	-19	0.73

Table 3.87. CropWatch-estimated wheat, Rice and Maize production for Pakistan in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Maize	4904	-3.1%	-7.2%	4410	-10.1%
Rice	9904	-0.2%	2.3%	10119	2.2%
Wheat	24283	-0.6%	-0.5%	24004	-1.2%

[PHL] The Philippines

In the Philippines, the main rice crop is currently growing, maize has reached the stage of maturity and is about to be harvested, while the harvesting stage of the secondary rice and maize is over. According to the NDVI profiles for the country, crop condition was below the five-year average. Nationwide, precipitation (RAIN) presents a negative departure of 5% compared with average, accompanied by below average radiation (-2%) and temperature (-0.5°C), which resulted in a decrease of BIOMSS 3% below average.

Based on the VCIx indicator, which mostly exceeded 0.80, favorable crop condition prevailed. The cropped arable land fraction (CALF) nation-wide was almost 100%. Considering the spatial patterns of NDVI profiles, 56% of the cropped area experienced average conditions, but other areas display different profiles including: （1）21.2% of the cropped area experienced average conditions from April to June, after which (in July) conditions suddenly dropped below average; （2）16.7% of the cropped area experienced average conditions from April to early May, below average conditions in the middle of May, but returned to average conditions in June and July; （3） 6.1% of the cropped area experienced average conditions from April to the middle of May, and fluctuations (average-below average) from the middle of May to July.

The behavior of NDVI can be explained mainly by the cloud and low radiation, partially by several typhoons of minor magnitude that affected the Philippines, including Henry, Inday and Josie, etc..Storms brought some heavy and short duration rain, causing flash floods. However, the rain anomaly is negative comparing to the 15-year average (RAIN, -5%). Altogether, the outputs for maize and rice in the country are expected to be below average.

Regional analysis

Based on cropping systems, climatic zones, and topographic conditions, three main agro-ecological regions can be distinguished for the Philippines. They are the Lowlands region, the Hills region, and the Forest region.

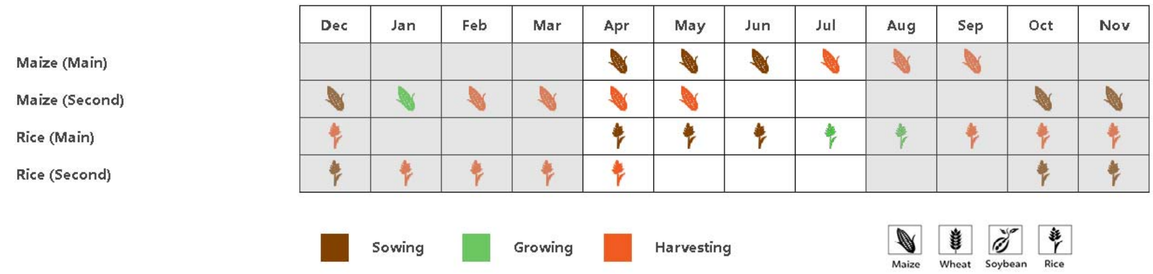
The Lowlands region (northern islands) experienced average rainfall, low radiation (RADPAR -4%) and mildly below average temperature (TEMP -0.7°C). According to the NDVI profiles for the region, crop condition was below the five-year average. BIOMSS was 3% below the average. Altogether, the outputs for maize and rice are expected to be below average.

The Forest region (mostly southern and western islands) experienced a rainfall deficit (RAIN -7%), mildly below average temperature (TEMP -0.4°C) and marginally above average radiation (RADPAR +1%). According to the NDVI profiles for the region, crop condition was below the five-year average from the middle of May to July. BIOMSS was 1% below compared to the average for the period and region. Altogether, the outputs for maize and rice are expected to be slightly below average as well.

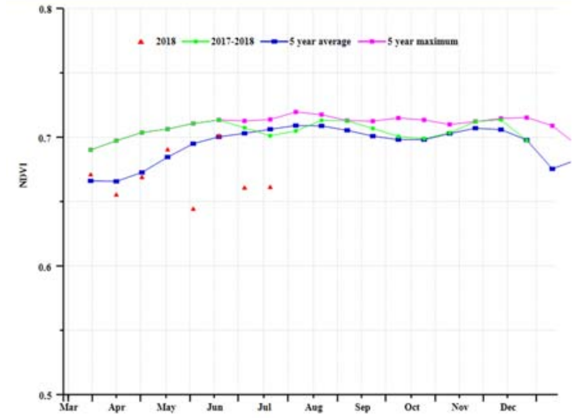
The hills region (Islands of Bohol, Sebu and Negros) recorded the largest negative rainfall departure (RAIN, -40%), average temperature and below average radiation (RADPAR -1%). According to the NDVI profiles for the region, crop condition was below the five-year average from the middle of June to July. BIOMSS is 24% below the five-year average. Altogether, the outputs for maize and rice are expected to be below average.

The NDVI-based Crop condition development graphs indicate below average conditions over the monitoring period or the last 2-3 months. Crop prospects are generally below average due to rainfall deficit or low radiation, especially rainfall deficit. Current CropWatch estimates indicate drops in maize (7,236 ktons, -5.1% below 2017) and rice (20,033 ktons, -0.8% below 2017).

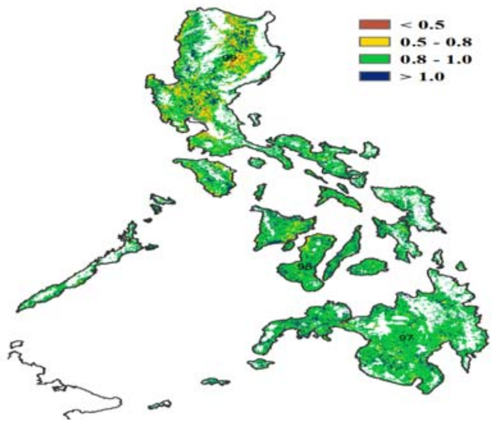
Figure 3.36. Philippines's crop condition, April -July 2018



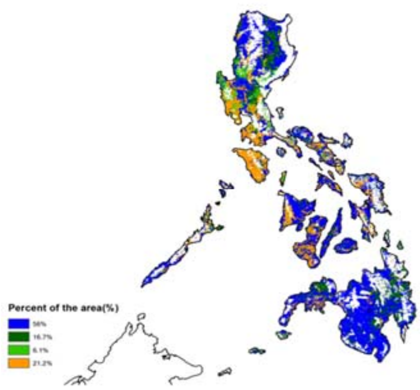
(a). Phenology of major crops



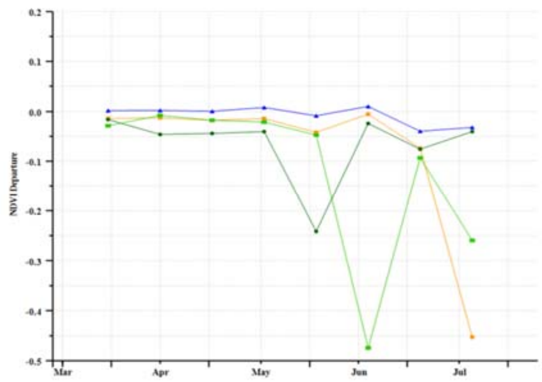
(b) Crop condition development graph based on NDVI



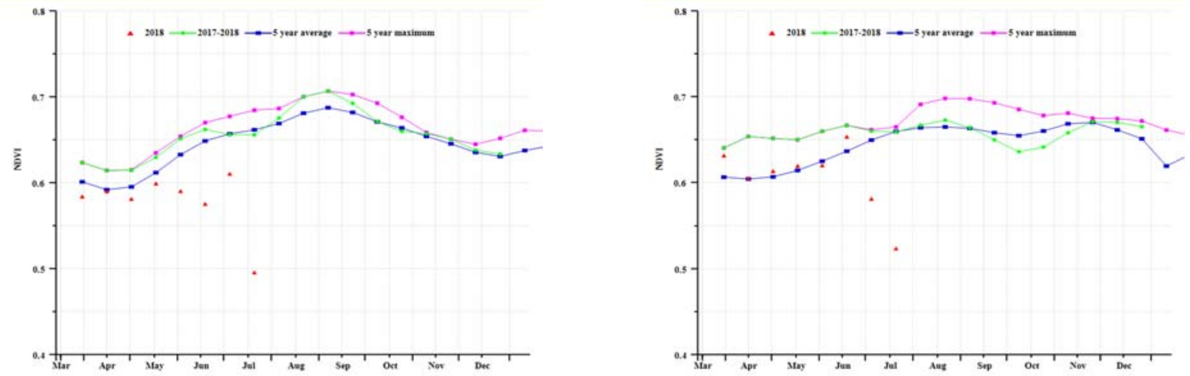
(c) Maximum VCI



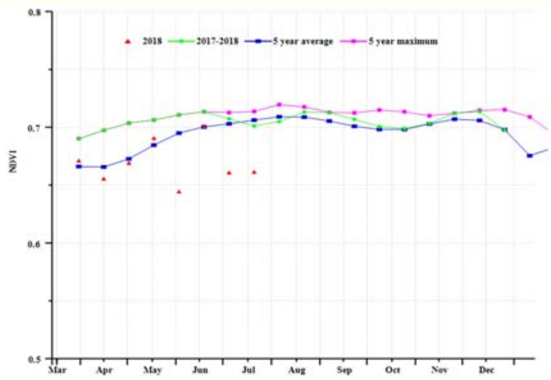
(d) Spatial NDVI patterns compared to 5YA



(e) NDVI profiles



(f) Crop condition development graph based on NDVI (Lowland region (left) and Hilly region (right))



(g) Crop condition development graph based on NDVI (Forest region)

Table 3.88. Philippines's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m²)	Departure from 15YA (%)
Lowlands region	993	0	26.6	-0.7	1124	-4
Hills region	473	-40	27.5	0	1131	-1
Forest region	790	-7	26.6	-0.4	1121	1

Table 3.89. Philippines's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m²)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Lowlands region	1865	-3	100	0	0.89
Hills region	1416	-24	99	0	0.94
Forest region	1997	-1	100	0	0.95

Table 3.90. CropWatch-estimated maize and rice production for Philippines in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Maize	7626	-5.1%	0.0%	7236	-5.1%
Rice	20188	-0.8%	0.0%	20033	-0.8%

[POL] Poland

The reporting period covers the sowing and growing of maize and spring wheat, and final winter wheat stages before harvest in July. For the whole country, the cropped arable land fraction (CALF) was very close to 100%, comparable to the average of the last five years. During the monitoring period, RAIN was 12% below average and both of temperature (16.8°C) and radiation were significantly above average (TEMP +1.8°C, RADPAR +8%). Resulting from dry-hot weather, crops were water-stressed and the potential biomass (BIOMSS) decreased 17% due to water stress.

As shown in the NDVI crop condition development graphs, the NDVI in Poland was below average when compared to the previous 2016-17 season and the last five years, especially from June to July. As NDVI was close to average in May, VCIx was 0.92 for Poland overall.

Crop condition was below average in Poland as a result of dry weather in the period.

Regional analysis

Three Agro-Ecological areas examined more closely for CropWatch include the Central rye and potatoes area, Northern oats and potatoes area, and the Northern-central wheat and sugarbeet area. The fourth area (Southern wheat and sugarbeet area) was wetter and the crop condition was slightly better than in the other three areas.

In the Central rye and potatoes area, the crop condition was below the average of last 5 years due to lower rainfall (RAIN -16%) and higher temperature (TEMP +1.8°C), which accounts for the decrease of biomass (BIOMSS -21%) compared to the five-year average. RADPAR was above average (+8%). The area has high CALF (100%) and VCIx (0.92).

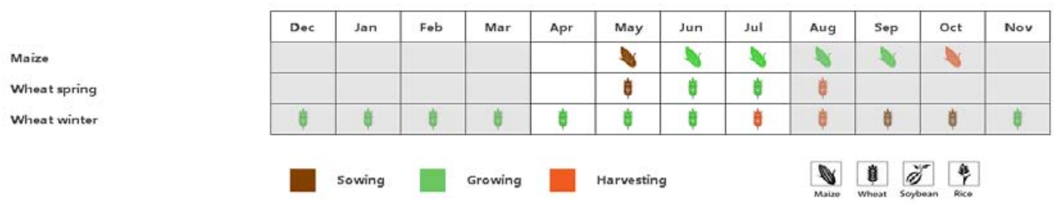
The Northern oats and potatoes area experienced the relatively driest weather condition in four areas, with RAIN down 20% and both of TEMP and RADPAR above average (+1.8°C and +9%), resulting in the decreased biomass (BIOMSS -24%). The area also has high CALF (100%) and VCIx (0.91).

The Northern-central wheat and sugarbeet area recorded a decrease in rainfall (RAIN -12%) and a temperature increment (TEMP +1.8°C), leading to decreased biomass (BIOMSS -15%) compared to the five-year average. The area has high CALF (100%) as well as VCIx (0.87).

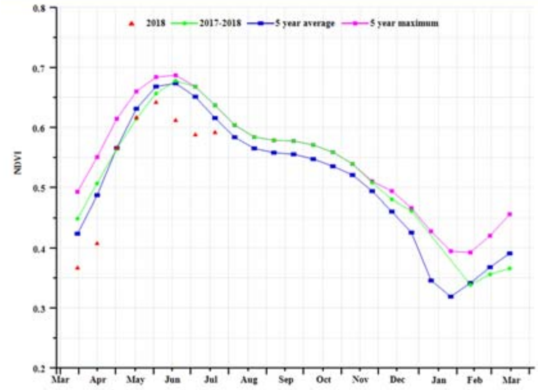
Crop conditions in the Southern wheat and sugarbeet area were slightly below the average of the last five years, with 6% below average RAIN, and warmer (TEMP +1.7°C) weather, resulting in the decreased biomass (BIOMSS -10%). The area has a high CALF (100%) and VCIx (0.94).

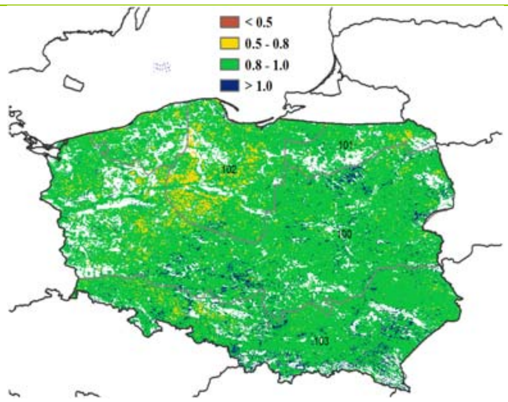
In conclusion, both crop condition and BIOMSS were below average across the four areas due to drier weather in the growing period of plants, pointing to an estimated yield and production in 2018 that both slightly decrease over 2017.

Figure 3.37. Poland's crop condition, April -July 2018



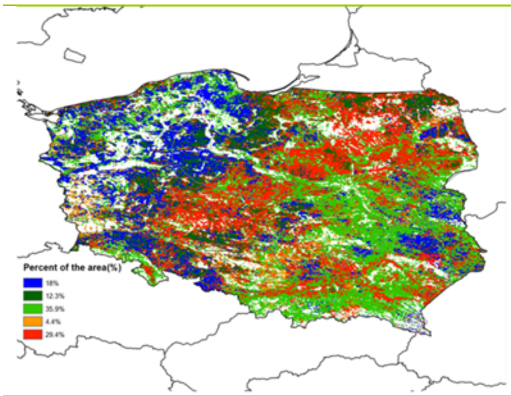
(a). Phenology of major crops

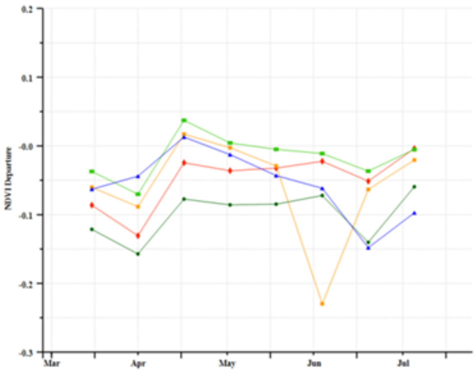




(b) Crop condition development graph based on NDVI

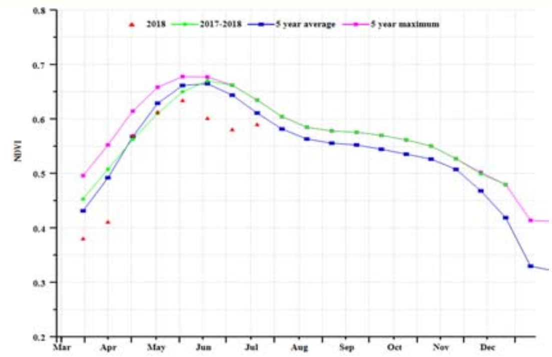
(c) Maximum VCI

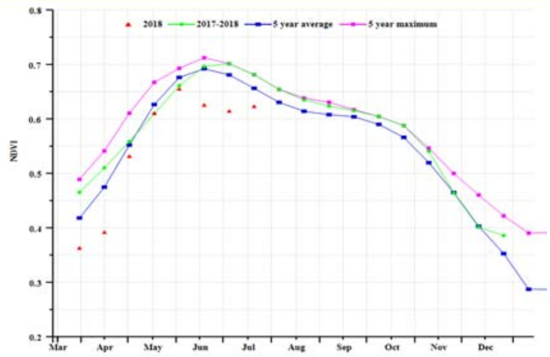




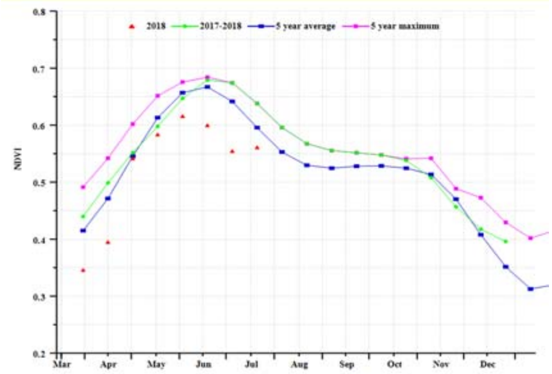
(d) Spatial NDVI patterns compared to 5YA

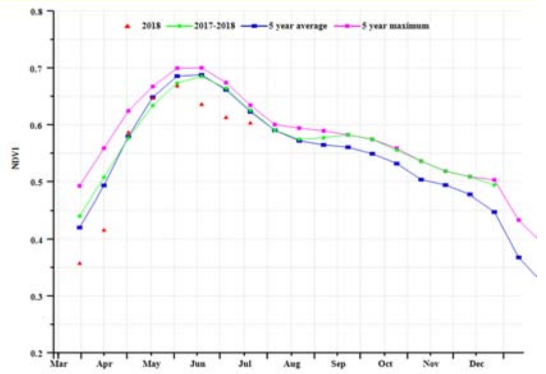
(e) NDVI profiles





(f) Crop condition development graph based on NDVI, Central rye and potatoes area (left) and Northern oats and potatoes area (right).





(g) Crop condition development graph based on NDVI, Northern-central wheat and sugar beet area (left) and Southern wheat and sugar beet area (right).

Table 3.91. Poland’s agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m2)	Departure from 15YA (%)
Central rye and potatoes area	215	-16	17.1	1.8	1176	8
Northern oats and potatoes areas	213	-20	15.8	1.8	1192	9
Northern-central wheat and sugarbeet area	217	-12	16.4	1.8	1181	8
Southern wheat and sugarbeet area	296	-6	16.9	1.7	1153	6

Table 3.92. Poland’s agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Central rye and potatoes area	852	-21	100	-2	0.92
Northern oats and potatoes areas	848	-24	100	-1	0.91
Northern-central wheat and sugarbeet area	888	-15	100	-2	0.87
Southern wheat and sugarbeet area	1124	-10	100	-1	0.94

Table 3.93. CropWatch-estimated Wheat production for Poland in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Wheat	10931	-8.21	0.83	10117	-7.45

[ROU] Romania

The reporting period includes the harvest of winter wheat, which started in July, and the growth of spring wheat and maize, sown in April. Overall crop conditions in Romania was good. The maximum VCI was 0.93 and the current cropped arable land fraction was 1.00, 0.01 higher than average. At 369 mm, rainfall was marginally higher than average; TEMP exceeded average by 0.9° C and radiation was high by 1%. This led to an increase of 5% of the biomass production potential. According to the crop condition development graph based on NDVI, conditions were close to average in April and May, but below average in June and July.

Regional analysis

More spatial detail is provided below for three main agro-ecological zones in the country: the Central mixed farming and pasture Carpathian hills; the Eastern and southern maize, wheat and sugar beet plains and the Western and central maize, wheat and sugar beet plateau.

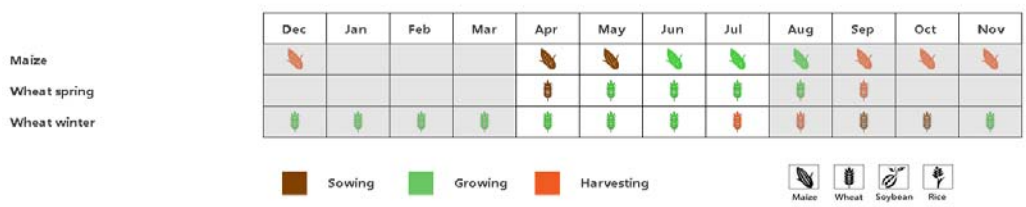
Climate conditions were fair in all three regions. Conditions were alike and differed little from average in the Central mixed farming and pasture Carpathian hills and the Western and central maize, wheat and sugar beet plateau. For the listed three regions, rain was 8%, 14% and 20% higher than average, respectively, while temperature anomalies were significant at +1.0℃, +0.7℃ and +1.1℃. Radiation was slightly higher than average.

According to NDVI development profiles, crop condition differed in the three regions. For the central maize, wheat and sugar beet plateau, crop condition remained stable for most part of the reporting period except for a slight decrease in May. In the eastern and southern maize, wheat and sugar beet plains, a sharp decrease occurred in May, followed by an increase in June. For western Romania, the influence of crop phenology, especially the starting of maize and spring wheat growing season resulted in an increase in May and June.

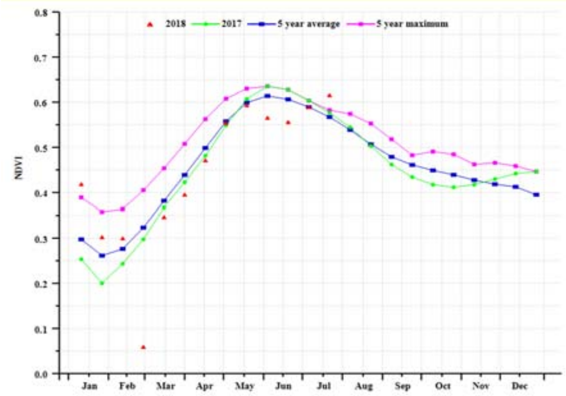
VCIx values were close to 1.0 in all three regions; VCIx was below 0.8 in some parts of the southern maize, wheat and sugar beet plains and higher than 1.0 in the central area. CALF of the three regions was close to average.

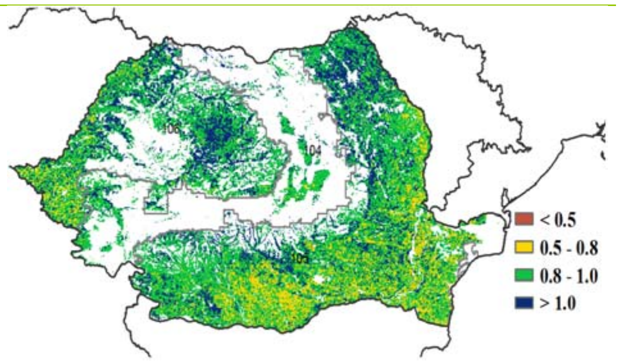
Overall, satisfactory crop condition prevailed in Romania. CropWatch predicts that the 2018 maize production will be up by 15.8% while wheat will drop by 2.1% below last season's values

Figure 3.38. Romania's crop condition, April -July 2018



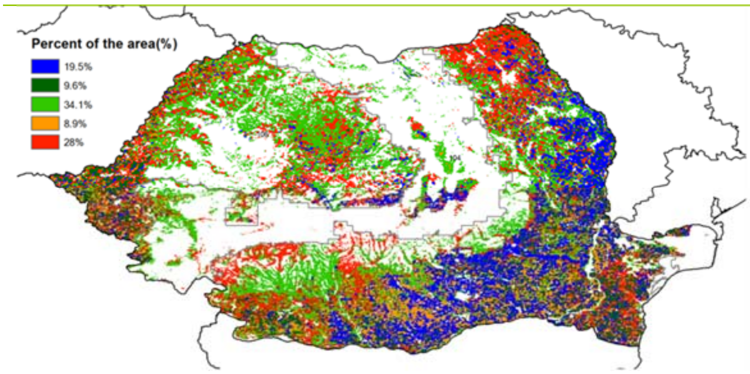
(a). Phenology of major crops

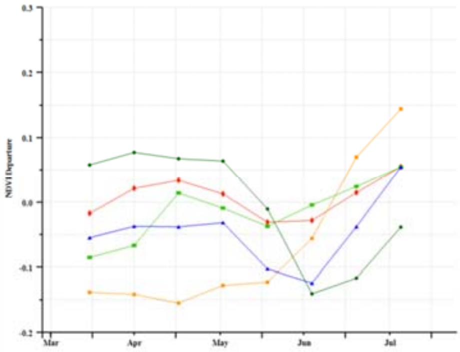




(b) Crop condition development graph based on NDVI

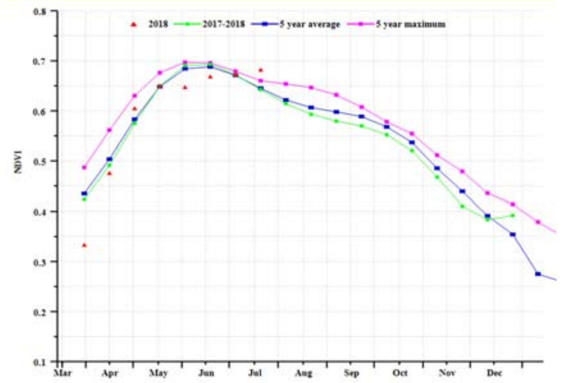
(c) Maximum VCI

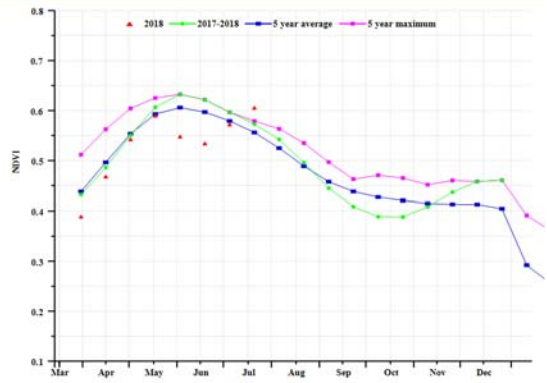




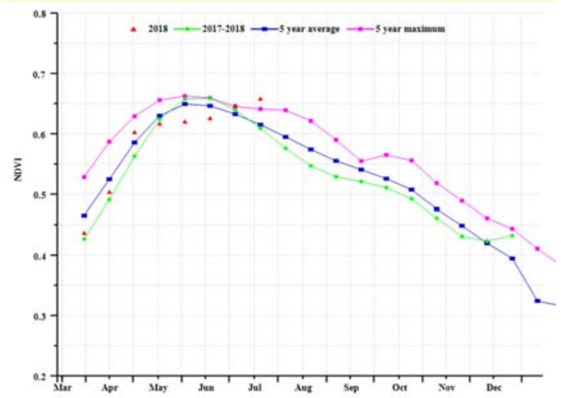
(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles





(f) Crop condition development graph based on NDVI (Central mixed farming and pasture Carpathian hills (left) and Eastern and southern maize, wheat and sugarbeet plains (right))



(g) Crop condition development graph based on NDVI (Western and central maize, wheat and sugarbeet plateau)

Table 3.94. Romania's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m2)	Departure from 15YA (%)
Central mixed farming and pasture Carpathian hills	409	8	14.8	1.0	1191	0
Eastern and southern maize, wheat and sugar beet plains	325	14	19.0	0.7	1249	1
Western and central maize, wheat and sugar beet plateau	417	20	17.6	1.1	1230	2

Table 3.95. Romania's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Central mixed farming and pasture Carpathian hills	1370	3	1	0	0.97
Eastern and southern maize, wheat and sugar beet plains	1132	4	1	0	0.91
Western and central maize, wheat and sugar beet plateau	1411	10	1	0	0.97

Table 3.96. CropWatch-estimated Wheat and Maize production for Romania in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Maize	11986	-0.20%	16.10%	13878	15.80%
Wheat	7670	-0.40%	-1.70%	7512	-2.10%

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[RUS] Russia

Russia experienced locally unsatisfactory climate conditions during this monitoring period although the national VCIx reached 0.90 on average. The winter wheat harvest began in July, while the planting of maize and spring wheat started in April and May. The Cropped Arable Land Fraction was just below the last five-year average (-1%). Nationwide weather was average with a 1% drop in RAIN and slightly cool TEMP 0.4°C below average. The BIOMSS indicator recorded a marginal drop of 1% below its five-year average.

As shown in the NDVI crop condition development graph for the country as a whole, the NDVI was lower than during 2017 and the average of the previous year from May to July. In the Caucasus and north Volga area the NDVI was initially close to the average but significantly decreased from May (10.2% or cropland). In the Central Economic Region (20.8% of arable land), the NDVI was lower than average before June but close to average thereafter. More details are provided in the regional analysis. Due to poor winter climate condition wheat yield is expected to drop 6.8%, with a 10.3% drop on production below 2017 values, while summer crops, especially maize are doing relatively well so far (0.9% on yield).

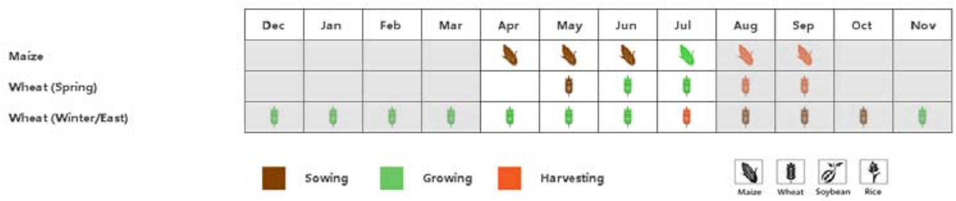
Regional analysis

Additional spatial detail is provided below for seven regions, namely the Kaliningrad Oblast, Caucasus, Volga Basin, Central Economic Region, Southern Urals, South Siberia, and Northwest region including Novgorod.

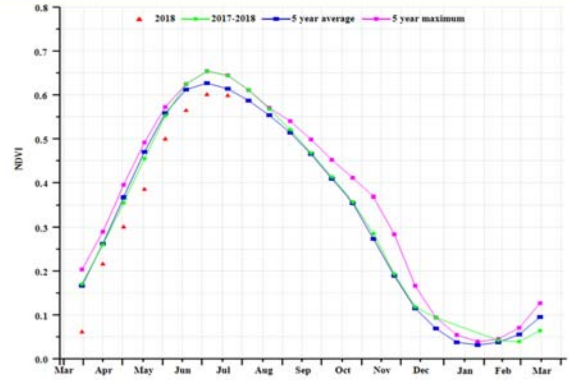
In the Kaliningrad Oblast, Caucasus, Volga region, Central Economic Region and Northwest region including Novgorod biomass expectations are below to averge by -16%, -4%, -7%,-3% and -2% respectively due to the precipitation deficits in the range from 9 to 17%. NDVI in these areas were lower than both last year and the average. Especially in Kaliningrad Oblast, the precipitation deficit was -17%, the Cropped arable land fraction was only 93% and VCIx was 0.78, which was the most affected area by climate condition in whole Russia.

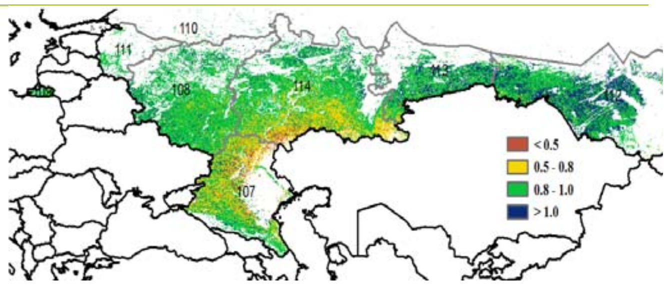
In the Southern Urals and South Siberia, the BIOMASS was above average by 7% and 2% due to the satisfactory supply. The rainfall increased 13% in Southern Urals and the BIOMASS increase 7%. Unlike most of the rest of croplands in Russia, the NDVI in these two areas are close or above the previous year and average.

Figure 3.39. Russia's crop condition, April -July 2018

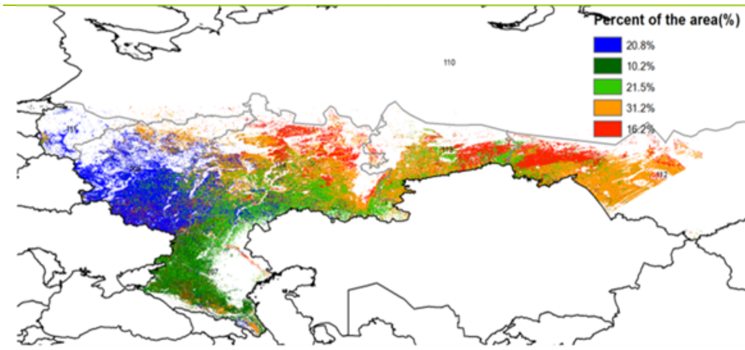


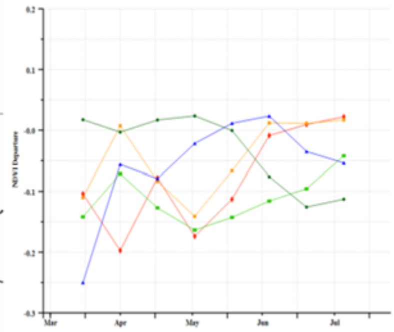
(a). Phenology of major crops



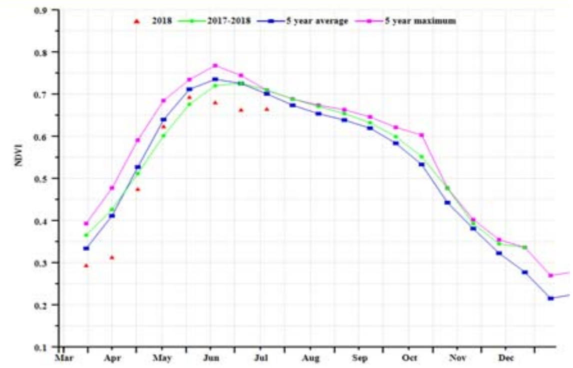


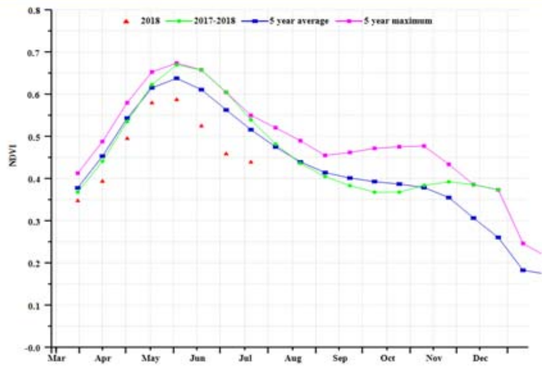
(b) Crop condition development graph based on NDVI (c) Maximum VCI



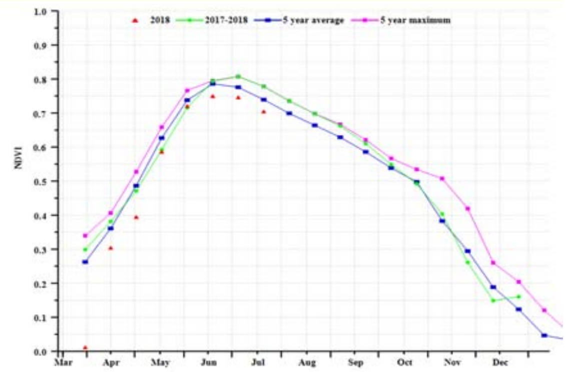


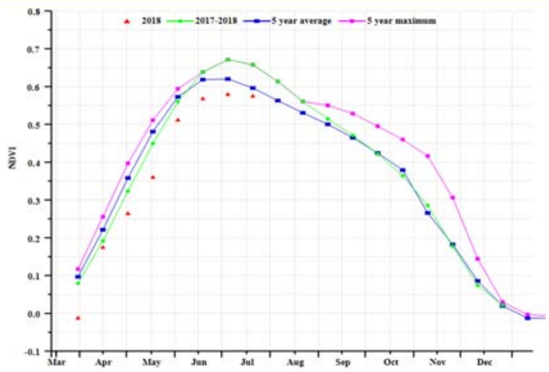
(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles



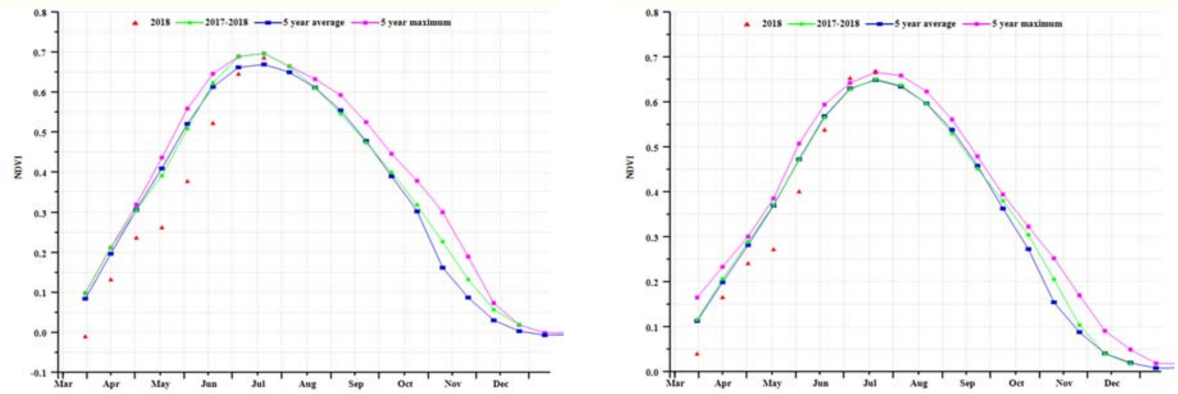


(f) Crop condition development graph based on NDVI (The Caucasus (left) and Central Economic Region (right))

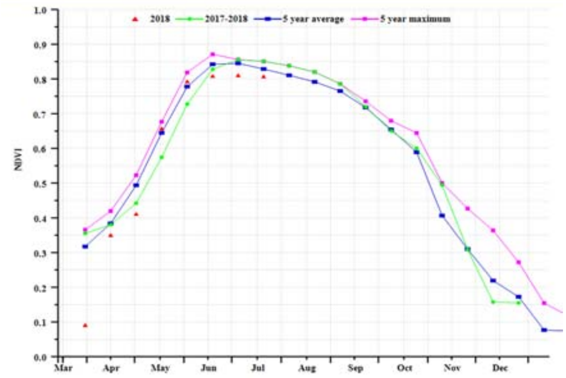




(g) Crop condition development graph based on NDVI (Kaliningrad oblast (left) and Northwest region (right))



(h) Crop condition development graph based on NDVI (Southern Siberian area (left) and Southern Urals (right))



(i) Crop condition development graph based on NDVI (Volga Basin)

Table 3.97. Russia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m2)	Departure from 15YA (%)
The Caucasus	201	-17	19.2	0.7	1306	7
Central Economic Region	246	-4	15.0	0.3	1145	4
Kaliningrad oblast	234	-11	16.0	1.9	1193	8
Northwest region including Novgorod	251	-9	13.9	0.6	1094	4
Southern Siberian area	267	13	11.2	-1.0	1103	-8
Southern Urals	228	-3	11.9	-2.0	1074	-5
Volga Basin	212	-3	14.1	-0.9	1155	1

Table 3.98. Russia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
The Caucasus	787	-16	93%	-3	0.78
Central Economic Region	1043	-4	100%	0	0.93
Kaliningrad oblast	1029	-7	100%	0	0.91

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Northwest region including Novgorod	1116	-3	100%	0	0.96
Southern Siberian area	1061	7	98%	1	0.98
Southern Urals	1012	2	100%	0	0.95
Volga Basin	919	-2	97%	-2	0.85

Table 3.99. CropWatch-estimated Wheat and Maize production for Russia in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Maize	12817	-0.9%	-17.5%	10476	-18.3%
Wheat	58912	-6.8%	-3.8%	52815	-10.3%

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[THA] Thailand

The main rice crop was sown in Thailand during the current April to July monitoring period, while the harvest of the second rice crop was completed in June. According to the agroclimatic indices, temperature (TEMP, -1.2°C) and radiation (RADPAR, -5%) were below average for the country. Due to satisfactory rainfall (RAIN, +11%), the biomass production potential (BIOMSS) is up 4%. The NDVI development graph shows that crop condition was between average and the 5-year maximum condition before it deteriorated in July. According to the NDVI departure clustering map, 59.2% of cropland throughout the country was above average up to July, except in the southern region and Udon Thani, Nong Khai, Khon Kaen and Roi Et. 28.1% of cropland was consistently above average including Chumphon, Ranong, Surat Thani, Phangnga, Krabi, Nakhon Si Thammarat, Trang, Narathiwat, Phatthalung and Songkhla. Altogether, the crop output is anticipated to be above average.

Regional analysis

The regional analysis below focuses on some agro-ecological zones of Thailand, of which some are mostly defined by the rice cultivation typology. They include the Central double and triple-cropped rice lowlands (115), South-eastern horticulture area (116), Western and southern hill areas (117) and the Single-cropped rice north-eastern region (118). The numbers correspond to the labels in the VCIx and NDVI profile maps.

According to agro-climatic indicators for the Central double and triple-cropped rice lowlands, temperature (TEMP -1.3ºC), radiation (RADPAR -4%) and accumulated rainfall (RAIN -4%) were below average, resulting in an average biomass production potential in Thailand (BIOMSS +1%). According to the NDVI development graph, crop condition fluctuated around the 5-year maximum before July but deteriorated in July. Considering the favorable maximum VCIx value of 0.96, the situation is assessed as average.

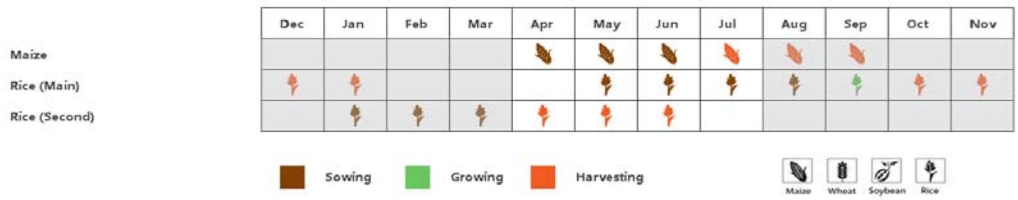
The South-eastern horticulture area suffered cool weather with low sunshine during this monitoring period (TEMP down 1.3℃ compared with average and RADPAR at -9%, which is significant). RAIN, however was close to average (-4%) and so was the biomass production potential. NDVI development graphs show a fluctuation around the 5-year maximum before July, and a subsequent drop. Considering that Cropped arable land fraction (CALF) increased 1% compared to 5-year average and the maximum VCIx value was around 0.95, the situation in South-eastern horticulture area was average or slightly above.

Crop condition in the Western and southern hill areas was usually below average according to the Agroclimatic indicators: TEMP -1.1°C, RADPAR -7%, and BIOMSS -4% when compared to their respective averages. RAIN was above average (+7%) but the positive effect was canceled out by low temperature and poor sunshine. The CALF was close to average compared to 5-year average, and the maximum VCIx was about 0.95. According to the NDVI development graph, crop condition was nevertheless close to 5-year average.

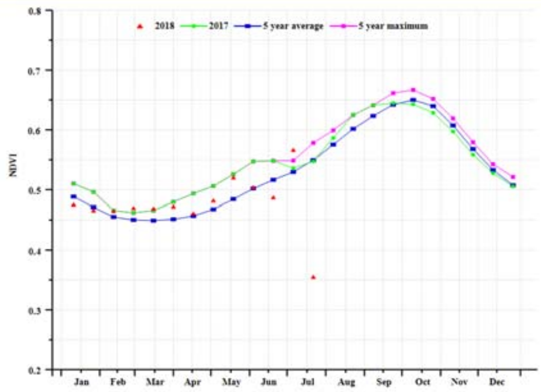
Finally, the situation in the Single-cropped rice north-eastern region follow the same patterns as those for the country as a whole: temperature (TEMP -1.5ºC) and radiation (RADPAR -5%) were below average, and accumulated rainfall was significantly above (RAIN +26%), resulting in slight biomass production potential increase (BIOMSS +5%). According to an average CALF (+1% change) and favorable VCIx value of 0.92, the crop condition was close to average, which is confirmed by the NDVI profiles and development graph.

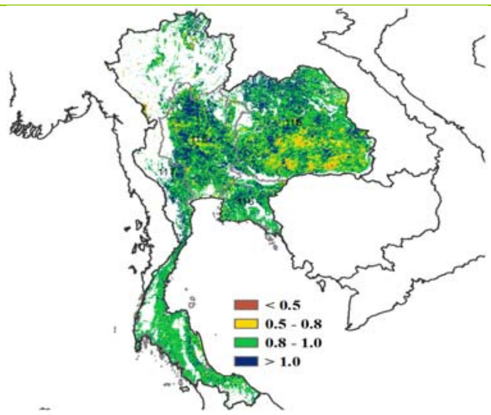
At the national level, most arable land was cropped during the season and had favorable VCIx values around 0.94. CropWatch projects that yield of maize and rice in Thailand in 2018 will increase by 9.2% and 7.7%, respectively.

Figure 3.40. Thailand's crop condition, April -July 2018



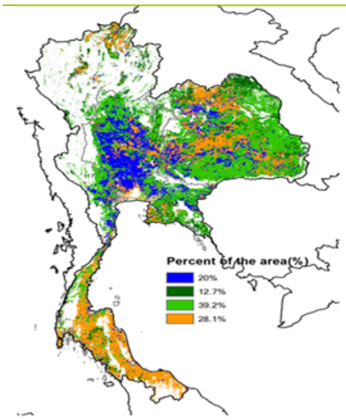
(a). Phenology of major crops

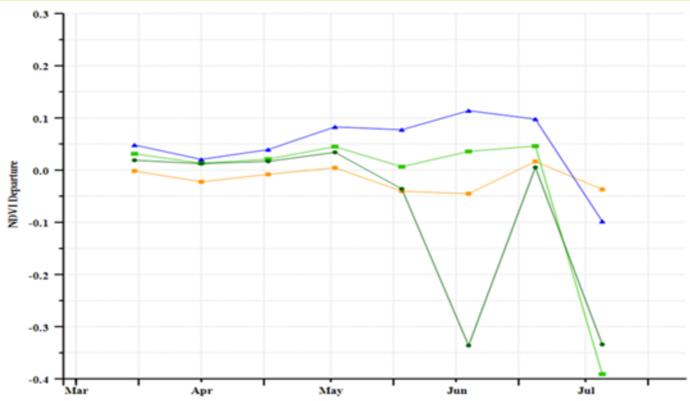




(b) Crop condition development graph based on NDVI

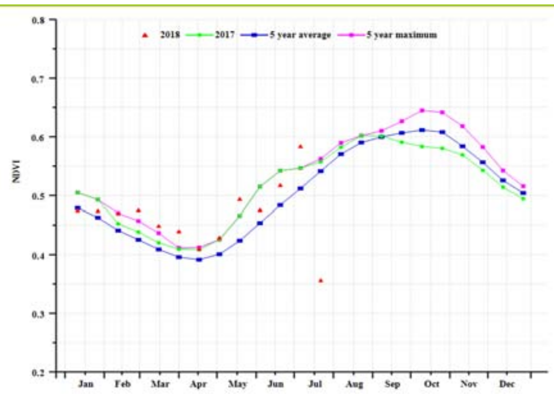
(c) Maximum VCI

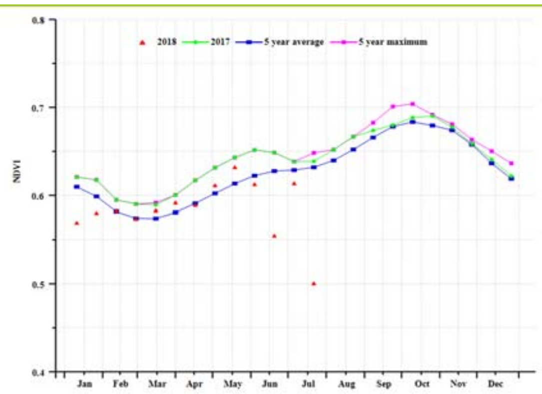




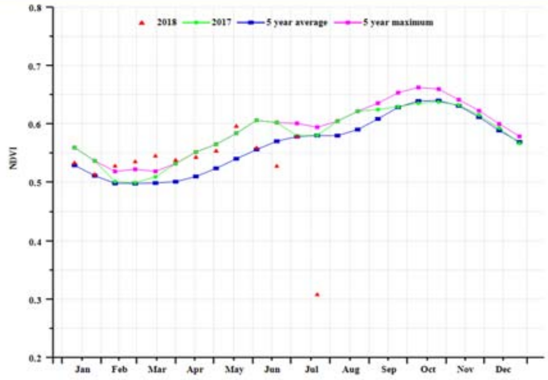
(d) Spatial NDVI patterns compared to 5YA

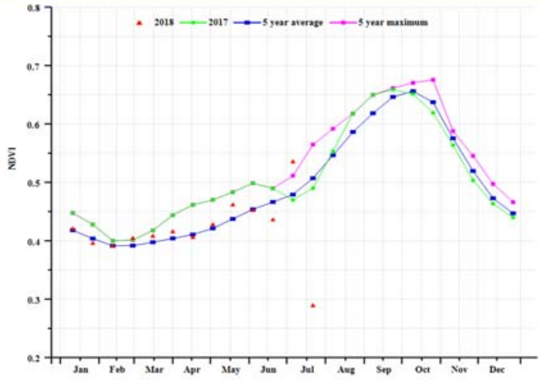
(e) NDVI profiles





(f) Crop condition development graph based on NDVI (Central double and triple-cropped rice lowlands (left) and Western and southern hill areas (right))





(f) Crop condition development graph based on NDVI (South-eastern horticulture area (left) and Single-cropped rice north-eastern region (right))

Table 3.100. Thailand's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Central double and triple-cropped rice lowlands	582	-4	28.2	-1.3	1072	-4
South-eastern horticulture area	774	-9	27.7	-1.3	1034	-5
Western and southern hill areas	807	7	26.9	-1.1	1028	-4
Single-cropped rice north-eastern region	1025	26	28.1	-1.4	1069	-5

Table 3.101. Thailand's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Central double and triple-cropped rice lowlands	1784	1	99	2	0.96
South-eastern horticulture area	2127	3	99	1	0.95
Western and southern hill areas	1986	4	99	0	0.95
Single-cropped rice north-eastern region	2087	5	99	1	0.92

Table 3.102. CropWatch-estimated Rice and Maize production for Thailand in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
maize	4999	9.3%	0.0%	5461	9.2%
Rice	38495	8.3%	0.5%	41450	7.7%

AFG AGO ARG AUS BGD BLR BRA CAN DEU EGY ETH FRA GBR HUN IDN IND IRN ITA KAZ KEN KHM LKA MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA **TUR** UKR USA UZB VNM ZAF ZMB

[TUR] Turkey

Maize and rice were planted and growing, while wheat was growing and harvested during the monitoring period. In the whole country, rainfall and temperature were above average (RAIN +37%, TEMP +1.0℃), which led to an increase of biomass (BIOMSS +17%). The NDVI profiles indicate average crop condition in the whole country. The national average VCIx was 0.89. From the spatial NDVI patterns map, the NDVI was below average in Southeast Anatolia and the Marmara sea region, which mainly covers four provinces (Edirne, Kerklerelli, Tekirda and Shangle Urfa). Above average NDVI occurred in Eastern Anatolia, Mush, Ararat and Erzurum indicating good crop condition.

CropWatch estimates the wheat production in 2018 to be 2.0% below 2017. The wheat yield decreased by 2.3%, while the area increased by 0.3%. For maize, CropWatch puts the yield and area 0.3% and 2.5% above the 2017 value, respectively. The maize production is, therefore, estimated to be 2.8% above 2017.

Regional analysis

The regional analysis includes four agro-ecological zones (AEZ): the Black Sea area, Central Anatolia, Eastern Anatolia and Marmara Agean Mediterranean lowland zone.

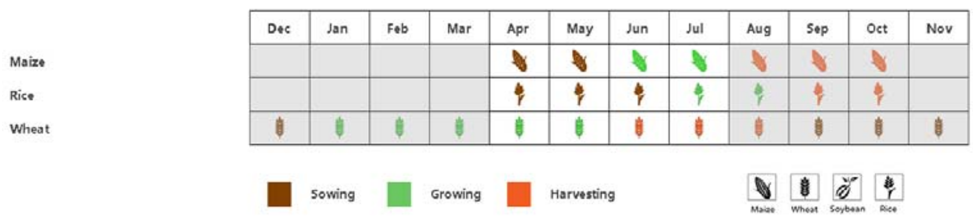
In the Black Sea zone, crop condition was generally above or close to average. In this region, the temperature was above average (TEMP +1.5℃), and the radiation (RADPAR) increased by 2%. The cropped arable land fraction was 98%. The average value of VCIx was high at 0.91. The output of summer crops was favorable.

During this reporting period, the crop condition was above or close average from April to May, and below average from June to July in the Central Anatolian zone. The abundant rainfall （RAIN+55%）resulted in a significant increase of BIOMSS index (+26%).The average VCIx for this region was 0.87. The CALF increased by 12%. The output of winter crops in this region was favorable.

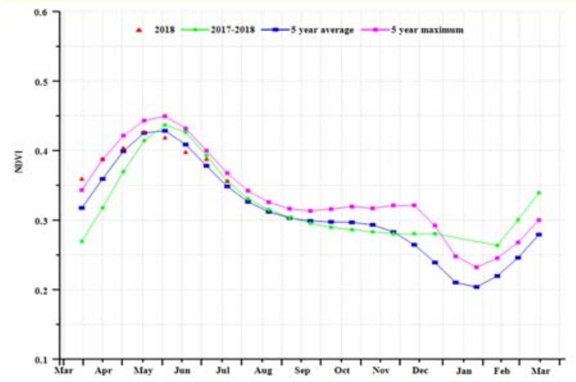
In the Eastern Anatolia zone, crop condition was above average. The VCIx map showed that most of this region enjoyed higher VCIx than 1.0. The excellent crop condition is also confirmed by the spatial NDVI patterns map. The rainfall and temperature were both above average (RAIN +14%, TEMP +1.0℃). The favorable climate condition resulted increases of biomass and cropped arable land fraction (BIOMSS, +2%; CALF, +9%). The output of summer crops is expected to be favorable.

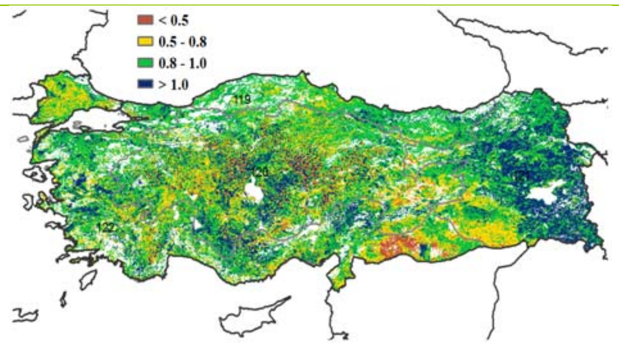
As indicated by the NDVI profile in the Marmara Agean Mediterranean lowland zone, the crop condition was below average during the monitoring period. The temperature was close to average (TEMP +0.7℃), while the radiation was below average (RADPAR -3%). In this whole region, the VCIx was 0.86. The output of winter crops in this region is just fair.

Figure 3.41. Turkey's crop condition, April -July 2018



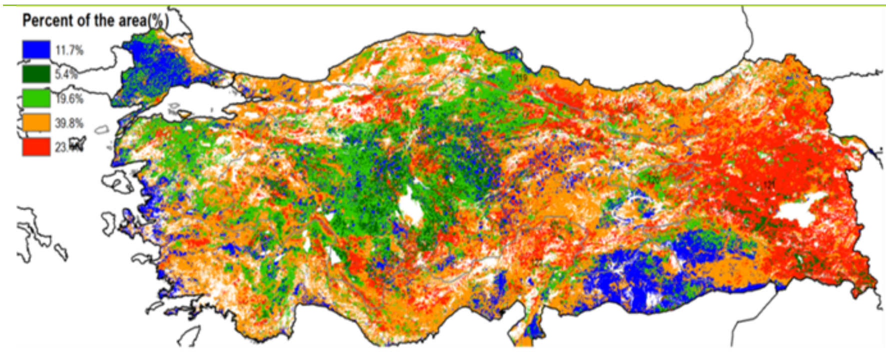
(a). Phenology of major crops

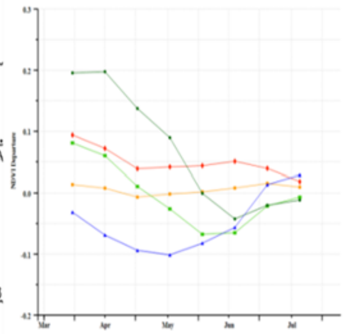




(b) Crop condition development graph based on NDVI

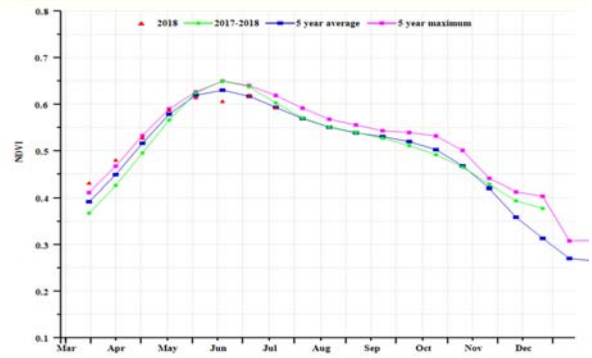
(c) Maximum VCI

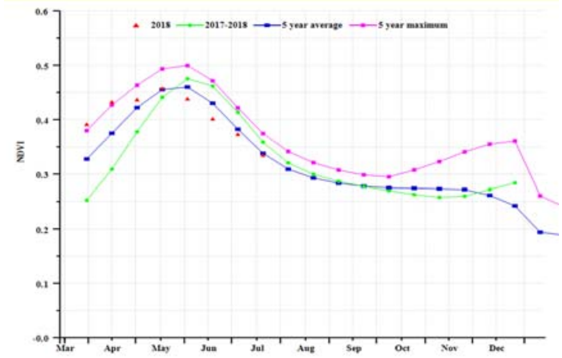




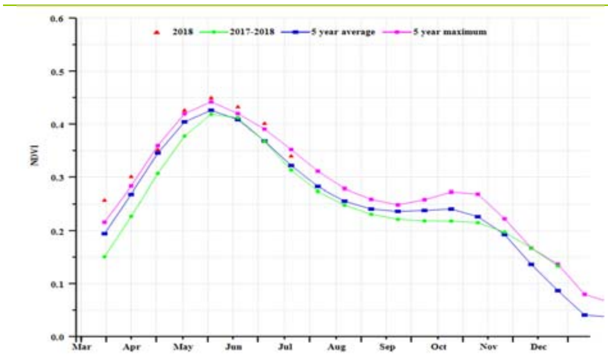
(d) Spatial NDVI patterns compared to 5YA

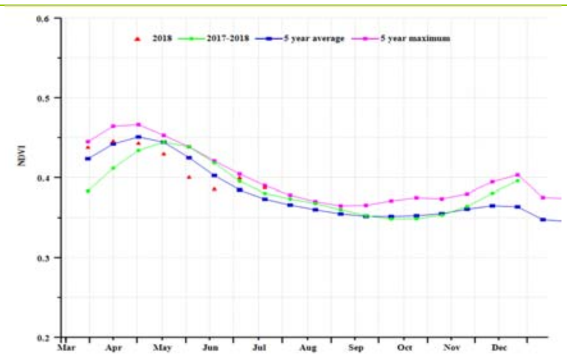
(e) NDVI profiles





(f) Crop condition development graph based on NDVI (Black Sea region (left) and Central Anatolia region (right))





(f) Crop condition development graph based on NDVI (Eastern Anatolia region (left) and Marmara_Agean_Mediterranean lowland region (right))

Table 3.103. Turkey's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Black Sea region	220	-10	16.6	1.5	1302	2
Central Anatolia region	287	55	17.6	1.0	1423	0
Eastern Anatolia region	266	14	16.1	1.0	1402	-3
Marmara Agean Mediterranean lowland region	236	61	20.4	0.7	1413	-3

Table 3.104. Turkey's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Black Sea region	861	-11	98	0	0.91
Central Anatolia region	951	26	70	12	0.87
Eastern Anatolia region	945	2	86	9	0.96
Marmara Agean Mediterranean lowland region	803	32	80	2	0.86

Table 3.105. CropWatch-estimated Wheat and Maize production for Turkey in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Wheat	19174	-2.3	0.3	18794	-2.0
Maize	6294	0.3	2.5	6469	2.8

[UKR] Ukraine

During this monitoring period, maize and other summer crops were planted in May, while winter wheat, another main crop in Ukraine, was harvested in July.

At the national level, precipitation was close to average (RAIN 246 mm, -0.3% compared with average), but temperature and radiation exceeded average significantly (TEMP, 18.2℃, +1.1℃; RADPAR, 1240 MJ/m², +6%). Nearly all cropland was cultivated (CALF, 99%) and the maximum vegetation condition index reached 0.87. Agroclimatic and agronomic indicators provide a mostly optimistic assessment of crop growth, even if the potential biomass (BIOMSS, 946 DM/m²) is down 6% below the average of the last five years.

Based on national NDVI curves, the crop condition was persistently below the 5-year average, especially from May to July, which suggests some growth restrictions. According to spatial NDVI patterns, NDVI was relatively below the 5-year average level everywhere. In 21% area (concentrated in southern areas), NDVI dropped dramatically in June and July, in this area, maximum VCI just reached 50-80% while other area usually reached above 80%. The mentioned area for Kherson to Luhansk (Oblasts) is a minor summer-crop production area except for sunflower.

CropWatch provisionally predicts 2018 maize production to decrease by 8.8% below 2017. Wheat (essentially winter grown) is put at -7.1%.

Regional analysis

Based on cropping systems, climatic zones and topographic conditions, reports covering four agroecological zones are provided: Central wheat area (118), Northern wheat area (119), Eastern Carpathian hills (120), and Southern wheat and maize area (121).

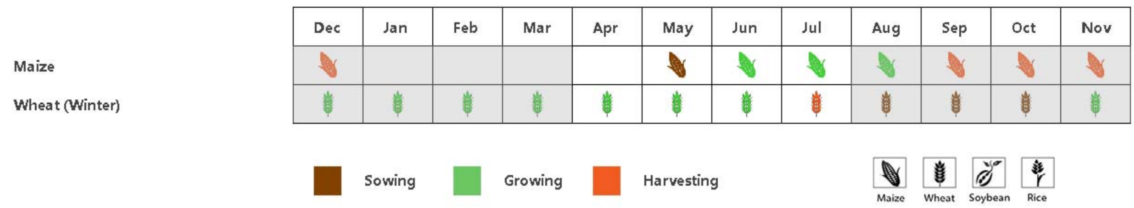
The Central wheat area (Poltava, Cherkasy, Dnipropetrovsk and Kirovohrad Oblasts) showed mostly normal spring and early summer weather (RAIN 232 mm, +3%; TEMP 18.3℃, +0.9℃; RADPAR 1252 gDM/m², +6%) and favourable agronomic conditions (CALF 99%; VCIx 0.91). The resulting biomass was normal (-2%). Attention should pay to the NDVI development profile, the NDVI was always below the average level, possibly due to increased water consumption linked to warm and sunnier than average weather.

The Northern wheat area (Rivne, Zhytomyr and Kiev oblasts) also experienced a basically average agroclimatic and agronomic situation, akin to that in the Central wheat area. Rainfall, temperature and sunshine was marginally higher than average, by 7%, 1.2℃ and 4%, respectively. Region had good CALF (0.94) as well as VCI (0.96), which ensured BIOMSS was closed to 5-year average. Average summer crops can be expected.

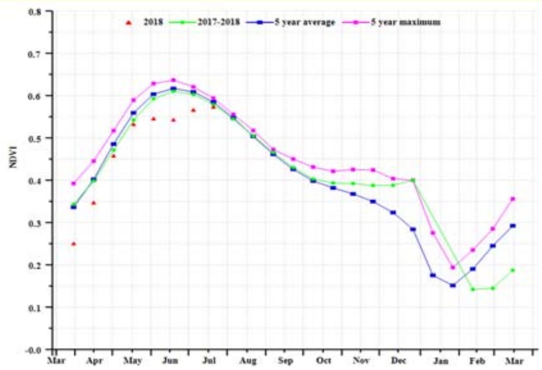
The Eastern Carpathian hills (Lviv, Zakarpattia and Ivano-Frankivsk oblasts) received 2% higher than average rainfall, 3% higher radiation and 1.3℃ higher temperature; Stable agroclimatic conditions led BIOMSS stay at 5-year average level (-2%). Agronomic indicators showed a very good CALF (100%) and VCIx (0.97), the NDVI in this area recovered to 5-year average since July. all of these indicated the condition for crop was improving at the time of reporting.

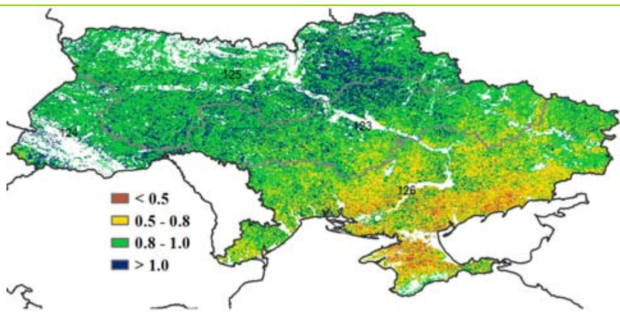
The Southern wheat and maize area (Mykolaiv, Kherson and Zaporizhia oblasts) was 16% deficient in rainfall, while the higher temperature (+1.0℃) and radiation (+8%) aggravated the water shortage. Such condition was unfavourable for crop growth, confirmed by NDVI profiles significantlybelow the 5-year average since May and a rather poor VCIx (0.77). This area will need close monitoring during the next reporting period but average crops are unlikely

Figure 3.42. Ukraine's crop condition, April -July 2018

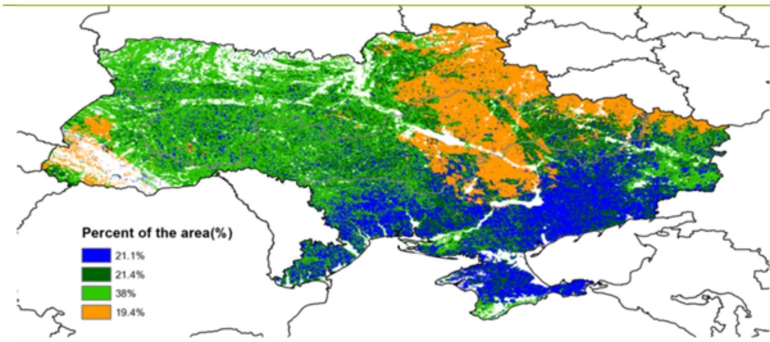


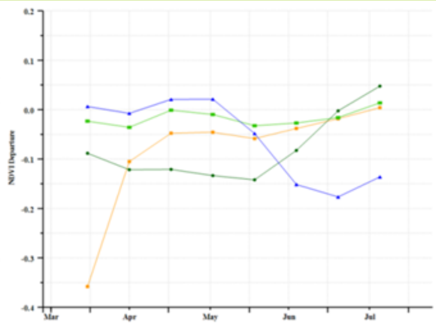
(a). Phenology of major crops



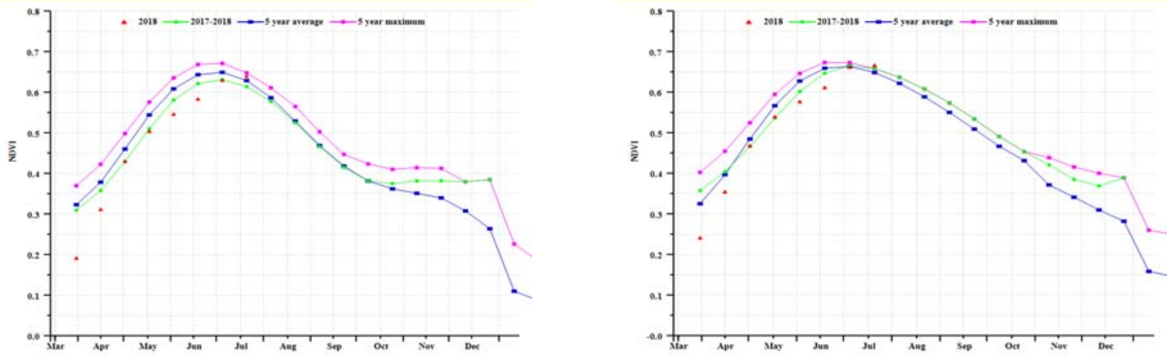


(b) Crop condition development graph based on NDVI (c) Maximum VCI

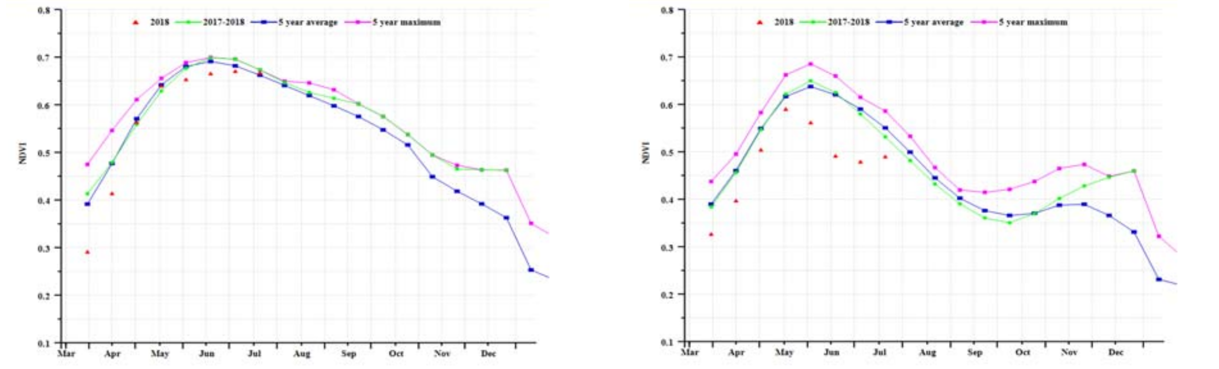




(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles



(f) Crop condition development graph based on NDVI (Central wheat area (left) and Northern wheat area (right))



(f) Crop condition development graph based on NDVI (Eastern Carpathian hills (left) and Southern wheat and maize area (right))

Table 3.106. Ukraine's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Central wheat area (Ukraine)	232	3	18.3	0.9	1252	6
Northern wheat area (Ukraine)	277	7	17.6	1.2	1191	4
Eastern Carpathian hills (Ukraine)	382	2	16.6	1.3	1148	3
Southern wheat and maize area (Ukraine)	178	-14	19.3	1	1316	8

Table 3.107. Ukraine's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Cebntral wheat area (Ukraine)	940	-2	99	0	0.91
Northern wheat area (Ukraine)	1082	-1	99	0	0.96
Eastern Carpathian hills (Ukraine)	1371	-2	100	0	0.97
Southern wheat and maize area (Ukraine)	723	-16	98	-2	0.77

Table 3.108. CropWatch-estimated Wheat and Maize production for Ukraine in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Maize	31398	-2.6%	-6.4%	28630	-8.8%
Wheat	22662	-4.2%	-3%	21043	-7.1%

[USA] United States

This current reporting period includes the sowing and early growth of maize, soybean and rice, the full cycle of spring wheat, and the final growth stages and harvest of winter wheat.

NDVI profiles indicated the crop condition was slightly above the average at the end of July. The agro-climatic indicators were normal and RAIN was 396 mm (+1% compared to average), TEMP was 19.0 ℃ (-0.2℃), RADPAR was 1301 MJ/㎡ (-2%), and caused an increase of 2% in BIOMSS. Some Sates in the Southern Plains, Corn Belt and Lower Mississippi River suffered from a rainfall deficit, including Texas (-22% compared to average), Washington (-23%), and California(-7%), Indiana (-18%) , Michigan (-33%), Missouri(-20%), Ohio(-10%) and Illinois (-7%) and Arkansas (-14%). The Northern Plains and western part of the Corn Belt received abundant rainfall, including North Dakota (up 53% above average), South Dakota (49%), Nebraska (47%) and Minnesota (33%). Almost all states experienced normal temperature in the range of -0.6℃ to 0.6℃ compared to average.

The precipitation distribution caused directly resulted in crop condition patterns. Spatial distribution of NDVI profiles indicates the good performance expected for the Southern Plains. Favorable crop condition was recorded in the Northern Plain (North Dakota, South Dakota, and Montana) due to abundant rainfall over the monitoring period. Poor crop condition was already reported for the previous (JFMA) reporting period in the Southern Plains (Texas and Oklahoma) due to rainfall deficit. Slightly below average crop condition occurred in some parts of the Northern Corn Belt resulting from drought, for instance in Michigan. Favorable crop condition in the Northern Plains and the southern Corn Belt (Illinois and Indiana) was also confirmed by the maximum vegetation condition index (VCIx) above 1. The regions with low VCIx (<0.5) were concentrated in the Southern Plains. As the major rice production region, good crop condition was recorded in Arkansas in spite of below average rainfall.

In this reporting period, crop condition for Northern Plains,Southern Plains, Corn Belt, Lower Mississippi, California, Southeast were described as following:

Regional analysis

The Northern Plains are an important spring crops zone. In general, above crop condition was reported due to abundant precipitation (RAIN was 51% above the average), TEMP was just 0.3℃ below. As a result, BIOMSS was significantly above the average (+28%). The planting was favored by abundant precipitation and CALF rose 9% over the average of the last 5 years. The good crop condition is confirmed by the VCIx value of 0.94.

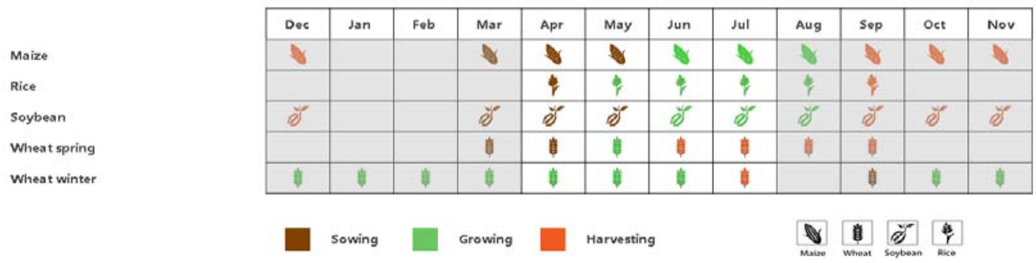
The Southern Plains constitute the most important winter wheat area of the United State. In general, below average crop condition was reported in this region due to water deficit. RAIN was 7% below the average, TEMP was average and the potential Biomass dropped 1%. Drought caused the decrease of cropped land in this region and CALF fell 6% below the average of the last 5 years. The VCIx was 0.76 and the northern part of Texas even lower than 0.5, confirming below average crop condition.

The Lower Mississippi is the major rice production zone. In general, above crop condition was recorded by CropWatch, even if agro-climatic conditions were only fair: RAIN -7%, TEMP -0.5℃ and RADPAR -1%. Irrigation compensated the RAIN deficit and rice performed well (VCIx 0.94).

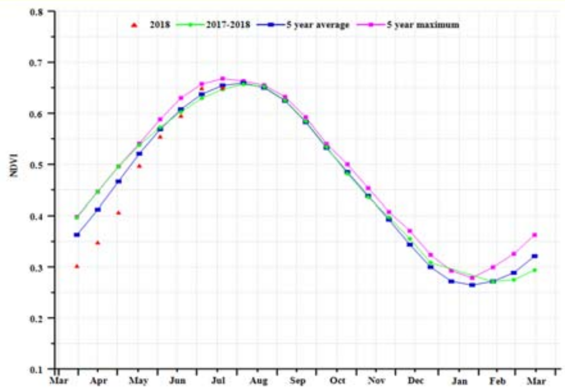
Crop condition was mixed in the Corn Belt, the most important maize and soybean zone of United States. Agro-climatic conditions was normal, with RAIN (0%), TEMP(-0.4℃), and RADPAR (1%) and caused a small drop in potential biomass (-1%). As described above, Michigan, Missouri, Indiana and Ohio suffered drought, with RAIN below average by 33%, 20%, 18% and 10%, respectively. Below average crop condition in Michigan, some parts of Indiana and Ohio is confirmed by the spatial distribution of NDVI profiles. The West and the core region (Illinois and Iowa) of Corn Belt, however, recorded high values of VCIx (above 0.9). This region deserves close monitoring.

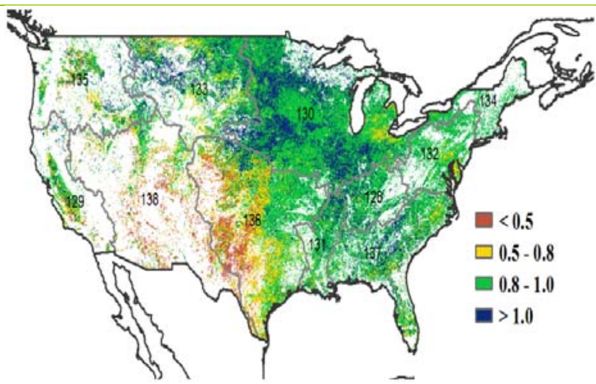
Crop condition was generally below average In the Northwest, an important winter crops producing region in the United States. Agro-climatic variables were close to average: RAIN -3%, TEMP +0.4℃ and RADPAR -4% but Washington State suffered serious drought (rain was short by 23%). The below average crop condition was confirmed by spatial the distribution of NDVI profiles, negative from April to July. Agronomic indicator, however, are more favourable with CALF at 0.85 (+4%) and VCIx at 0.88.

Figure 3.43. United States's crop condition, April -July 2018

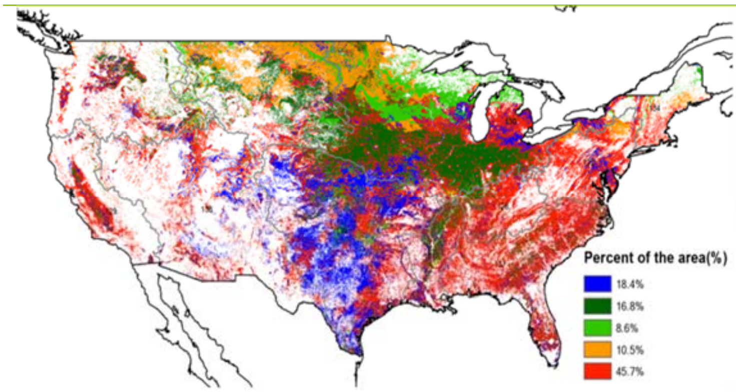


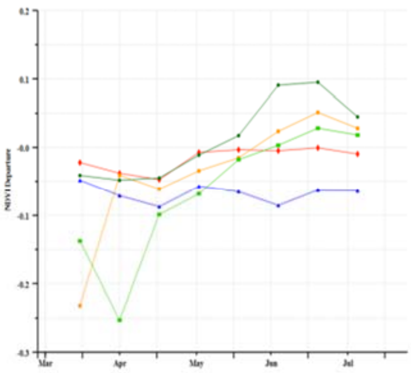
(a). Phenology of major crops



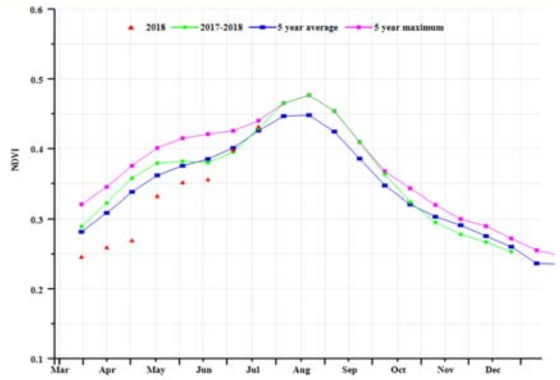


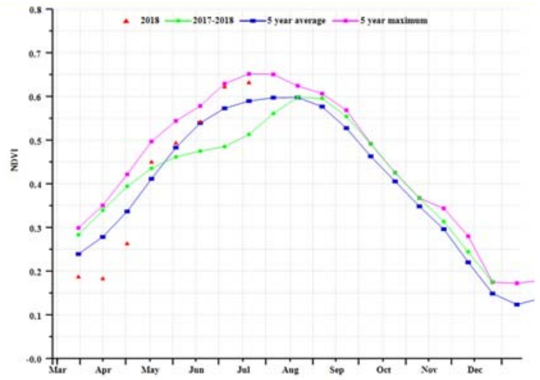
(b) Crop condition development graph based on NDVI (c) Maximum VCI



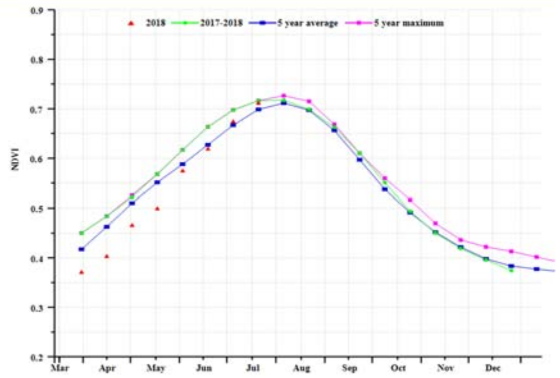


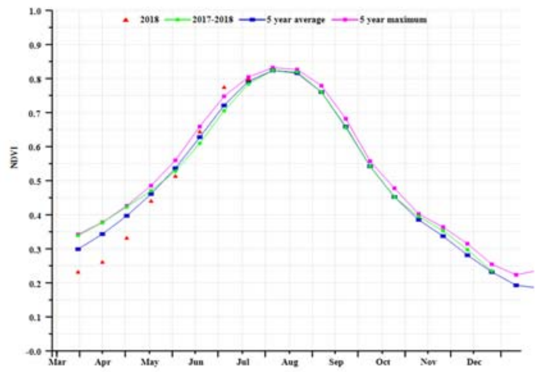
(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles



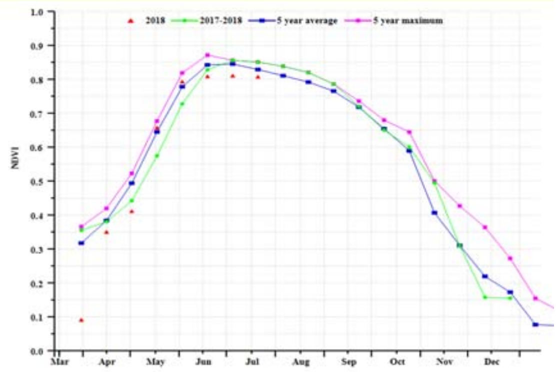


(f) Crop condition development graph based on NDVI (Southern Plains (left) and Northwest (right))





(f) Crop condition development graph based on NDVI (Mississippit (left) and corn belt (right))



(f) Crop condition development graph based on NDVI (Northwest)

Table 3.109. United States's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m²)	Departure from 15YA (%)
California	82	-5	16.8	0.3	1566	-2
Corn Belt	449	0	17.1	-0.4	1275	-1
Lower Mississippi	474	-7	23.7	-0.5	1300	-1
Middle Atlantic	426	-3	17.7	-0.4	1145	-7
Northern Plains	403	51	14.2	-0.3	1332	-4
Northeast	269	-33	14.5	-0.2	1182	0
Northwest	149	-3	13.3	0.4	1364	-4
Southern Plains	380	-7	22.8	-0.1	1376	0
Southeast	543	5	23.0	-0.6	1228	-5
California	82	-5	16.8	0.3	1566	-2
Corn Belt	449	0	17.1	-0.4	1275	-1

Table 3.110. United States's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m²)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
California	279	-10	0.76	12	0.82
Corn Belt	1374	-1	1.00	0	0.97
Lower Mississippi	1551	3	1.00	0	0.94
Middle Atlantic	1452	-3	1.00	0	0.93
Northern Plains	1302	28	0.92	9	0.94
Northeast	1069	-22	1.00	0	0.96
Northwest	649	2	0.85	4	0.89
Southern Plains	1184	-1	0.80	-6	0.76
Southeast	1614	2	1.00	0	0.94
California	279	-10	0.76	12	0.82
Corn Belt	1374	-1	1.00	0	0.97

Table 3.111. CropWatch-estimated Wheat production for United States in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Maize	37017.3	-2.4	2.7	37111.8	0.3
Rice	1093.3	1.8	13.7	1265.3	15.7
Wheat	5481.2	1.4	-5.3	5265.7	-3.9
Soybean	10964.9	-2.5	1.7	10872.8	-0.8

[UZB] Uzbekistan

The monitoring period covers the growing and harvesting of wheat and the planting and early growth of maize. Crop condition was generally unfavorable. The national average VCIx was 0.67, and the cropped arable land fraction decreased by 20%. Among the CropWatch agroclimatic indicators, TEMP and RADPAR were slightly below average (-0.5°C and -2%), while RAIN increased by 5%. The combination of factors resulted in increased BIOMSS (2%) compared to the recent five-year average. As shown by the NDVI development graph, crop condition was below average from April to July. NDVI cluster graphs and profiles showed that most areas across Uzbekistan experienced the unfavorable crop condition during the monitoring period. About 18.9% of the crop land had above average condition from April to May, covering most of the four wheat provinces (Namangan, Andijon, Quqon andFarghona) and some small parts of Angren, Nawoiy, Qarshi, Urganch, Samarqand, Bukhoro and Guliston provinces. Overall, CropWatch expects a decrease of 4.7% in wheat production and 5.5% in wheat yield compared with last year, while the wheat area increased by 0.9%.

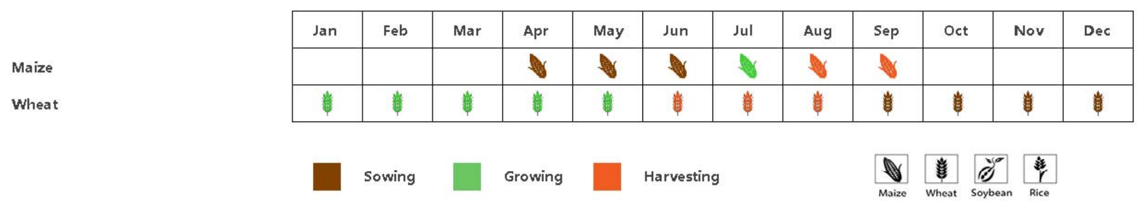
Regional analysis

According to cropping systems, climatic zones, and topographic conditions, Uzbekistan is divided into three agro-ecological zones of which the two first are covered below: the Aral sea cotton zone, Eastern hilly cereals zone and Central region with sparse crops. The following are crop condition analyses for main cropped regions.

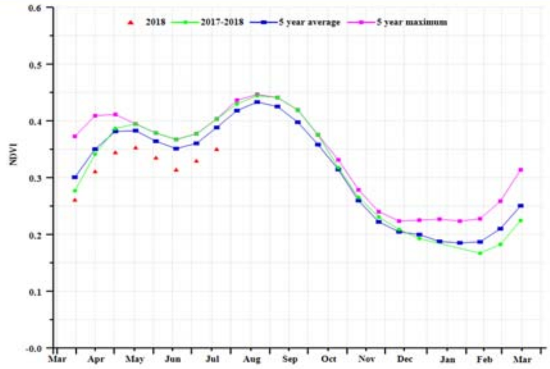
In the rainfed Eastern hilly cereals zone, NDVI was generally below the five-year average from April to July. RAIN was above average (+3%) and RADPAR and TEMP were below average (-2% and -0.5°C). The combination of the factors resulted in a slight BIOMSS increase (+3%) compared to the five-year average. The maximum VCI index was 0.66, while the cropped area decreased by 23% compared to the five-year average. Overall crop prospects are poor.

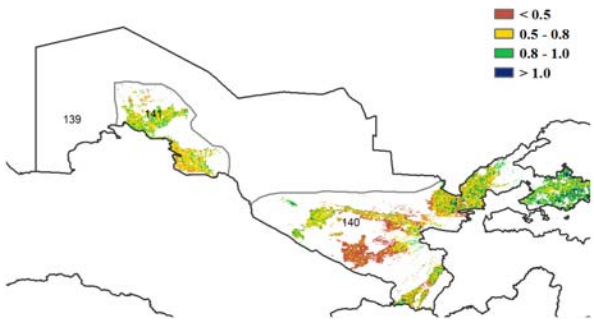
In the irrigated Aral Sea cotton zone, crop condition was close to 5YA only in May and below in the other months. Accumulated rainfall was above average during the monitoring period (RAIN 30%), radiation and temperature were below average (RADPAR -1% and TEMP -0.8°C). The BIOMSS index increased by 27% compared to the five-year average. The maximum VCI index was 0.72, while the cropped arable land decreased by 12%. Overall crop prospects are unfavorable.

Figure 3.44. Uzbekistan's crop condition, April -July 2018

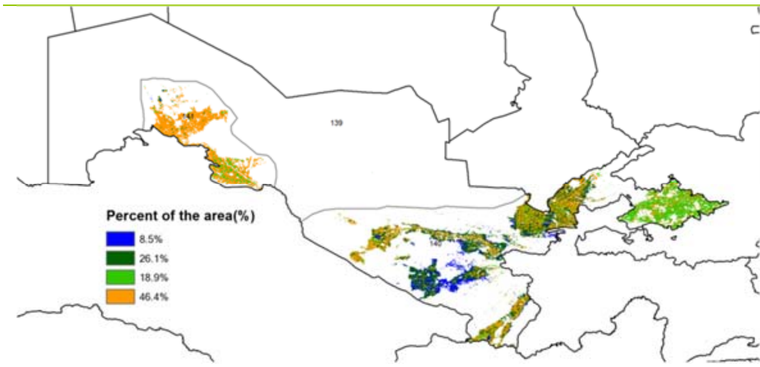


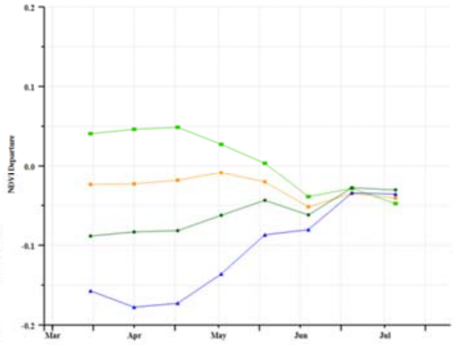
(a). Phenology of major crops



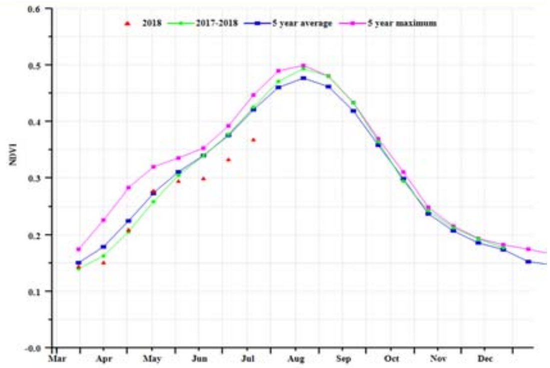


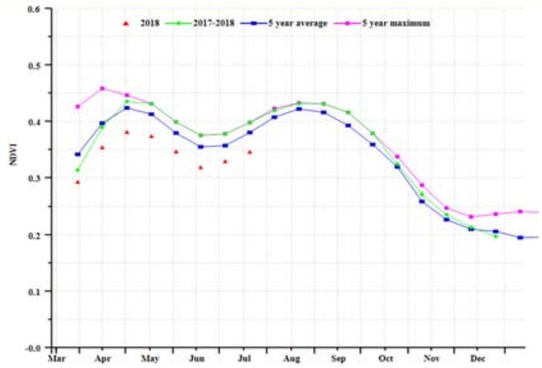
(b) Crop condition development graph based on NDVI (c) Maximum VCI





(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles





(f) Crop condition development graph based on NDVI Cotton region(left) Maize and Cereals region (right)

Table 3.112. Uzbekistan's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Cotton zone (UZB)	91	30	23.3	-0.8	1399	-1
Maize and Cereals zone (UZB)	118	3	21.6	-0.5	1416	-2

Table 3.113. Uzbekistan’s agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Cotton zone (UZB)	402	27	53	-12	0.72
Maize and Cereals zone (UZB)	428	-3	52	-23	0.66

Table 3.114. CropWatch-estimated Wheat production for Uzbekistan in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Wheat	6442	-5.5	0.9	6141	-4.7

[VNM] Vietnam

The monitoring period covers the sowing of the 10th month rice, as well as the harvesting of winter and spring rice. Generally, compared with the average of the past five years and the average of the same period last year, the crop condition in Vietnam was significantly lower, except in April. The initial NDVI value was close to average but was affected by wide fluctuations after May. The NDVI values in the north of Vietnam show a rapid decline which may result from cloudy weather. CropWatch agroclimatic indicators show that precipitation (+11%), BIOMSS (+1%) and VCIx (0.91) were above their respective reference averages (15YA and 5YA) while temperature (-0.8°C) and CALF (-0.5) were all below average. RADPAR was also below average (-6%). Overall crop condition in the country is unsatisfactory.

Regional analysis

Based on cropping systems, climatic zones, and topographic conditions, three sub-national regions can be distinguished for Vietnam: Northern Vietnam, Central Vietnam and Southern Vietnam.

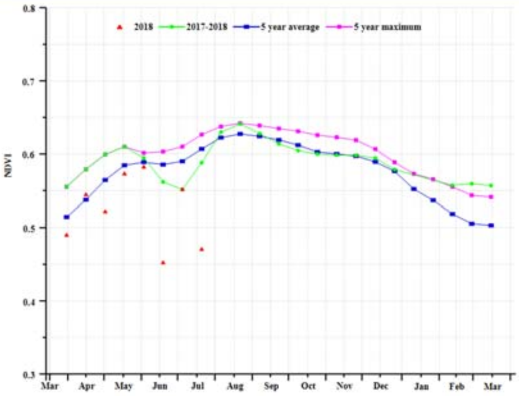
In Northern Vietnam the situation of RADPAR (-6%) and TEMP (+0.8°C departure) is almost identical with the one in the South of the country, but the abundant RAIN (15%), high CALF (0.99) and VCIx (0.94) compared to the average (5YA) resulted in increased BIOMSS (7%). The crop condition development graph of NDVI indicates exceeds the 5 years average from April to May. According to agroclimatic indicators, above average output is expected.

The situation and expected impact on crop production in Central Vietnam is very similar with the preceding zone with the exception of more abundant rainfall and lower temperature and RADPAR: RAIN +34%; TEMP -0.8°C; RADPAR -9%; BIOMSS +6%. VCIx reaches 0.91 and CALF is average. The graph of NDVI indicates that crop condition reaching the average of 5 years in April and May. Based on agroclimatic indicators, average output is expected.

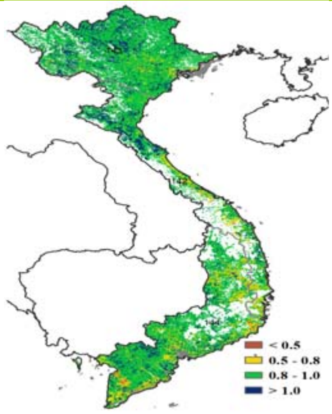
Southern Vietnam, recorded low RADPAR (-5%), RAIN (-5%) and TEMP (-0.8°C compared with the reference value). As a result BIOMSS fell by 8% compared with the averages (5YA). VCIx was low (0.89) with CALF down 1% below average. The crop condition development graph of NDVI also indicates mostly below average crop condition. CropWatch expects below average production.

Figure 3.45. Vietnam's crop condition, April -July 2018

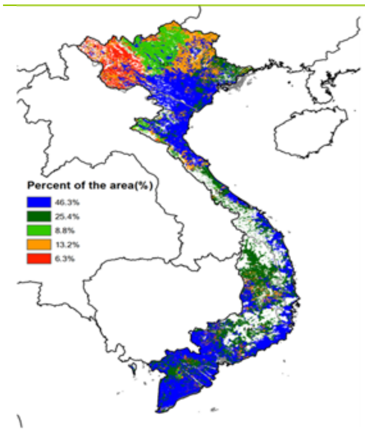
(a). Phenology of major crops

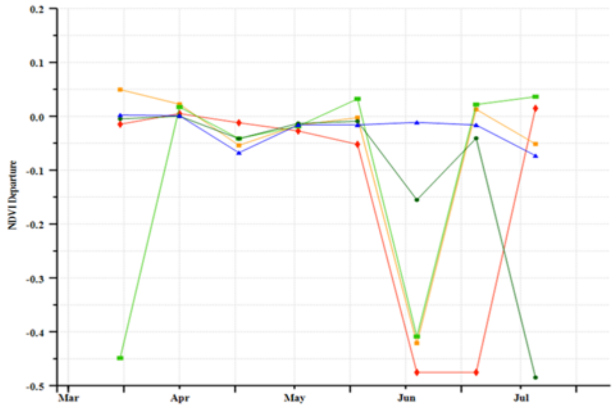


(b) Crop condition development graph based on NDVI



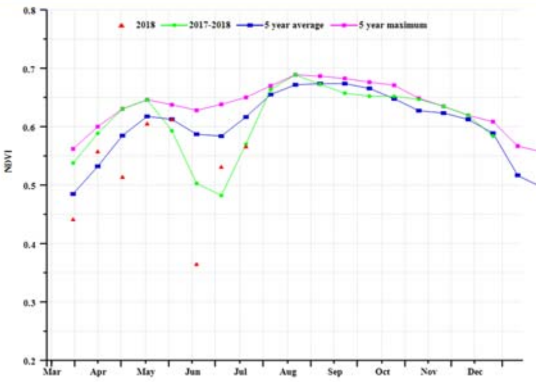
(c) Maximum VCI

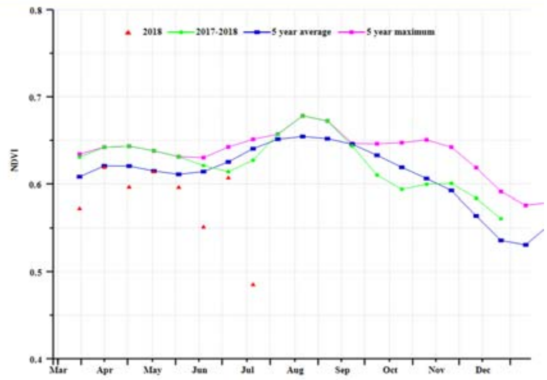




(d) Spatial NDVI patterns compared to 5YA

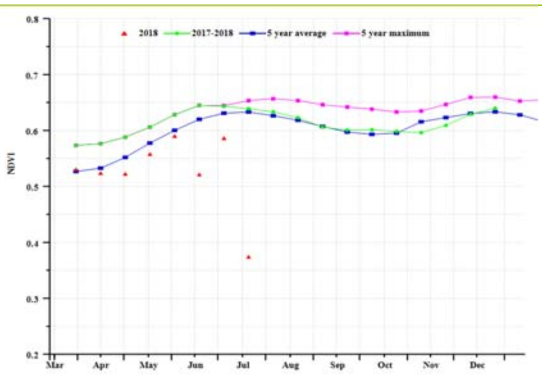
(e) NDVI profiles





(f) Crop condition development graph based on NDVI(Northern zone with Red river Delta)

(g) Crop condition development graph based on NDVI(Central coastal areas from Thanh Hoa to Khanh Hoa)



(h) Crop condition development graph based on NDVI(Southern zone with Mekong Delta)

Table 3.115. Vietnam's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April -July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Northern zone with Red river Delta	1113	15	25.3	-0.8	954	-6
Central coastal areas from Thanh Hoa to Khanh Hoa	867	34	27.8	-0.8	1077	-9
Southern zone with Mekong Delta	780	-5	26.7	-0.8	1057	-5

Table 3.116. Vietnam's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April -July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Northern zone with Red river Delta	2251	7	99	0	0.94
Central coastal areas from Thanh Hoa to Khanh Hoa	1749	6	97	0	0.91
Southern zone with Mekong Delta	1837	-8	90	-1	0.89

Table 3.117. CropWatch-estimated rice production for Vietnam's in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Rice	45422	0.5	0.1	45678	0.6

AFG AGO ARG AUS BGD BLR BRA CAN DEU EGY ETH FRA GBR HUN IDN IND IRN ITA KAZ KEN KHM LKA MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM **ZAF** ZMB

[ZAF] South Africa

During the monitoring period south-African summer crops (maize, rice, and soybean) were at the end of their growing period or had already been harvested. Wheat, however, was just at planting in Mediterranean climate areas and as an irrigated dry-season crop in the north-west. Average rainfall (RAIN) was 69 mm, 19% below the 15YA. At 14.0 °C TEMP was virtually average while RADPAR was just below (-1%). The biomass production potential was below the average (298 gDM/m2 or -15%).

The nationwide crop condition, based on NDVI graph, was above the maximum five years conditions indicating favorable weather after the recent El Niño conditions. The map of spatial NDVI patterns shows that only 4% of the total cropped area, especially located in western Cape province, was significantly below the average. A slight deficit of 0.02 NDVI units also occurs in 19.3% or cropland, MOSTLY around Western Cape and in the Northern Province. The pattern is confirmed in the maximum VCI map by values below 0.8. For the country as a whole VCIx reached 0.9; CALF was 0.9， 20% above the 5 years average.

CropWatch currently puts 2018 maize production 2.4% below last year's. For the wheat season, which is just starting, the production is tentatively put 1.9% below the 2017 output.

Regional analysis

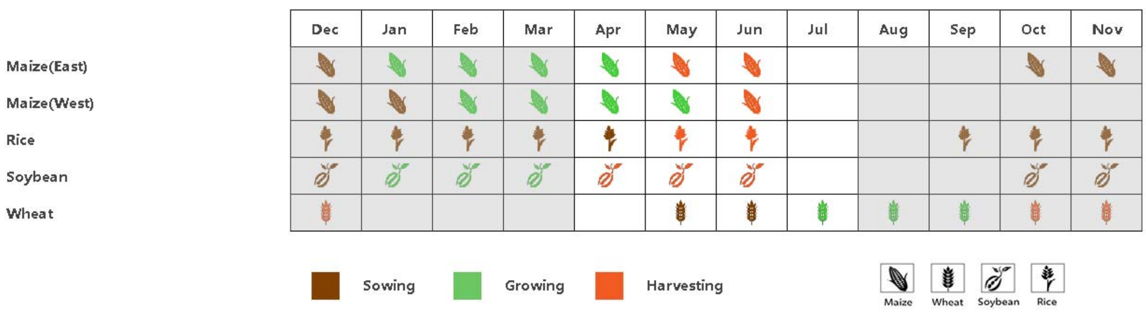
CropWatch adopts three agro-ecological zones (AEZs) relevant for crop production in South-Africa: Humid Cape Fold mountains, the Mediterranean zone and the Dry Highveld and Bushveld maize areas.

In the Humid Cape Fold mountains, the average rainfall (RAIN) was 28% below the average, leading to a 22% reduction in estimated BIOMSS compared to the average. No significant departure was recorded for temperature (TEMP) or RADPAR (-2%). The NDVI-based crop conditions graph shows that the conditions were above the maximum 5 years conditions and the VCI value for the whole zone was high (0.9).

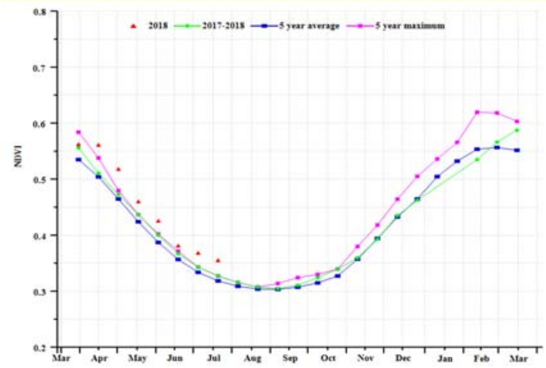
The Mediterranean zone recorded just 93mm of RAIN, 45% below the average. TEMP was 13.7 °C, 0.6 °C above the average. No significant change occurred for RADPAR (2% below the average), while the estimated BIOMSS dropped 33%. NDVI profiles showed below average conditions from April to mid-May but then rapidly rose above average until the end of the reporting period. The maximum VCI was 0.5 and CALF was 0.9, 3% above the average.

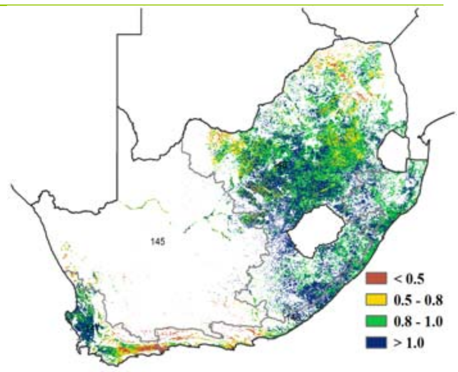
In Dry Highveld and Bushveld maize areas, the rainfall (RAIN) and the biomass production potential (BIOMSS) were both was about 10% below average. The CALF reached 1 (100%), 28% above the average. The VCI was 1, indicating excellent crop conditions confirmed by the NDVI-based crop conditions graph showing crop condition exceeding the recent 5-year maximum.

Figure 3.46. South Africa’s crop condition, April-July 2018

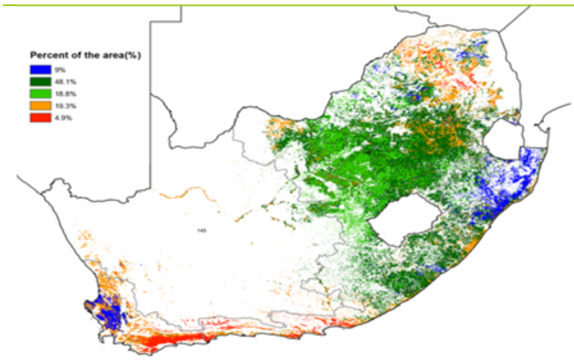


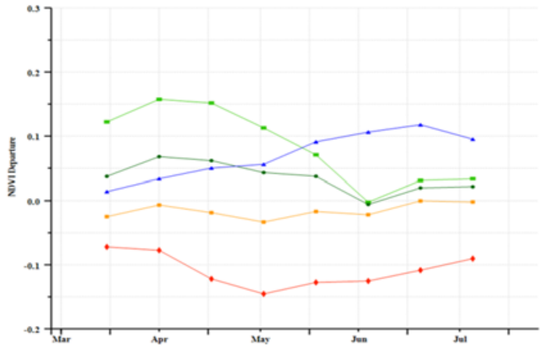
(a). Phenology of major crops



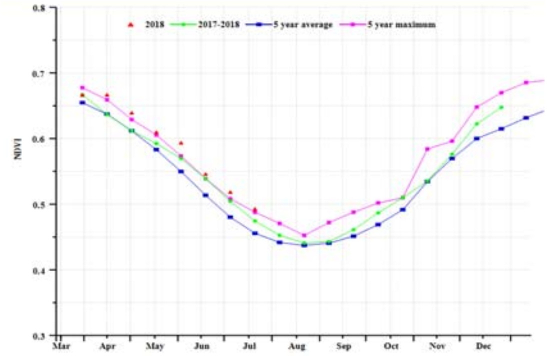


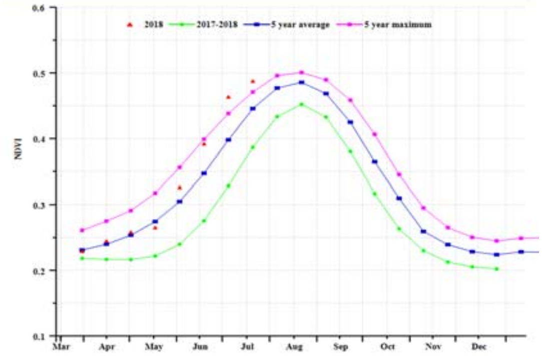
(b) Crop condition development graph based on NDVI (c) Maximum VCI



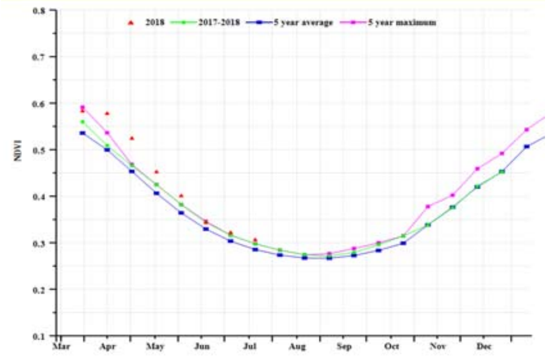


(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles





(f) Crop condition development graph based on NDVI (Humid Cape Fold Mountains (left) and Mediterranean wheat zone (right))



(f) Crop condition development graph based on NDVI (Dry Highveld and Bushveld maize zone)

Table 3.118. South Africa's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April-July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m²)	Departure from 15YA (%)
Humid Cape Fold Mountains	77	-28	16.1	0.0	755	-2
Mediterranean Zone	93	-45	13.7	0.6	674	-2
Dry Highveld and Bushveld	64	-12	13.5	0.0	871	-1

Table 3.119. South Africa's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April-July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m²)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Humid Cape Fold Mountains	342	-22	1	2	0.9
Mediterranean Zone	397	-33	1	3	0.5
Dry Highveld and Bushveld	274	-10	1	28	1.0

Table 3.120. CropWatch-estimated maize and Wheat production for South Africa in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Maize	14161	8.8%	-10.3%	13827	-2.4%
Wheat	1576	8.6%	-9.7%	1546	-1.9%

[ZMB] Zambia

During the monitoring period (April-July, 2018), the maize was being harvested and wheat has been sown. For the same period, the agro-climatic indicators estimated by CropWatch indicated that the average rainfall (RAIN) was 23% above the average, while the average temperature (TEMP) was 0.4°C below the average. The RADPAR was only 3% below the average, but the BIOMSS was 17% above the average.

According to NDVI graphs crop condition was slightly above; it was below average only in 11% of the cropped area. Both the maximum VCI and the spatial NDVI patterns map showed that the conditions were slightly better in the south than the middle and the north of the couintry. The VCI for the whole country was 0.9, while the CALF was 1.

All of the CropWatch indicators agree in assessing crop conditions as fairly good during this period and no significant variation in crop production is expected (-1% maize production variation compared to last season).

Regional analysis

Zambia can be divided into four agro-ecological zones (AEZ): Northern high rainfall zone, Western semi-arid plain, Central (Eastern and Southern Plateau) zone, and Luangwa Zambezi rift valley.

In the Northern high rainfall zone, the average rainfall (RAIN) was 39% above the average, while the temperature (TEMP) was 0.6°C below. RADPAR was low as well (-3%) and BIOMSS was 28% up.

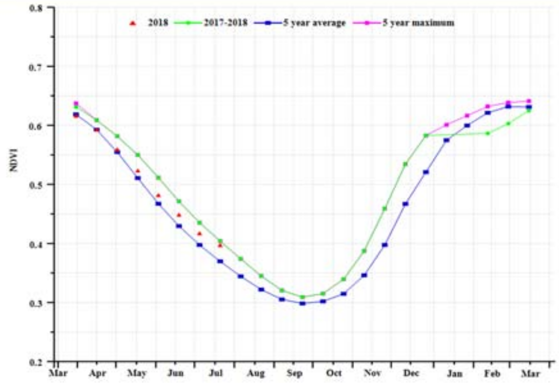
In the Western semi-arid plain, RAIN and TEMP were both above average (+36% and 0.8°C, respectively). RADPAR was low (-4%) and BIOMSS followed RAIN (+33%).

In the Central zone, and the Luangwa-Zambezi rift valley, RAIN was closer to average than in the two previous AEZs at +5% and +9%, respectively. The temperature (TEMP) was 0.7°C below the average in the Central zone. The RADPAR was only 3% below the average, and the BIOMSS was 9% above the average for both zones.

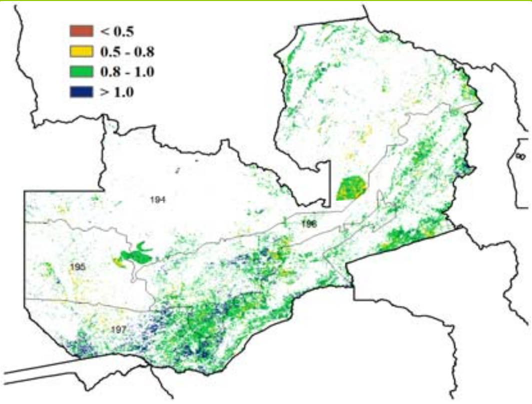
The NDVI-based crop condition graphs for the agro-ecological zones show that the crops were slightly below average until mid-May, after which they returned to average, except for the Luangwa Zambezi rift valley zone where crops conditions were slightly above the average during the whole reporting period. Maximum VCI was between 0.8 to 0.9 for all zones.

Figure 3.47. Zambia's crop condition, April -July 2018

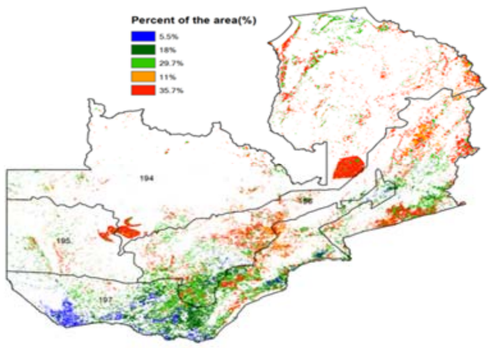
(a). Phenology of major crops



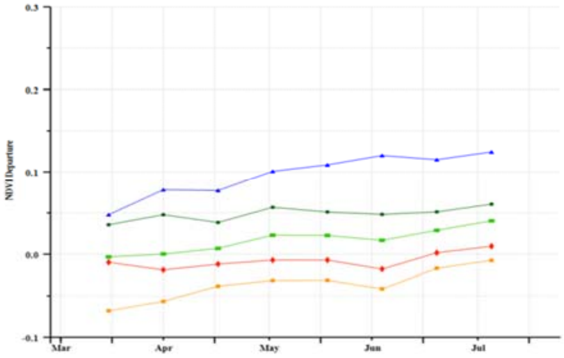
(b) Crop condition development graph based on NDVI



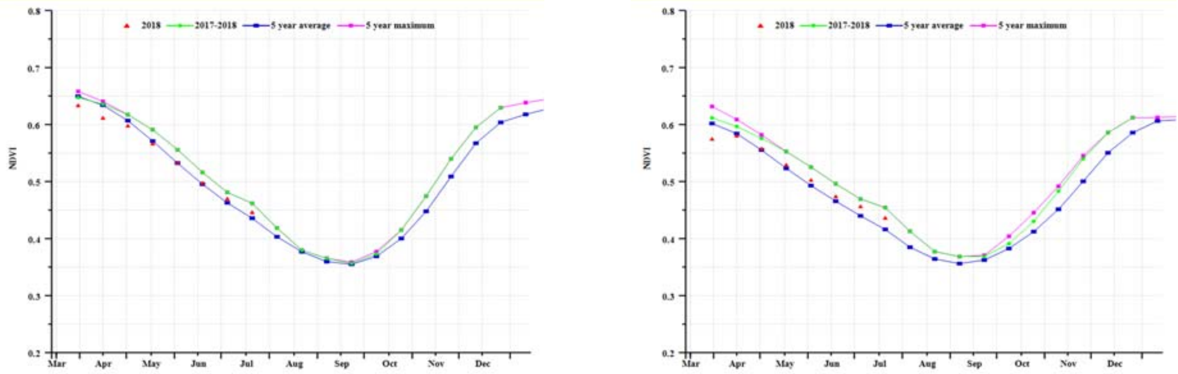
(c) Maximum VCI



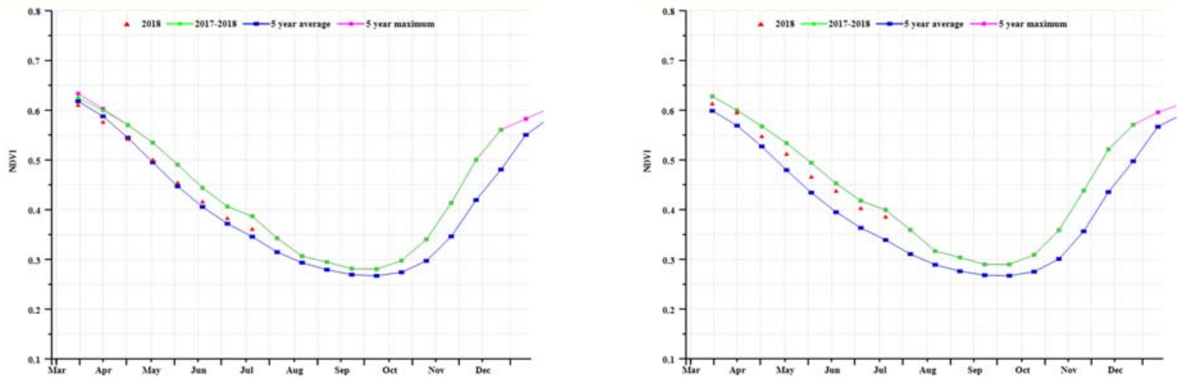
(d) Spatial NDVI patterns compared to 5YA



(e) NDVI profiles



(f) Crop condition development graph based on NDVI (Northern high rainfall zone (left) and Western semi-arid plain (right))



(g) Crop condition development graph based on NDVI (Central (Eastern and Southern Plateau) zone (left) and Luanguwa Zambazi rift valley (right))

Table 3.121. Zambia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, April-July 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Luanguwa Zambazi rift valley	44	9	21.6	0.0	1028	-3
Central (Eastern and Southern Plateau)	53	5	20.9	-0.7	1036	-3
Western semi-arid plain	61	36	22.2	0.8	1089	-4
Northern high rainfall zone	131	39	20.3	-0.6	1110	-3

Table 3.122. Zambia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, April-July 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Luanguwa Zambazi rift valley	185	9	1.0	1	0.9
Central (Eastern and Southern Plateau)	215	9	1.0	0	0.9
Western semi-arid plain	225	33	1.0	1	0.8
Northern high rainfall zone	402	28	1.0	0	0.9

Table 3.123. CropWatch-estimated maize production for Zambia in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Maize	2394	-2%	1%	2367	-1%

Chapter 4. China

After a brief overview of the agro-climatic and agronomic conditions in China over the reporting period (section 4.1), Chapter 4 presents an updated estimate of national winter crop production (4.2) and describes the situation by region, focusing on the seven most productive agro-ecological regions of the east and south: Northeast China, Inner Mongolia, Huanghuaihai, Loess region, Lower Yangtze, Southwest China, and Southern China (4.3). Section 4.4 presents the results of ongoing pests and diseases monitoring, while sections 4.5 and 4.6 describe trade prospects (import/export) of major crops (4.5) and an updated outlook for domestic prices of maize, rice, wheat and soybean (4.6). Additional information on the agro-climatic indicators for agriculturally important Chinese provinces are listed in table A.11 in Annex A.

4.1 Overview

During the current period, summer crops were growing in China, including mostly early rice, semi-late rice, spring maize, and soybean.

At the national scale, rainfall and temperature were average while RADPAR was low by 6%. The BIOMSS and CALF were respectively 5% and 2% above average. The maximum VCI was 0.94. Overall crop condition was favorable.

At the sub-national level, above-average rainfall occurred in Huanghuaihai, Inner Mongolia, Loess region and Southwest China. On the contrary, Lower Yangtze, Northeast China and Southern China experienced below-average rainfall. Temperature was average or above in all regions, except Southern China (-0.5℃), even if it fluctuated significantly. Rainfall profiles show that the variable fluctuated a lot, especially in southeast China, accounting for 7% of national cropped areas (figure 4.1). These regions experienced more than 60 mm below-average rainfall in early May, whereas 105 mm above average fell in late May. In 93% of areas in China, however, rainfall was continuously close to average over the monitoring period.

BIOMSS was 7%, 13% and 11% above average for Huanghuaihai, Inner Mongolia and the Loess region, and was close to average for Lower Yangtze, Northeast, Southern and Southwest China (departures between 0% and 2%). CALF increased by 10% and 13% in Inner Mongolia and Loess region, compared to average. In contrast, the values for this indicator in other regions were slightly below average or average. The maximum VCI values exceeded 0.90 for all regions, indicating mostly satisfactory crop condition.

As shown in figure 4.3, most cropland in China was cropped (with the exception of central Inner Mongolia and eastern Gansu) during the reporting period as it is now the the peak of the agricultural season. The Highest values (larger than 1) of maximum VCI appear in northeast and northern China (figure 4.4). The values of this indicator were generally between 0.5 and 1.0 in other regions.

Table 4.1. CropWatch agroclimatic and agronomic indicators for China, April-July 2018, departure from 5YA and 15YA

Region	Agroclimatic indicators			Agronomic indicators		
	Departure from 15YA (2002-2016)			Departure from 5YA (2012-2016)		Current
	RAIN (%)	TEMP (°C)	RADPAR (%)	BIOMSS (%)	CALF (%)	Maximum VCI
Huanghuaihai	10	0.4	-15	7	-1	0.90

Region	Agroclimatic indicators			Agronomic indicators		
	Departure from 15YA (2002-2016)			Departure from 5YA (2012-2016)		Current
	RAIN (%)	TEMP (°C)	RADPAR (%)	BIOMSS (%)	CALF (%)	Maximum VCI
Inner Mongolia	24	0.8	-8	13	10	0.93
Loess region	16	0.0	-14	11	13	1.00
Lower Yangtze	-2	0.1	-5	1	-1	0.93
Northeast China	-7	0.4	-7	1	0	0.97
Southern China	-6	-0.5	-2	0	-2	0.93
Southwest China	3	0.0	-4	2	0	0.94

Figure 4.1. China spatial distribution of rainfall profiles, April-July 2018

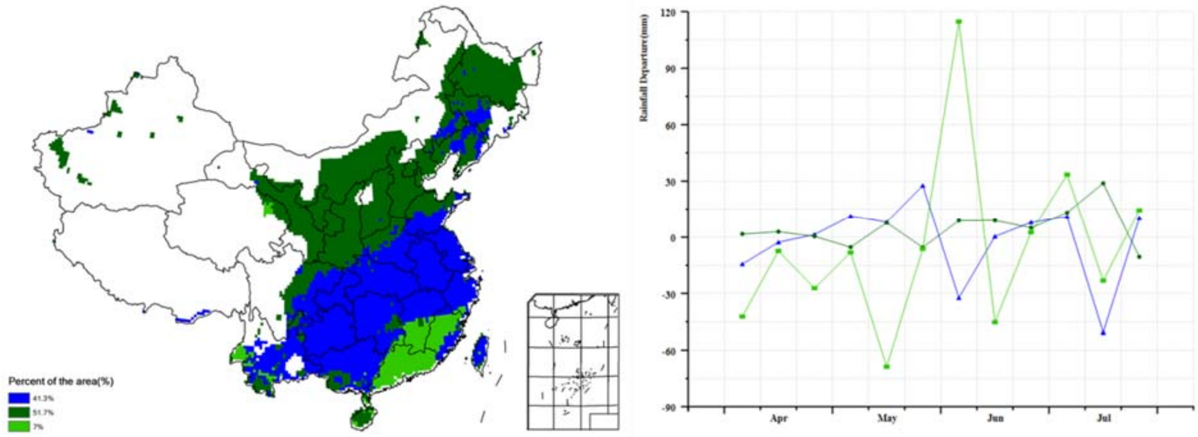


Figure 4.2. China spatial distribution of temperature profiles, April-July 2018

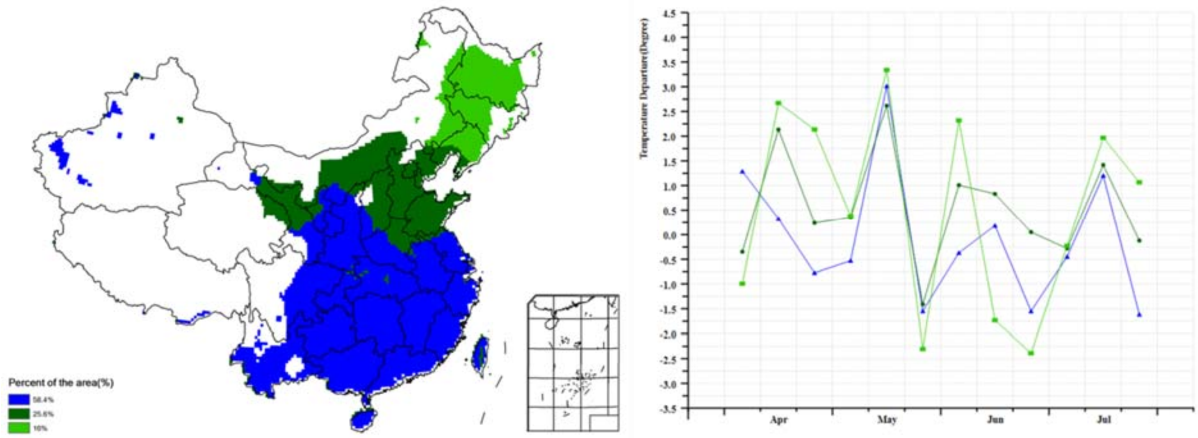


Figure 4.3. China cropped and uncropped arable land, by pixel, April-July 2018

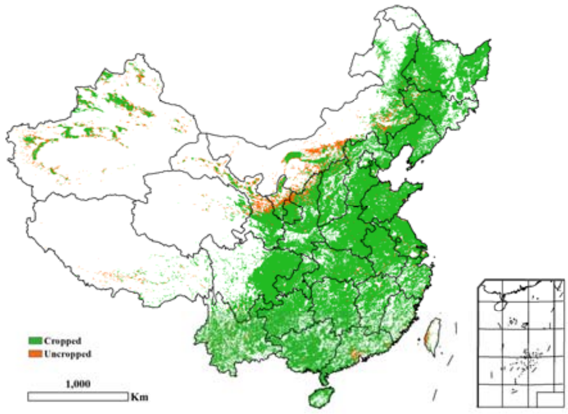


Figure 4.4. China maximum Vegetation Condition Index (VCIx), by pixel, April-July 2018

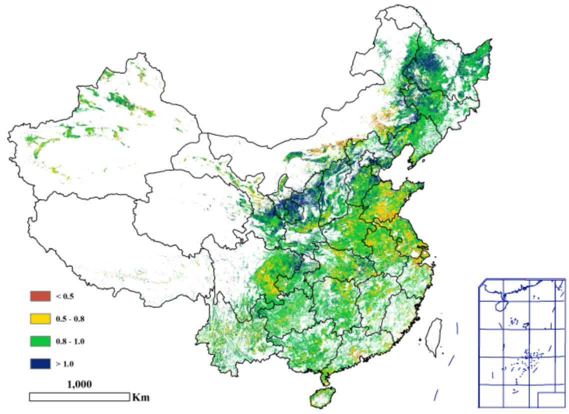
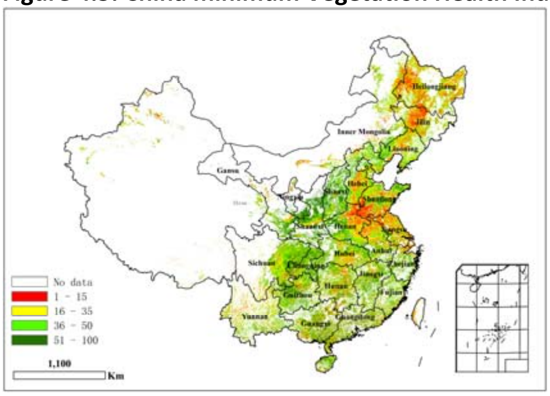


Figure 4.5. China minimum Vegetation Health Index (VHIn), by pixel, April-July 2018



4.2 China crop production

China 2017-2018 total winter crops production (among which wheat accounts for more than 91%) is revised at 126 million tons, the same level as 2016-2017. The revised production is 347 ktons up from previous forecast, mainly contributed by the 1.6% increase of yield thanks to the adequate climatic conditions. Sufficient rainfall during grain filling stage in Henan, the leading winter crops producing province, benefited winter crops and helped crops recover from the winter drought. Average yield was estimated to be 0.6% up from 2016-2017. Shandong, the second winter crops producing province, also received high rainfall in mid-May which narrowed the yield decrease from 5.8% (April forecast) to 4.3% (current estimate). Table 4.2 provides detailed information for each province.

Table 4.2. China 2017-18 winter crops production (tons) and variation (%) from 2016-17, by province

	production 2017 (thousand tons)	2018			
		Area variation (%)	Yield variation (%)	Production variation (%)	Production (thousand tons)
Hebei	1228.9	-1.2	4.2	3.0	1265.5
Shanxi	225.1	2.7	4.6	7.5	241.9
Jiangsu	999.6	-1.2	3.0	1.8	1017.1
Anhui	1166.2	-1.1	2.6	1.5	1183.9
Shandong	2489.8	-0.6	-4.3	-4.9	2368.7
Henan	2629.3	-0.9	0.6	-0.3	2622.4
Hubei	575.6	-0.7	0.7	0.0	575.5

	production 2017 (thousand tons)	2018			
		Area variation (%)	Yield variation (%)	Production variation (%)	Production (thousand tons)
Chongqing	2289	-0.1	1.4	1.3	2319
Sichuan	5513	-1.5	1.4	-0.1	5507
Shaanxi	3889	5.4	4.4	10.0	4279
Gansu	2999	0.8	6.2	7.1	3211
Sub total	107211	-	-	0.8	108068
Other provinces	19064	-	-	-4.7	18160
National total	**126275**	**-1.6**	**1.6**	**0.0**	**126228**

Maize

Even if the planted area of maize continues to decrease, overall favorable conditions result in 1.5% above 2017's average yield, especially in Northeast China and the Loess Region where sufficient rainfall benefited maize development and grain filling. The most significant increase of maize production was observed in the semi-arid Loess Region and Inner Mongolia, including Gansu (+9%), Inner Mongolia (+4%), Shaanxi (9%), and Shanxi (7%). Extreme weather conditions (typhoons, strong wind, flooding and drought) negatively impacted the summer crops development in eastern coastal provinces (Jiangsu, Anhui, Shandong) and south western China (Yunnan, Guizhou, Sichuan and Chongqing).

Rice

CropWatch forecasts the overall rice production for China at 196.4 million tons, 2% below 2017 mainly due to the decrease of planted area. Since most of rice cultivation relies on irrigation, the inter-annual variation of production has been limited for the past ten years. Two percent drop of rice production resulted in 2018 ranking as the lowest production since 2009. Both early rice and late rice production decreased by 1% due to the decreased yield for early rice and both reduced planted area and yield for late rice. While single rice production was 3% below 2017 values because both yield and planted area dropped compared with 2017. Semi-late rice production in Anhui, Chongqing, and Guizhou fell by 7%, 6% and 5%, respectively. A large drop for late rice production was also forecast for Anhui, Guangxi and Hubei.

Wheat

Wheat production is revised up to 121.5 million tons, equivalent to 2017's bumper production. Although the wheat planted area shrank by 1.6%, favorable weather conditions between late April and the harvest of winter crops in most of semi-arid areas in the Loess Region led to very good output. Among the provinces, only two spring wheat producing provinces (Heilongjiang and Inner Mongolia) and two winter wheat producing provinces (Shandong and Sichuan) outputs less grain than during 2017. The major reason is the lower planted area for spring wheat and lower yield for winter wheat. In all other provinces yield at least equaled 2017 values.

Soybean

The amplitude of inter-annual production variation for soybean is generally larger than for other three crops mainly due to the newly released policies which encourage farmers to keep increasing soybean cultivation. The most significant increase in soybean production was observed in Inner Mongolia and Jilin, with 13% and 11% increase compared with 2017. Both yield and planted area are up from the previous year. The leading soybean producing province, Heilongjiang, is forecasted to produce the same amount of soybean as last year's. The soybean area decreased by 2.0% because of the low income from soybean cultivation and the late release of new policy (after sowing in major producing regions). Favorable conditions benefited soybean development and yield is expected to increase by 2.0%, offsetting the impact of area decrease. Reduced output in Anhui (-4%) and Jiangsu (-8%) is mainly due to the unfavorable conditions brought about by several typhoon since May.

All summer crops

CropWatch forecasts the total 2018 output of summer crops (including maize, single rice, late rice, spring wheat, soybean, minor cereals, and tubers) at 417.0 million tons, a 0.4% drop from 2017 or 1748 thousand tons in production decrease. The total annual crop production is estimated at 577.3 million tons, down 0.9% from 2017 (2460 thousand tons decrease).

As late rice is still at an early growing stage, and maize and single rice are at at grain filling in August, CropWatch will further revise the production for each crop type as well as total production in the next bulletin.

A caveat, however: depending on weather conditions during the grain-filling stage, production of winter wheat and total winter crop output could be revised up or down in the final CropWatch estimate, which will be published in the next bulletin.

Table 4.3, China 2018 production of maize, rice, wheat, and soybean, and percentage change from 2017, by province

	Maize		Rice		Wheat		Soybean	
	2018	Δ (%)	2018	Δ (%)	2018	Δ (%)	2018	Δ (%)
Anhui	3390	-4	16016	-6.2	10736	5	1021	-4
Chongqing	2001	-4	4466	-5.9	1092	0		
Fujian			2742	-2.0				
Gansu	5388	9			2728	7		
Guangdong			10925	-1.2				
Guangxi			10639	-4.8				
Guizhou	4926	-1	5175	-4.7				
Hebei	18453	3			10956	3	203	8
Heilongjiang	31197	2	21404	2.2	430	-9	4731	0
Henan	15579	0	3829	-1.5	25599	0	777	3
Hubei			16008	0.6	4308	1		
Hunan			24641	0.0				
Inner Mongolia	15745	4			2038	-4	1216	13
Jiangsu	2092	-5	16796	-1.9	9816	3	714	-8
Jiangxi			17869	2.4				
Jilin	23439	-1	5664	-0.3			770	11
Liaoning	15333	0	4359	-0.4			396	-3
Ningxia	1703	0	524	0.2	831	6		
Shaanxi	3765	9	1004	-1.6	4165	8		
Shandong	18937	-2			21337	-4	709	1
Shanxi	8978	7			2421	7	174	9
Sichuan	6916	-1	14357	-1.3	4612	-1		
Xinjiang	6530	-3						
Yunnan	5941	-3	5528	-1.5				
Zhejiang			6392	-1.6				
Sub total	190312	1	188341	-1.1	101071	1	10710	2
Other provinces*	5200	3	8065	-20.4	20457	-4	3493	9
China*	**195512**	**1**	**196406**	**-2.1**	**121528**	**0**	**14203**	**3**

Table 4.4. China 2018 early rice, single rice, and late rice production and percentage difference from 2017, by province

	Early Rice		Single Rice		Late Rice	
	2018	Δ (%)	2018	Δ (%)	2018	Δ (%)
Anhui	1824	0.1	12601	-6.6	1591	-9.1
Chongqing			4466	-5.9		
Fujian	1606	-3.7			1137	0.6
Gansu	5178	-1.4			5747	-1.0
Guangdong	5153	-4.0			5487	-5.6
Guangxi			5175	-4.7		
Guizhou			21404	2.2		
Hebei			3829	-1.5		
Heilongjiang	2323	-0.7	11094	3.4	2590	-8.7
Henan	8025	-2.4	8358	2.6	8258	-0.2
Hubei			16796	-1.9		
Hunan	7712	1.6	2891	2.6	7267	3.1
Inner Mongolia			5664	-0.3		
Jiangsu			4359	-0.4		
Jiangxi			524	0.2		
Jilin			1004	-1.6		
Liaoning			14357	-1.3		
Ningxia			5528	-1.5		
Shaanxi	820	-0.3	4710	-2.0	862	-0.8
Shandong	32641	-1.3	122762	-0.9	32938	-1.8
Shanxi	**34046**	**-1.2**	**128258**	**-2.5**	**34102**	**-1.4**

4.3 Regional analysis

Figures 4.6 through 4.12 present crop condition information for each of China's seven agricultural regions. The provided information is as follows: (a) Phenology of major crops; (b) Crop condition development graph based on NDVI, comparing the current season up to July 2018 to the previous season, to the five-year average (5YA), and to the five-year maximum; (c) Spatial NDVI patterns for April - July 2018 (compared to the (5YA)); (d) NDVI profiles associated with the spatial patterns under (c); (e) maximum VCI (over arable land mask); and (f) biomass for April - July 2018. Additional information about agro-climatic indicators and BIOMSS for China is provided in Annex A.

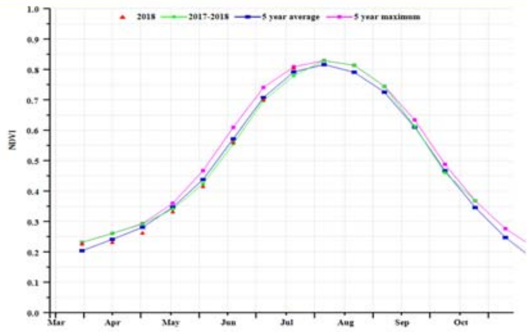
Northeast region

For the Northeast region, the current monitoring period mostly covers the sowing and cultivation of spring maize. Single-season rice is sowed in part of the region from April on, which is similar to the growing season of soybean. Overall condition of crops was at the five-year average before June, but further improved since then as a result of favorable weather.

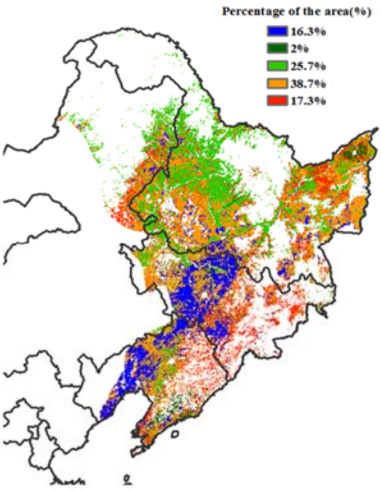
According to the CropWatch agro-climatic and agronomic indicators, rainfall was +9% compared to average in Heilongjiang, while a 26% drop was observed for Liaoning and -17% in Jilin respectively. Three provinces experienced a slight increase in temperature (+0.4°C for the region) and decreased radiation (RADPAR -7%). Local shortage of water supply and average meteorological conditions led to an overall +1% decrease of biomass (BIOMSS) for the region, with a more marked reduction in Liaoning (BIOMSS -12%).

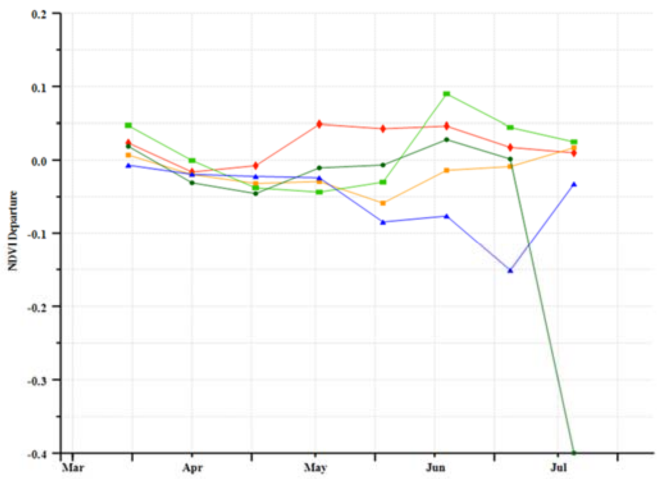
16.3% of arable land near the east slope of south Great Khingan mountains (west of Jilin and Liaoning province) suffered unsatisfactory crop condition, which is confirmed by the biomass map but disagrees with the VCIx which is well over 0.8; future weather condition the final outcome of the season. VCIx values exceeded 1.0 in western Heilongjiang where soybean and maize are major crops, indicating favorable yield outlook. Rice conditions in north-eastern of Heilongjiang remains average. Overall, crop prospects in North-east China remain average.

Figure 4.6. Crop condition China Northeast region, April-July 2018



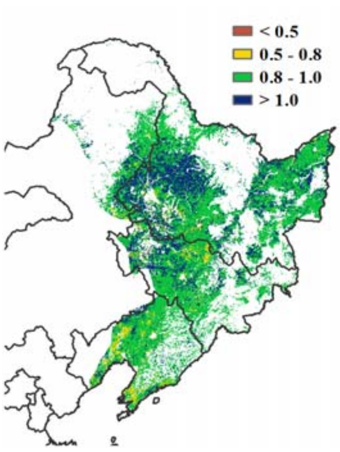
(a) Crop condition development graph based on NDVI



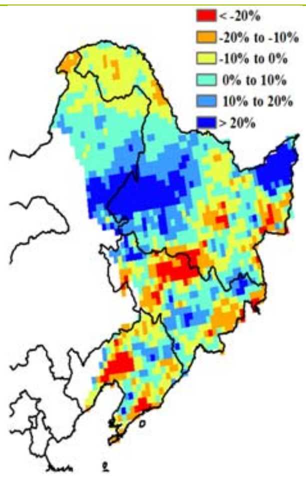


(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles



(d) Maximum VCI



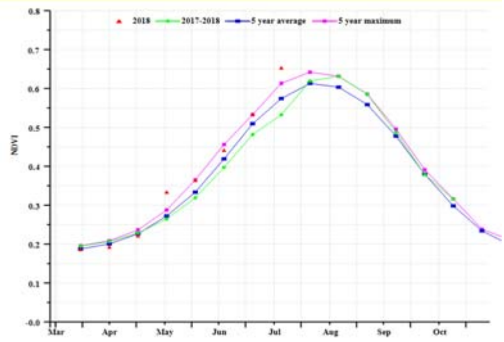
(e) Biomass

Inner Mongolia

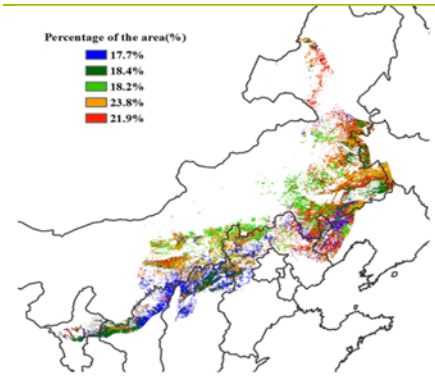
The condition of spring crops was unfavorable in Inner Mongolia over the reporting period. Among the CropWatch agroclimatic indicators, RAIN was above average (+24%) and TEMP was about average (+0.8°C), while a decrease was recorded for RADPAR (-8%), resulting in increased potential biomass production index BIOMSS (+13%). The spatial and temporal distribution for these indicators, however, was very uneven. Conditions were unfavorable for the sowing and early growth of spring crops, as illustrated in the crop development graph (in April). Later crop condition improved to higher than average in May. There is, however 18.2% of the cropped areas which display consistently below average NDVI conditions especially in east and north-east Inner Mongolia, north Hebei, along with some areas in Shaanxi and Liaoning. This condition is confirmed by VCIx values below 0.5. The biomass accumulation potential (BIOMSS) is also poor in those areas.

Overall, however, Inner Mongolia saw the fraction of cropped arable land (CALF) increase by 10% and VCIx was 0.93 on average: crop condition was favorable for this area of China from April to July. The final outcome of the season will depend on August and later weather.

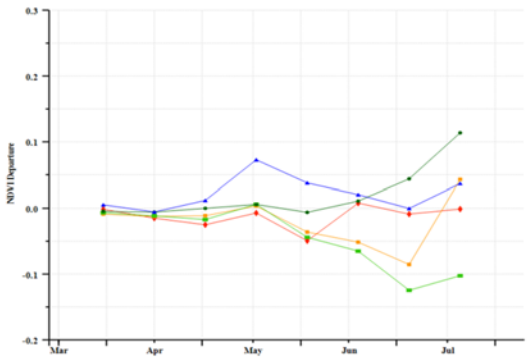
Figure 4.7. Crop condition China Inner Mongolia, April-July 2018



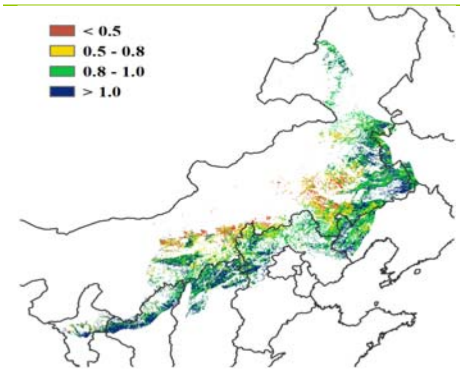
(a) Crop condition development graph based on NDVI



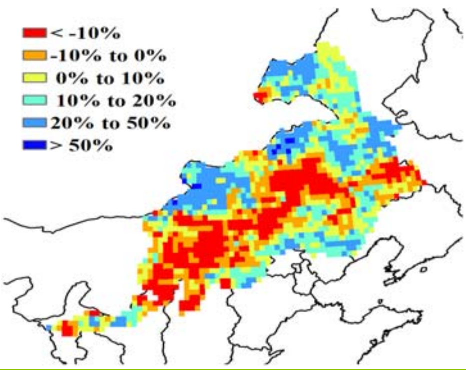
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI



(e) Biomass

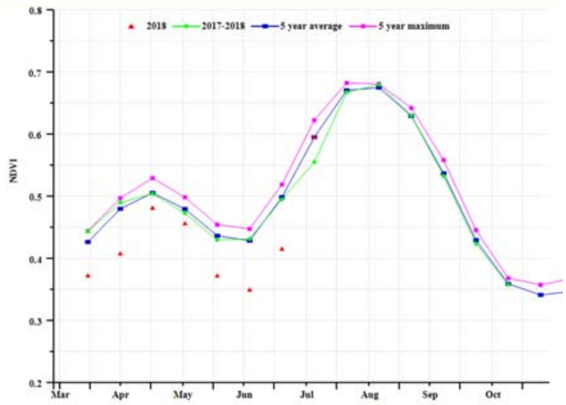
Huanghuaihai

Crop condition in Huanghuaihai was not favorable over the current monitoring period. The main crop in the region during the period is winter wheat, which was sowed in early October last year, in full development since April and with harvests starting in early June. And summer maize is planted after the harvesting of winter wheat. According to the crop condition development graph based on NDVI, crop condition was almost constantly below the 5YA during the entire period, especially in early April, June and early July, and recovered to average in late July. Poor condition of winter wheat may be related to less radiation, which dropped 15% compared to 5YA, while precipitation and temperature were 10% and 0.4°C above. In addition, low values in April and June may be due to the sowing and growth of some other crops. The fraction of cropped arable land (CALF) decreased by 1%. Though the crops performed poorly, sufficient precipitation and warmer weather led to a 7% increase in biomass potential.

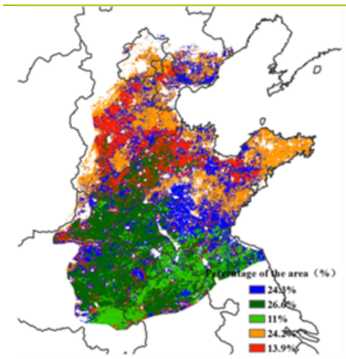
The spatial distribution of crop condition follows patterns that are similar to those of NDVI profiles. Several regions in southern Hebei and eastern Shandong had above-average condition in May and July. Very low values occurred in the south after May, confirmed by VCIx map and biomass departure map.

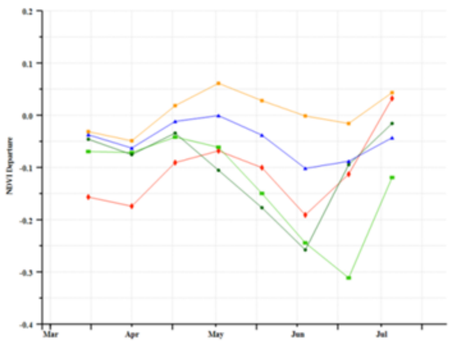
NDVI values over the whole region improved late in July and the regional average VCIx was 0.90 at the end of July. There is currently no specific concern about Huanghuaihai summer crops.

Figure 4.8. Crop condition China Huanghuaihai, April-July 2018

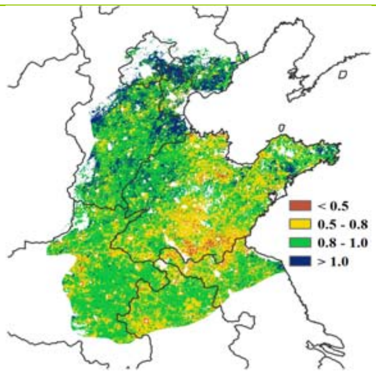


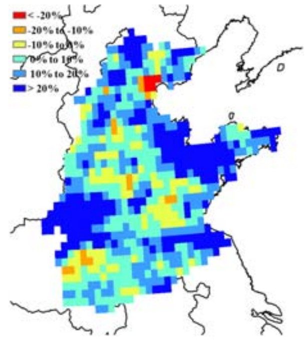
(a) Crop condition development graph based on NDVI





(b) Spatial NDVI patterns compared to 5YA (c) NDVI profiles





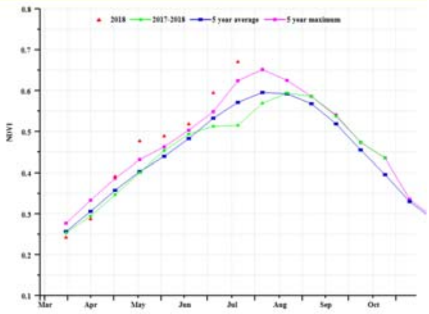
(d) Maximum VCI

(e) Biomass

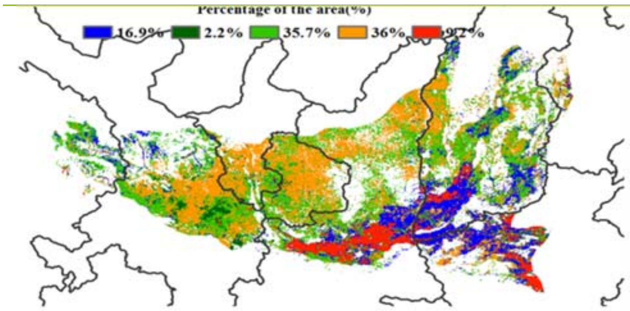
Loess region

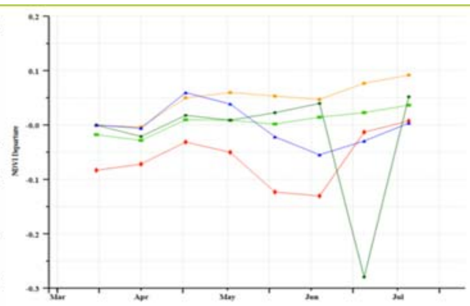
In the Loess region, winter wheat was harvested from early to middle June, while summer maize had been planted gradually from late May to late June. Compared to the average, rainfall (RAIN) was 16% above average, radiation (RADPAR) dropped by 14%, and TEMP was about average. The potential biomass (BIOMASS) was 11% above the five-year average as a result of ample rainfall. Crop condition was mostly above the five-year average and last year's level, except during early to middle April. The VCIx for the Loess region is 1.00, generally showing very good crop condition. The spatial NDVI clusters and profiles indicate that more than 90% of the areas had better crop condition than the average during the monitoring period. In general, crop condition was favorable except in some parts of central Gansu. The Cropped Arable Land Fraction (CALF) increased 13%, resulting in a favorable crop production outlook for the region, which was also confirmed by figure 4.3.

Figure 4.9. Crop condition China Loess region, April-July, 2018



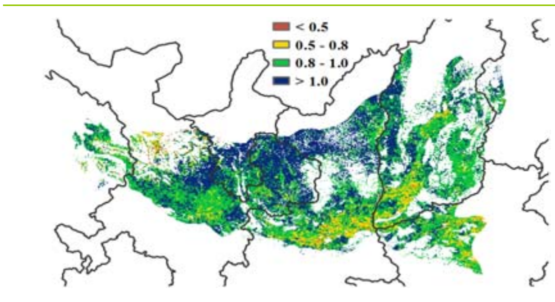
(a) Crop condition development graph based on NDVI

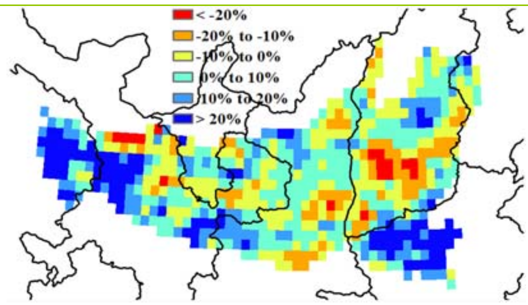




(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles





(d) Maximum VCI

(e) Biomass

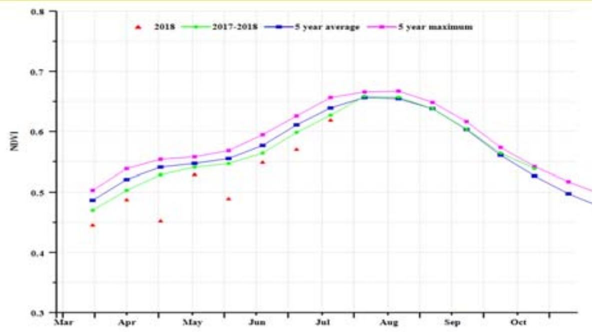
Lower Yangtze region

During the current monitoring period, the winter wheat harvest was completed in the north of the Lower Yangtze region, including the south of Henan, Jiangsu, and Anhui provinces. The semi-late and late rice crops are still growing in the south and the center of the region (including in Fujian, Jiangxi, Hunan, and Hubei provinces), while early rice has been harvested. Crop condition was below but close to average according to agroclimatic indicators. Accumulated rainfall and radiation were close to average (RAIN -2%, RADPAR -1%), but with great spatial varibility. Temperature was roughly average (+0.1℃). Alltogether, average agro-climatic conditions resulted in average biomass production potential (BIOSMSS, +1%).

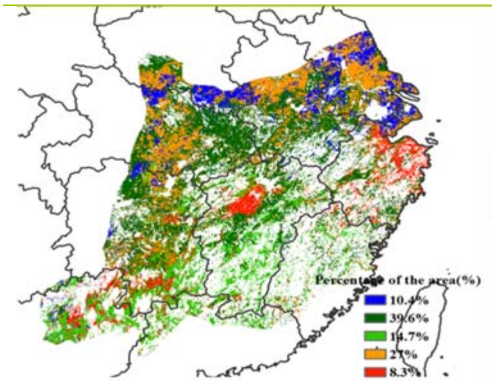
According to the NDVI development graph, crop condition was below average and last year, especially in the middle of April and May. As shown in the BIOMSS map, the biomass production potential was relatively favorable (+20%) in the north of the region, including the middle of Anhui and Jiangsu and south of Henan province. The south and middle north of the region, however, suffered a significant decrease in the BIOMSS potential, which coincides with the situation depicted by the VCIx map.

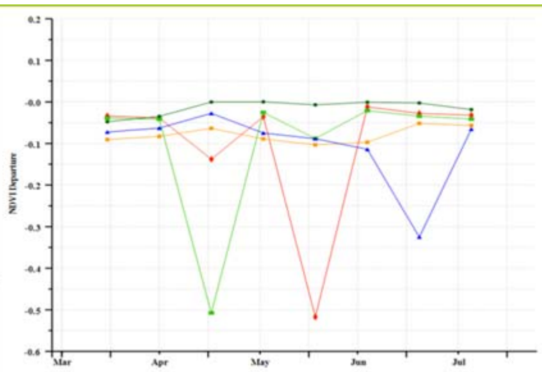
Finally, according to NDVI profiles, crop condition was close but slightly below average in 39.6% of cropped areas, mostly located in the middle of Anhui, West of Hubei and Hunan and middle of Jiangxi province. Considering the favorable VCIx value of 0.93, crop production is anticipated to be below but close to average.

Figure 4.10. Crop condition Lower Yangtze region, April - July 2018



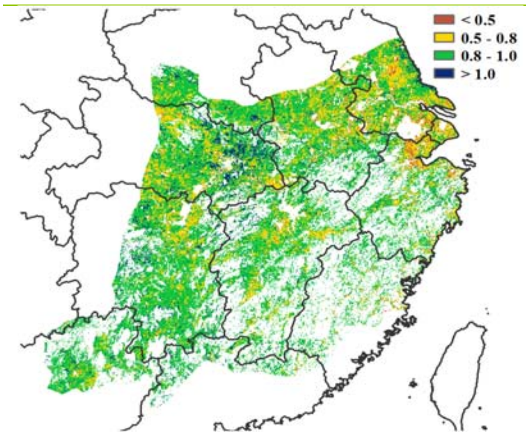
(a) Crop condition development graph based on NDVI

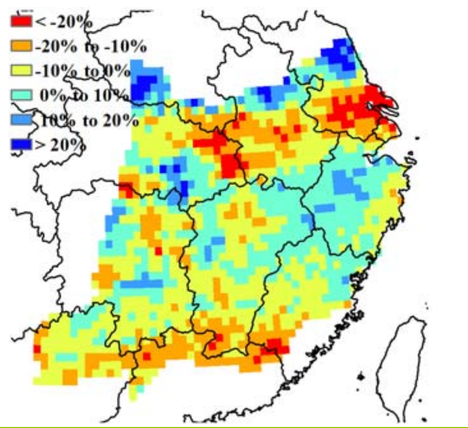




(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles





(d) Maximum VCI

(e) Biomass

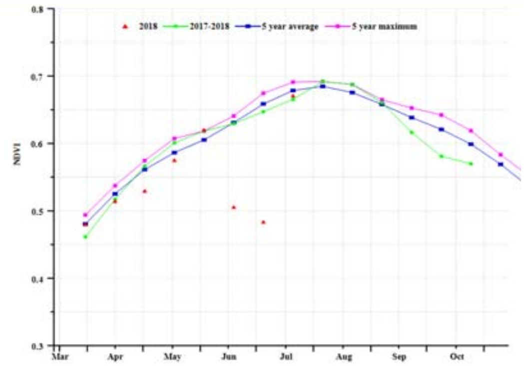
Southwest China

The reporting period covers the flowering and maturity of winter wheat in southwestern China. Summer crops including semi-late rice, late rice and maize are still at growing stage. According to the regional NDVI profile, overall crop condition was close to average. It exceeded the average level in early June and reached the maximum of five years.

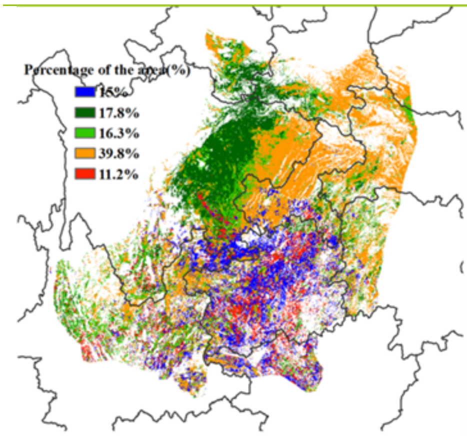
According to the agroclimatic and agronomic indices, compared to average, rainfall was just above (RAIN +3%), sunshine was low (RADPAR -4%) while the temperature was average. Compared to the average of the past 5 years, the cropped arable land fraction remained stable and the potential biomass production index was very slightly above (BIOMSS +2%). The maximum VCI was 0.94 indicating the crop growth status is close to the best level in the past ten years.

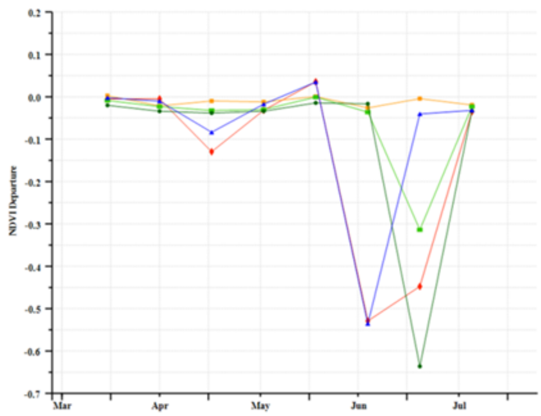
As shown by NDVI clusters and maps, crop condition in the region was close to average throughout the monitoring period except for late June and early July in western Sichuan Plain and Guizhou; both areas experienced very low NDVI but with different reason: the former one is due to abundant precipitation (RAIN +32%) early in the season, while the latter one is suffering from water shortage. Considering the average condition before June and during late July, the short period of abnormal weather had limited impacts on crops. Altogether, the situation in the region is average but still deserves close monitoring during late growing stage.

Figure 4.11. Crop condition Southwest China region, April - July 2018



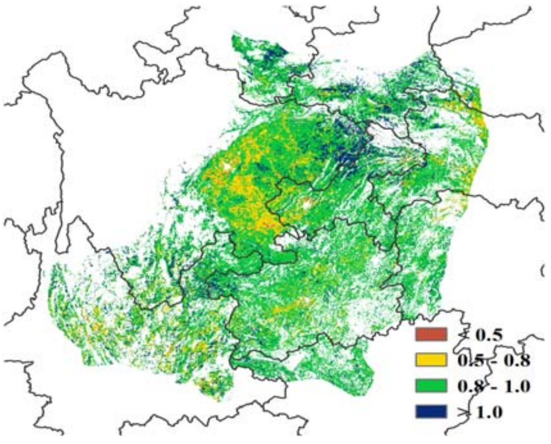
(a) Crop condition development graph based on NDVI

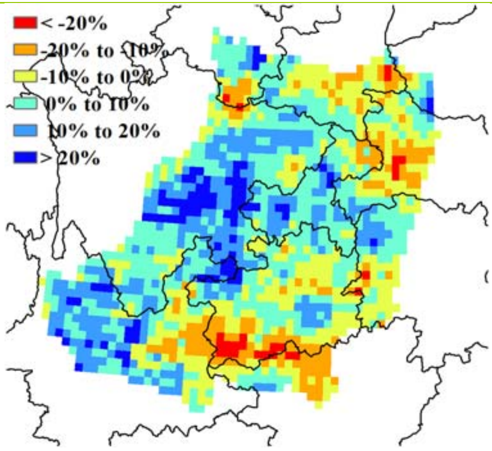




(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles





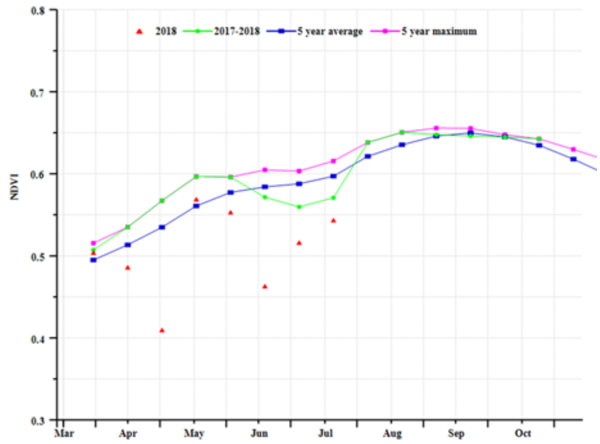
(d) Maximum VCI	(e) Biomass

Southern China

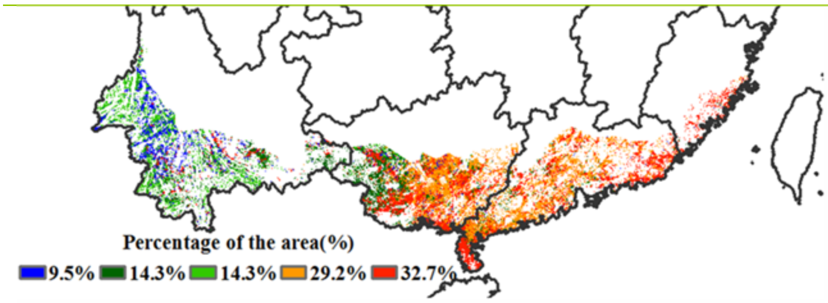
As shown by the spatial NDVI patterns and profiles map, CropWatch estimates that the crop condition was below average in Southern China. The rainfall was moderately below average, and so were temperature and radiation (RAIN -6%, TEMP -0.5°C, RADPAR -2%). As a result of the slightly below average climate conditions, the biomass was also close to average, while the cropped arable land fraction (CALF) decreased by 2%.

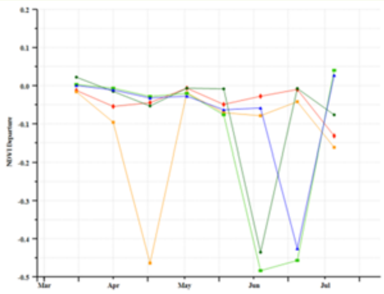
During this reporting period, Guangdong and Guangxi suffered deficits of rainfall: -14% and -10%, respectively. In these two provinces, the temperature was below average（Guangdong-0.2°C, Guangxi -0.5°C）, and the shortage of rainfall was unfavorable for crops and biomass accumulation. In Yunnan, the rainfall, temperature, and radiation were below average (RAIN -2%, TEMP -0.7°C, RADPAR -3%). Considering that Yunnan province is frequently impacted by drought, the below average conditions during the monitoring period will hamper the crop development.

Figure 4.12. Crop condition Southern China region, April -July 2018.



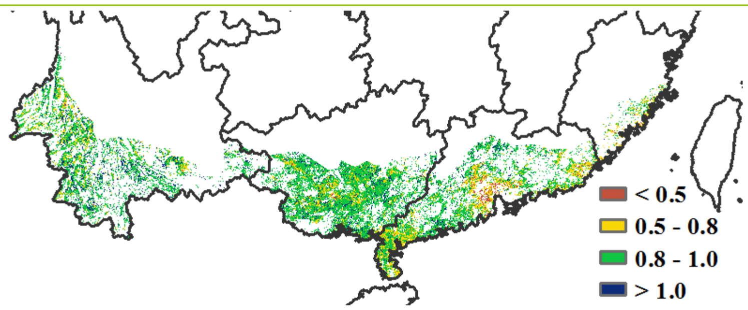
(a) Crop condition development graph based on NDVI



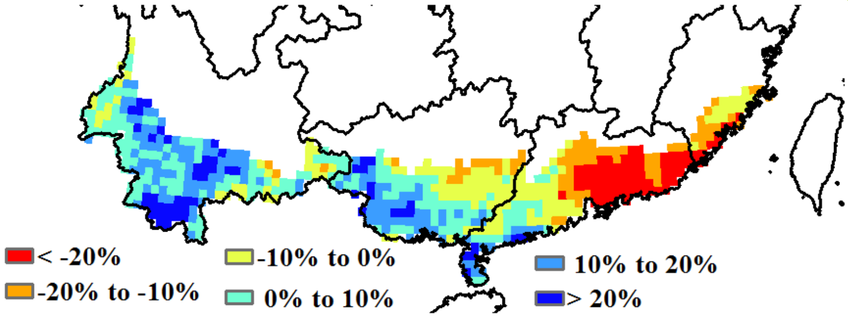


(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles



(d) Maximum VCI



(e) Biomass

4.4 Pest and diseases monitoring

The impact of pests and diseases was moderate during early August 2018 in the main rice regions of China. During July to August in 2018, the temperature was mostly higher than average and there were abundant rains in some parts of southwest China, northeast China, and southern China. They provided appropriate conditions for rice Plant hopper and rice Leaf roller migration, and rice Sheath blight dispersal.

Rice plant hopper

The distribution of rice plant hopper during early August 2018 is shown in Figure 4.13 and Table4.5. The total area affected by the plant hopper reached 4.7 million hectares, with the pest occurring severely in northeastern Sichuan, central Jiangsu, and central Hunan, and moderately in western Heilongjiang, southern Henan, eastern Anhui, and western Jiangxi.

Figure 4.13. Distribution of rice plant hopper in China (early August 2018)

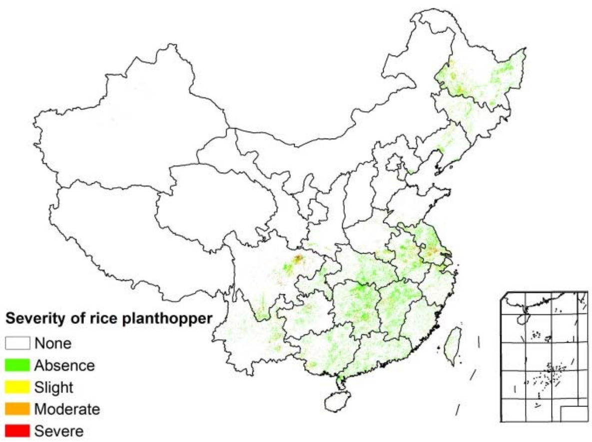


Table4.5. Statistics of rice planthopper in China (early August 2018)

Region	Occurrence ratio / %			
	Absence	Slight	Moderate	Severe
Huanghuaihai	77	13	6	4
Inner Mongolia	75	18	5	2
Loess region	76	17	5	2
Lower Yangtze	87	6	4	3
Northeast China	75	17	5	3
Southern China	92	4	2	2
Southwest China	82	5	7	6

Rice leaf roller

Rice leaf roller (Figure 4.14 and Table4.6) damaged around 3.4 million hectares, with the pest severely occurring in northeastern Sichuan, central Jiangsu, eastern Anhui, central Hunan, and northern Guizhou. Moderate occurrence is estimated for western Heilongjiang, southern Henan, and western Jiangxi.

Figure 4.14. Distribution of rice leaf roller in China (early August 2018)

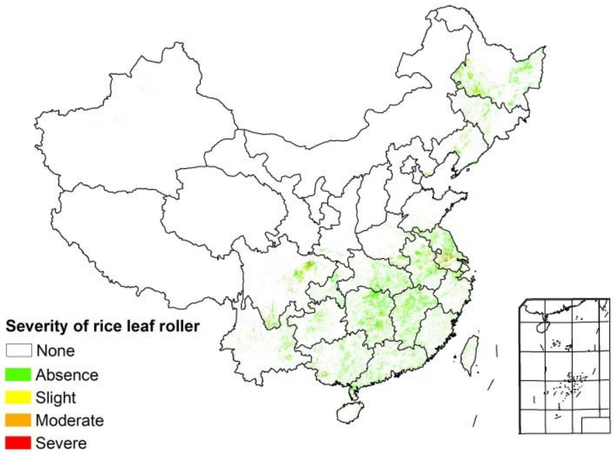


Table 4.6. Statistics of rice leaf roller in China (early August 2018)

Region	Occurrence ratio/%			
	Absence	Slight	Moderate	Severe
Huanghuaihai	83	8	5	4
Inner Mongolia	82	13	3	2
Loess region	83	12	3	2
Lower Yangtze	91	4	3	2
Northeast China	82	12	4	2
Southern China	94	3	2	1
Southwest China	87	7	4	2

Rice sheath blight

Rice sheath blight (Figure 4.15 and Table4.7) damaged around 4.9 million hectares, with the disease occurring mainly in eastern Sichuan, central Jiangsu, eastern Anhui, and western Guangxi. Moderate impact vis assumed for western Heilongjiang, eastern Hunan, and western Jiangxi.

Figure 4.15.. Distribution of rice sheath blight in China (early August 2018)

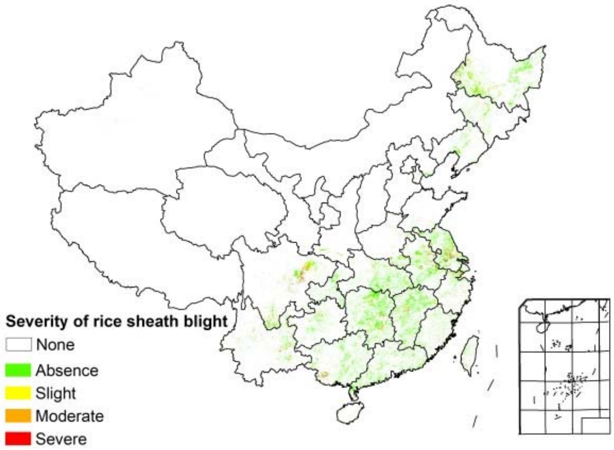


Table 4.7. Statistics of rice sheath blight in China (early August 2018)

Region	Occurrence ratio/%			
	Absence	**Slight**	**Moderate**	**Severe**
Huanghuaihai	78	9	8	5
Inner Mongolia	78	16	4	2
Loess region	79	15	4	2
Lower Yangtze	86	5	5	4
Northeast China	78	16	4	2
Southern China	90	4	3	3
Southwest China	79	11	6	4

The maize suffered moderately from pest and disease attacks during early August in the main production areas. Heavy rains and high humidity in north China, northeast China, and Huanghuaihai were conducive to armyworm reproduction and sheath blight dispersal.

Maize armyworm

The distribution of maize armyworm in early August 2018 is shown in Figure 4.16 and Table 4.8. The total area affected with armyworms reached 2.0 million hectares, with the pest mainly occurred in most of Jilin, central Liaoning, central Hebei, most of Henan, and western Shandong.

Figure 4.16 Distribution of maize armyworm in China (early August 2018)

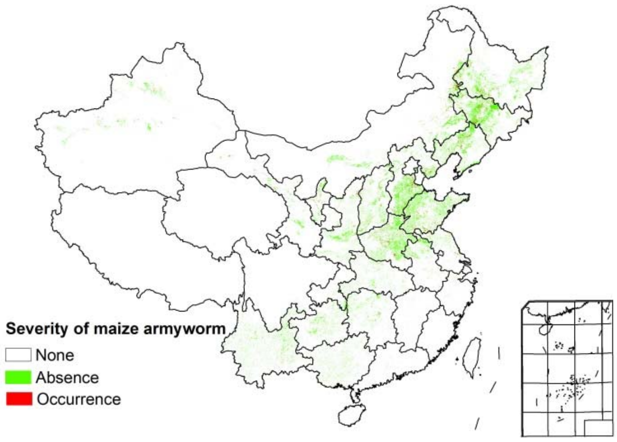


Table 4.8. Statistics of maize armyworm in China (early August 2018)

Region	Occurrence ratio/%	
	Absence	**Occurrence**
Huanghuaihai	93	7
Inner Mongolia	93	7
Loess region	93	7
Lower Yangtze	96	4
Northeast China	93	7
Southern China	97	3
Southwest China	95	5

Maize sheath blight

Maize sheath blight damaged around 1.0 million hectares, with the disease mainly occurring in central Jilin, central Hebei, western Shandong, eastern Henan, and central Shaanxi.

Figure 4.17. Distribution of maize sheath blight in China (early August 2018)

Table 4.9. Statistics of maize sheath blight in China (early August 2018)

Region	Occurrence ratio/%	
	Absence	Occurrence
Huanghuaihai	97	3
Inner Mongolia	97	3
Loess region	97	3
Lower Yangtze	98	2
Northeast China	97	3
Southern China	97	3
Southwest China	97	3

4.5 Major crops trade prospects

Imported and exported grains in the first quarter of 2018

Rice

In the first quarter, the total import of rice in China was 0.7752 million tons, a decrease of 11.0% compared to the previous year. The imported rice mainly stems from Vietnam, Thailand, and Pakistan, respectively accounting for 46.9%, 32.3%, and 12.3% of imports. The expenditure for rice import was US$426 million. Total rice exports over the period were 337,100 tons, mainly exported to the Republic of Korea, Côte d'Ivoire, and Mozambique (24.3%, 14.2%, and 12.8%, respectively). The value of the export was US$182 million.

Wheat

Chinese wheat imports in the first quarter of 2018 totaled 0.6417 million tons, down by 40.6% year-on-year. The main sources include Australia (28.1%), Kazakhstan (19.0%), and the United States (11.5%). Imports amounted to US$186 million. Wheat exports (90,400 tons) went mainly to the Democratic People's Republic of Korea (76.4%) and Hong Kong (19.4%). The generated income for wheat export was US$38 million.

Maize

In the first quarter of 2018, maize imports reached 557,300 tons, an increase of 81.8% over 2017. The main importing countries were Ukraine and the United States, accounting for 95.4% and 3.2% of imports respectively. Imports amounted to US$116 million. The United States (42.9%), Canada (28.6%), and France (14.3%) were the main destinations of Chinese maize exports, reached to 700 tons. The value of the export was US$0.2343 million.

Soybean

In the first quarter of 2018, the total import of soybean was up by 0.2% to 19,566,800 tons in China. Brazil and the United States respectively contributed 58.7% and 35.4%, for a total value of US$8216 million. Soybean exports were 30,800 tons, down 5.2%.

Trade prospects for major grains in China for 2018

Based on the latest monitoring results, China grain imports are projected to increase. The projections are based on remote sensing data and the Major Agricultural Shocks and Policy Simulation Model, which is derived from the standard GTAP (Global Trade Analysis Project).

Rice

According to the model forecast, rice imports and exports increased by 9.8% and 20.4% respectively in 2018. Due to the price differences at home and abroad and the influence of China-ASEAN Free Trade area Agreement, the rice import in 2018 will maintain its growth. Exports will remain a low growth due to the lack of price advantage.

Wheat

According to the model forecast, wheat imports will increase by 3.4%, while exports will decrease by 7.8%. As result the global supply and demand is in a relaxed pattern, global wheat price slightly increased. But the persistence of wheat price difference at home and abroad still exists, wheat imports in 2018 will increase slightly in stability.

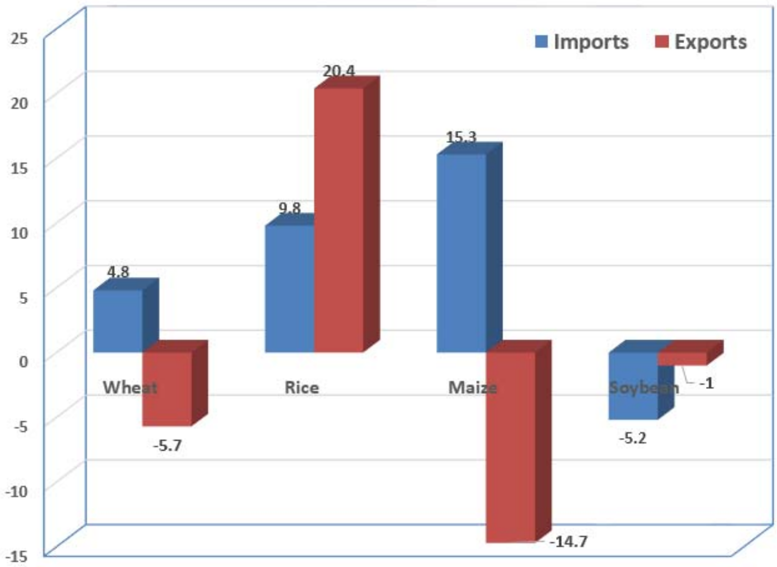
Maize

According to the model forecast, maize imports increased by 24.6% in China in 2018, but exports decreased by 9.4%. At present, global supply and demand of maize is relaxed, and the prices of maize perform downward trend. Due to the strong demand for livestock industry, maize imports are expected to increase in 2018.

Soybean

Soybean imports and exports will decrease by 0.8% and 3.0%, respectively. Under the influence of insufficient domestic production and other factors, imports will remain high. However, under in response to the structural adjustment policies for planting and the changing international context, soybean imports in China will decrease slightly in 2018.

Figure 4.18. Rate of change (%) of imports and exports for rice, wheat, maize, and soybean in China in 2018 compared to those for 2017.



Chapter 5. Focus and perspectives

Building on the CropWatch analyses presented in chapters 1 through 4, this chapter presents initial CropWatch food production estimates for 2018 (section 5.1), as well as sections on recent disaster events (section 5.2), and an update on El Niño (5.3).

5.1 CropWatch food production estimates

Methodological introduction

Table 5.1 presents the first revision of global maize, rice, wheat and soybeans production estimates prepared for 2018 by the CropWatch team. It is issued at a time when almost all winter crops in the northern hemisphere have been harvested and summer crops are in their late stages; in the southern hemisphere winter crops are growing and the planting of the summer season/monsoon season will start in a month or so.

The estimate is based on a combination of remote-sensing models (for major commodities at the national level) and statistical projections based on recent trends for minor producers1 and for those countries which will harvest their crops later during 2018, for which no directly observed crop condition information is currently available. In the table below, modelled outputs are red bolded. The percentage of the production which is modelled (as opposed to projected using trends) now mostly exceeds 90% for all crops.

It is also important to remember that, for China and the 41 countries described in chapters 3 and 4 and listed by name (conventionally referred to as the “major producers”), the quantitative estimates in the present chapter are calibrated against national agricultural statistics (as opposed to FAOSTAT for the trends). This means that (1) sub-national statistics are used at least for the largest countries and (2) 2017 information in included in the calibration. It is also stressed that the calibration is crop-specific, i.e. based on different crop masks for each crop and that, for each crop, both yield variation and cultivated area variation are taken into account when deriving the production estimates. The major producers represent at least 80% or production and 80% of exports. “Others” or “Minor producers” [Footnote 1] and the countries shown in black in the production table were extrapolated to 2018 based on the linear trend from 2013 to 2017, with FAOSTAT data up to 2016 (the last year available).

CropWatch production estimates differ from other global estimates by the use of geophysical data in addition to statistical and other reference information such as detailed crop distribution maps. The reader is also reminded that a specific section (chapter 4) provides addition detail about China, of which only national data are mentioned in this section.

Production estimates

CropWatch estimates the global 2017 production of the major commodities at 1011 million tonnes of maize, down 0.1% from 2017, 727 million for rice (up 1.7%), 702 million tonnes of wheat (with a 2.4% decrease below 2017 output) and 320 million tonnes of soybeans, down 1.0%.The major producers contribute 924 million tonnes of maize (-0.2%), 684 million for rice (+1.8%), 640 million tonnes of wheat (a 2.9% drop) and 300 million tonnes of soybeans (-1,4% below 2017 output). The contribution of the "minor producers" (shown as "others" in the table) to the global production is 6% (soybean) to 10% (wheat), and about 8% for rice and maize. The group of the major producers generally outperforms the bulk of the remaining nations, except for wheat where production drop is less than for the major producers. In August 2017 we noted a trend of many small (and not so small: PAK) producers of soybean to move away from the crop on all continents. The tendency is present in 2018 as well. For purpose of comparison, it is noted that the median nation-wide population-based increase in food demand is currently 1.3% and just under 3% for the upper decile. It is also stressed that the trend-based projection of 2018 for major producers amount to +0.1% for maize, -0.1 for rice, 1.4% for wheat and 5.1% for soybean. For all crops except rice, the actual variation remains below the projections. Adverse weather (or favorable in the case of rice) is directly responsible for the situation, as shown in other sections of this report. Detailed information for China is provided below.

Maize

For maize and the other crops below, this presentation limits itself to remote sensing productions. Large increases in maize production are listed for Hungary (+9.0%) and Romania (+15.8%), while neighboring Ukraine, where rainfall was less favorable, is foreseen to undergo a significant drop of 8.8%. Similarly, production estimates for Russia are at -18.3%. Low values are estimated as well for Pakistan (-10.1%), Argentina (-6.2%) and Canada (-4.2%). Countries with significant increases also include Kenya (+16.1%) and Thailand (+9.2%). Among the major exporters, the USA underwent a minor increase (+0.3%) while Brazil is put at +1.7%. Due to the poor expectations regarding Argentinian maize, the output of the three major exporters (according to table 5.2) is up just 0.1% while the expected output from other exporters (including Ukraine, Russia, but also India) results in a 0.3% drop of production of the top ten exporters. Major importers (Japan, Mexico, Korean Republic) did relatively well (+1.9% for the top 3) thanks to Mexico (+1.9%). It is stressed, however, that the volume of maize exported by the top 3 providers (about 85 million tonnes) is more than double the imports by the major importers and no dramatic changes should result from the relatively poor global maize output.

Rice

Because rice, as an irrigated crop, is relatively less weather dependent than maize, wheat or soybean, which are mostly rain-fed, the variations among producers are also less marked than for the other cereals. The largest production drop occurred in Argentina (-5.6%), which is a relatively minor rice producer and exporter. In terms of volume of production deficit, it is worth mentioning China (-2.1%, equivalent to 4.2 million tonnes) and Indonesia (-2.5%, equivalent to 1.7 million tonnes) while India increased production by 10.1 million tonnes (+6.2%), the fourth largest increase in the table after Bangladesh (+6.2% as well) and Thailand (+7.7%). In terms of output of major exporters (Table 5.2), the offer by the top 3 exporters increased significantly essentially because of the good performance of India and Thailand - which was just mentioned - while Vietnam increased output only marginally (+0.2%). Among the top importers, production fell 5.7% but, although the list includes China, imported volumes are small (less than 3 million tonnes).

Wheat

Australian and Argentinian wheat outputs are among the most variable in the group of major producers. This time, Australia's estimated production for 2018 is down by a very significant 12.8%, followed by Russia (-10.3%) and Ukraine (-7.1%), two countries already mentioned above for the poor projections of summer crop outputs (i.e. maize). For the United States, CropWatch estimates winter wheat output to be down 3.9% below 2017, while production deficits of France and Germany, two major European producers reach 4.5% and 4.4%, respectively. A positive note is the good performance of Iran (+8.8%)

after a series of unfavorable seasons. Although they trade only litlle, the major producers of wheat are China and India. Both underwent a drop in production that was only minor in China (-0.1%, equivalent to just 80 thousand tonnes) but more significant in India (-2.3%, equivalent to 2.1 million tonnes). This is more than compensated by rice in India and by maize in China.

The production drop among major exporters (Table 5.2; −5.7 % for the top 3 exporters and −7.1 for the top 5) is more significant than the global production drop in wheat (-2.6%). The top 10 importers did rather well as a group (+1.2%), among others due to the presence of Iran and Mexico.

Soybean

Soybean is the crop for which the difference between the trend-based projection for 2018 and the value simulated by CropWatch (table 5.1) is the largest, reaching 6.5% (forecast -1.4%; projected 5.1%), the second largest discrepancy occurring for wheat (4.0%, resulting from a forecast -2.6% and a projection of 1.4%). This underlines the fact that the current behavior of Soybean somehow departs from optimistic expectations. With the exception of China, all the major Soybean producers undergo a drop compared to 2017, most notably Canada and India (both at 5.3%) but especially Argentina (7.6) due to unfavourable weather. China reversed the decade long negative production trend by adopting a new agricultural policy.

Soybean is also the crop for which importers did particularly well in 2018, increasing output by 6.1% among the top ten importers. This results, again, from the production increase in China.

Table 5.1. CropWatch productions estimates, thousands tons

	Maize		Rice		Wheat		Soybean	
	Production 2018 (ktons)	% change from 2017	Production 2018 (ktons)	% change from 2017	Production 2018 (ktons)	% change from 2017	Production 2018 (ktons)	% change from 2017
Afghanistan	322	0.6	265	-16.7	3353	-21.7		
Angola	2791	4.1	72	13.1	4	1.9	20	12.0
Argentina	28084	-6.2	1689	-5.6	15674	-1.4	47214	-7.6
Australia	476	-0.7	490	-29.3	21456	-12.8	80	3.0
Bangladesh	2337	4.1	48063	6.2	1448	7.7	112	9.3
Belarus	280	-46.0			2768	0.1		
Brazil	85482	1.7	11666	2.8	8205	1.1	96311	-0.4
Cambodia	196	-42.0	9093	3.4			186	9.6
Canada	11387	-4.2			30741	0.2	5183	-5.3
China	195512	0.9	196406	-2.1	121528	-0.1	14203	3.3
Egypt	5774	-2.4	6358	-2.9	10790	-1.6	44	12.5
Ethiopia	6679	-6.6	160	6.8	4021	-3.8	111	6.3
France	14359	-1.5	51	-19.5	36333	-4.5	430	19.2
Germany	4621	-2.8			26885	-4.4	50	22.3
Hungary	5976	9.0	9	-5.8	5022	-4.1	171	12.3
India	18920	-0.6	173270	6.2	91374	-2.3	11514	-5.3
Indonesia	17769	-0.1	66675	-2.5			1017	4.9
Iran	728	-27.6	2338	2.9	13851	8.8	147	2.5
Italy	6072	4.4	2527	4.9	7295	1.3	1388	14.3
Kazakhstan	888	8.2	1522	0.6	16287	-1.9	283	6.3
Kenya	3483	16.1	467	6.8	156	-10.5	2	-7.0
Mexico	24315	1.9	121	-4.7	3589	9.3	565	12.0
Mongolia			278	10.5	258	11.6		

	Maize		Rice		Wheat		Soybean	
	Production 2018 (ktons)	% change from 2017	Production 2018 (ktons)	% change from 2017	Production 2018 (ktons)	% change from 2017	Production 2018 (ktons)	% change from 2017
Morocco	47	-0.6			7043	-0.8	1	0.0
Mozambique	2085	2.2	62	12.4	19	-2.5		
Myanmar	1661	-2.4	41	-40.4	126	-8.5	131	6.6
Nigeria	10736	-3.8	4532	-3.2	13	-66.0	656	-1.5
Pakistan	4410	-10.1	10119	2.2	24004	-1.2		
Philippines	7236	-5.1	20033	-0.8			1	-2.8
Poland	4877	2.1			10117	-7.4	11	29.6
Romania	13878	15.8	36	-9.3	7512	-2.1	320	14.9
Russia	10476	-18.3	1091	1.7	52815	-10.3	3609	10.7
South Africa	13827	-2.4	3	0.4	1546	-1.9	1036	3.4
Sri Lanka	333	9.8	2494	-0.2			9	13.3
Thailand	5461	9.2	41450	7.7	1	3.4	11	-4.8
Turkey	6469	2.8	914	0.2	18794	-2.0	203	5.2
Ukraine	28630	-8.8			21043	-7.1	5280	9.3
United Kingdom					14279	-1.7		
United States	371118	0.3	12653	15.7	52657	-3.9	108728	-0.8
Uzbekistan	568	8.1	391	7.1	6141	-4.7		
Vietnam	5002	-2.2	45678	0.6			89	-10.8
Zambia	2367	-1.1	19	-21.9	167	-15.2	137	-15.5
Major producers	**925634**	**-0.2**	**661035**	**1.9**	**637315**	**-3.2**	**299252**	**-1.4**
Others	**85766**	**1.4**	**66301**	**0.3**	**65123**	**0.5**	**20610**	**6.4**
Total	**1011400**	**-0.1**	**727336**	**1.7**	**702438**	**-2.4**	**319862**	**-1.0**

Rice

A major observation is the generalized drop in rice production in South-East Asia, starting with Cambodia (-2.2%), Indonesia (-1.1%), Thailand (-5.2%) and Vietnam (-1.4%). It is not evident what caused the drop, although reduced sunshine may have played a part. The countries also have in common a climate with equatorial tendencies ("all year round wet") and they experienced generally cooler than average temperature during the previous reporting period. Countries further to the north (Bangladesh, India, Myanmar, Philippines) have generally a more marked dry season during the northern hemisphere winter and dry-season irrigation is more common. In the four listed countries rice output increased by 3.2%, 2.6%, 1.5% and 3.8%, respectively.

Argentina produces about twenty times less rice than maize, but the crop is mentioned here because of the poor performance of rice (-15.3%). Argentina faces a historically poor agricultural season as next to rice, maize and soybean performed poorly and will affect the country's export capacity.

Wheat

Good actual satellite data are available for northern hemisphere wheat. Some of the southernmost countries (India, Pakistan, Bangladesh, and Nigeria) have reached or completed harvest, while the high latitudes will harvest from early to late summer, depending on location. Thus is also to say that unfavorable crops in the second group may improve if spring (May onwards) precipitation provides moisture that was short during dormancy. Reductions in production exceeding 5% occurred on all continents, and include some of the major global producers such as Canada (-13.0%) and the United States (-13.5%) due to unfavorable weather including poor sunshine, drought and floods and cold waves. Other major producers such as India, Kazakhstan and Russia suffered a drop in production reaching 6.3%, 12.9% and 7.9%, respectively. It is mostly the poor performance of the large global producers of wheat that are responsible for the global drop of production mentioned above (-3.2%).

Countries with positive outcomes include Bangladesh (+7.7%, a relative new comer to wheat cultivation), Iran and Turkey (+6.2% and +7.9%, in both countries the first favorable crop after a run of bad or mixed seasons), Belarus, Poland and Romania (+9.7%, +11.9% and +6.5%, respectively), Egypt (+7.0%) where the good rice crop is to be added to increased maize and rice productions.

Soybean

In the northern hemisphere the crop is just past emergence or is still to be planted, so that only Argentina and Brazil can be meaningfully mentioned here. Similar to maize and rice, the Argentinian Soybean crop is down (-8.2%) while, in comparison, Brazil did well (+0.8%).

Major importers and exporters

Table 5.2 shows the performance of the major importers and exporters of maize, rice as paddy, wheat and soybeans according to the data in table 5.1. 14 additional countries are part of the top ten importers or exporters. They are listed in the note to Table 5.2.

Overall, the top 5 importers and the top 10 importers increased their production over 2018. For the top 10 importers, the increased volume of the output varies from 452 kTonnes (Wheat) to 3629 kTonnes for maize. The values are shown with a minus sign as they correspond to reduced demand on the international markets. As a group, their performance was slightly below that of the majority of countries (last line in table 5.1) for maize (+1.6% vs. +1.6% for the world) and for rice (+0.3% vs. +0.6%). For wheat and for Soybean (if the northern hemisphere output turns out to be “average”), they did significantly better for wheat (1.3% vs. -3.2% globally) and for soybean (3.8% vs. -0.1% globally). As a result, the demand will probably be comparable or slightly above last year’s by a couple of percent representing population growth.

Since the top exporters dominate the production landscape, the percentage change in their output closely follows table 5.1: +1.8% for maize in both the top 10 exporters and the total of all countries, 0.7% Vs 0.6% (top 10 exporters Vs global) for rice and -0.4% Vs. -0.1% for Soybean. Some difficulties may arise with wheat supply if the situation does not improve in the USA and Canada as the projected production deficit of the top 10 exporters reaches just above 17 million tonnes.

Table 5.2. 2017-2018 percent variation in production of the top 3, 5 and 10 exporters and importers.

	Maize		Rice		Wheat		Soybean	
	Exporters	Importers	Exporters	Importers	Exporters	Importers	Exporters	Importers
Top3	0.1	1.9	5.4	−2.1	−5.7	−3.1	−2.0	3.8
Top5	−0.5	0.3	5.7	−2.1	−7.1	−0.8	−2.2	3.8
Top10	−0.3	−0.7	5.5	−2.2	−4.9	1.2	3.9	6.1

Note: in addition to the countries listed in Table 5.2, the following countries belong to the group of major importers and exporters: Algeria, Bolivia, Colombia, Côte d'Ivoire, Iraq, Japan, Malaysia, Netherlands, Paraguay, Republic of Korea, Saudi Arabia, Spain, United Arab Emirates and Uruguay. Their 2017 and 2017 production of the reference crops are trend-based.

[Footnote 1] "Minor producers" include the 142 countries from Albania and Algeria to Yemen and Zimbabwe that are not included in the table of44 "major producers"

[Footnote 2] 2017 was first estimated based on 2012-16 data, then 2018 based on 2013-17 data.

5.2 Disaster events

The latest Crop Prospects and Food Situation Report issued by FAO on 7 June 2018, confirms that food production is mostly satisfactory. In Cabo Verde and Senegal, unfavorable weather is the main trigger of the poor food situation. According to the East African, the drought in Cabo Verde is the worst since 1977.

Volcanic eruptions

Volcanic eruptions in January on Kadovar Island (Papua New-Guinea) led people to Dandan in east Sepik province where they were still in need of assistance by late May. In Guatemala, the eruption of the Fuego Volcano at the beginning of June affected over 1.7 million people in Sacatepéquez, Escuintla, and Chimaltenango departments. 197 people went missing, 109 were killed and 58 injured, according to early reports. Some 12,407 people have been evacuated and over 4,000 are living in emergency shelters. The volcano produced pyroclastic flows and mud flows which also damaged and destroyed crops. This adds stress to farmer communities which suffered several years of drought: Some sources indicate that more than 100,000 families have lost their maize and bean crops this year.

Drought

Drought is reported from several areas across all continents. In Africa, Cabo Verde and Senegal were already mentioned above. Neighboring Sahelian areas in Burkina Faso, Chad, Mali, Mauritania, Niger are affected as well and have experienced losses of crops and livestock. Unrest and rising food prices contribute to a deteriorating food security situation, the worst since 2012.

In Asia, at the end of July, it was estimated that across Afghanistan, drought was affecting the health and nutrition situation of an estimated 4.2 million people, which was ranked as a severe humanitarian crisis resulting from the combination of insecurity and poor water supply. The Assessment Capacities Project (ACAPS), a major source of information on disasters, estimated that 3,300,000 people were in acute need of assistance with 1,900,000 in acute need of food security assistance.

In South America, the Uruguayan Ministry of Livestock, agriculture and fisheries declared an emergency at the end of June, especially in the Department of Tacuarembó. Altogether 14 Departments are affected by drought in the north of the country.

Floods

Floods in the Horn of Africa and surrounding regions started in April in Tanzania, Rwanda, Kenya, Ethiopia and especially Somalia. By mid-May, about a quarter million of people had been displaced but about 700,000 were affected. Settlements of Internally Displaced Persons (IDPs) were most badly affected through deteriorating sanitary situations.

During mid-July, damaging rainfall was also reported from parts of Niger and neighboring Nigeria. About 600 houses were damaged and about 50 people died. Close to 200000 people were affected.

In Asia, according to ACAPS, heavy rainfall was recorded in India (Tripura) and in north-eastern Bangladesh since 12 June; river water levels rose rapidly because of upstream flooding in India. The districts of Moulvibazar and Sylhet suffered most, where crops and infrastructure were destroyed. At least 700,000 people have been affected, and over 12,000 had to move to temporary shelters in Moulvibazar. In various areas of neighboring Myanmar, more than 120,000 people had been displaced due to flooding by late July. In Mongolia, floods occurred in the western part of the country from mid-July.

Floods were also reported for Sri Lanka around 20 May and in Tajikistan during the first days of June, but widest international coverage was received by the release of 5 billion cubic meters of water from a dam under construction by an international consortium in Champasak province in Laos. Most damage, however occurred downstream in Attapeu province. The collapse was contemporary with excess precipitation brought about by tropical storm Son-Tinh in the last days of July, although the causality links are not very clear. Hundreds of houses were damaged. More than thousand people are missing and 34 are confirmed dead. A United Nations report on the disaster mentions that about 12000 people in 357 villages are affected.

Figure 5.1. A Cambodian couple and their dog: News of Laos Dam Failure Didn't Reach Them, but the Water Did. Source: https://www.nytimes.com/2018/08/01/world/asia/laos-cambodia-dam-flooding.html

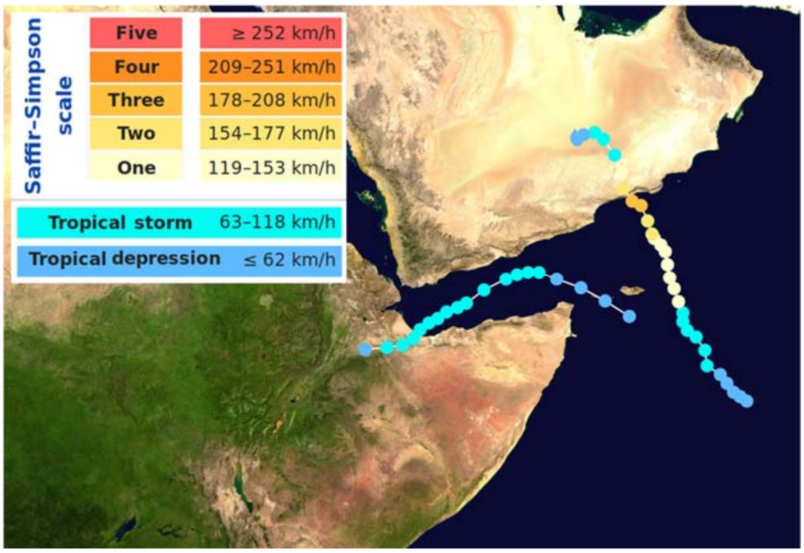
According to the Emergency Operations Centre of ASEAN, the flash-flood [that] occurred in Attapue Province [was] caused by water discharge from Xepien-Xenamnoyu Dam, due to heavy rainfall along Xe Pian River (these events took place while the monsoon season is ongoing.) Interestingly, the disaster provides an illustration of the failure of taking into account clear warning signals that became visible several days before the dam collapsed, but also the lack of warnings issued to the population due to poor cell-phone coverage in a mostly forested area (figure X1).

Cyclones

The situation of cyclones was relatively calm during the reporting period. It is in order to mention a tropical storm and a cyclone that developed in the north-western Indian Ocean, making landfall in the Horn of Africa (Somalia) and in the Arabian Peninsula in areas where their occurrence is rare.

Somalia is one of the countries that has been badly affected by political unrest and displaced persons for many years now. Between 16 and 20 May, the situation was made worse by the occurrence of a Tropical storm, Sagar, which affected N. Somalia and Djibouti. According to Wikipedia, Sagar caused deadly flash flooding that washed away roads (in particular two main roads connecting Gedo with Mogadishu and Kismayo), bridges, homes, and thousands of farm animals and crops (50,000 Ha inundated just before harvesting). Wells were contaminated by floodwater. This has led to a surge in water and vector borne diseases. The timing of flood recession crops [XXXX see note below for translators] is delayed due to high water levels and, as a result, replanting declined.

Figure 5.2. Tracks of tropical storm Sagar (16-20 May, western track) and cyclone Mekunu (21-27 May, eastern track) with the maximum wind speed. The Saffir-Simpson scale applies only to tropical cyclones. Figure based on Wikipedia.



Sagar was followed a week later by cyclone Mekunu which struck Socotra Island and the southern coast of Yemen, confirming the increasing frequency of cyclones in the north-western Indian Ocean. Stored food and fishing vessels were damaged or lost. Cyclonic Storm Sagar, which also hit Yemen, Djibouti and Ethiopia was the strongest tropical cyclone to ever make landfall in Somalia in recorded history.

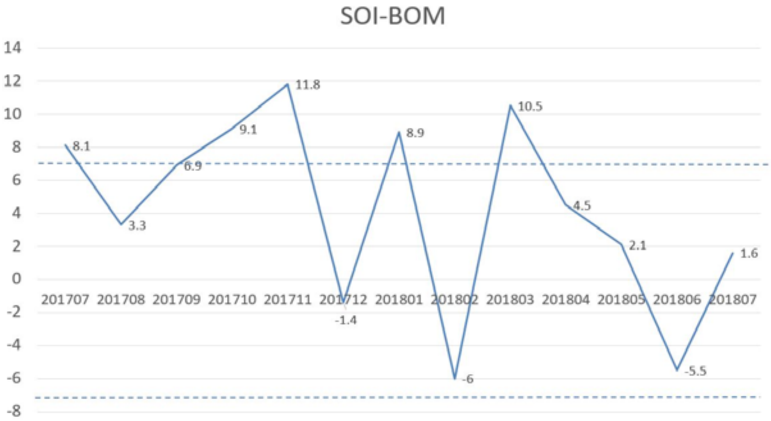
About 20 storms of various strengths developed in the Pacific Ocean during the reporting period. While many contributed rain to continental and maritime south-east Asia and to Eastern Asia, little damage is reported but for Son-Tinh (known as “Henry” in the Philippines). Between 15 and 24 July, this relatively weak tropical cyclone skimmed past the northern coast of Luzon, making landfall in Cagayan, then crossed Hainan, created a lot of havoc in Vietnam, remained over land again in Hainan and eventually died over the Himalayan foothills in China. In Vietnam the storm caused severe floods and mudslides leading to the death of about 30 people. Over 82,000 hectares (200,000 acres) of agricultural land was inundated and at least 17,000 farm animals were swept away by the floods. More than 100 houses have been destroyed and 4,000 have been flooded in the north and centre of the country. The Mekong River Commission has reported significant increase of water levels in the whole Mekong River area due to tropical storm Son-Tinh.

5.3 Update on El Niño

El Nino conditions have been neutral across the Pacific Ocean during the second quarter of 2018. Figure 5.3. Illustrates the behavior of the standard Southern Oscillation Index (SOI) of the Australian Bureau of Meteorology (BOM) from July 2017 to July 2018. Sustained positive values of the SOI above +7 typically indicate La Niña while sustained negative values below −7 typically indicate El Niño. Values between about +7 and −7 generally indicate neutral conditions.

During the current season, SOI decreased slightly from +4.5 in April to +2.1 in May, further to -5.5 in June, however, it increased to +1.6 in July again. The overall fluctuation of SOI between +7.0 and -7.0 indicates a neutral state of El Niño.

Figure 5.3. Monthly SOI-BOM time series from April 2017 to July 2018



The sea surface temperature anomalies in July 2018 for NINO3, NINO3.4 and NINO4 regions are +0.5°C, +0.4°C, and +0.4°C in sequence, slightly warmer than 1961-1990 average according to BOM (see Figure 5.4-5.5). Both BOM and NOAA think that the slight warmer condition is within the thresholds of El Niño–Southern Oscillation (ENSO) and their ENSO's outlook remains at El Niño WATCH. CropWatch will keep on monitoring the situation.

Figure 5.4. Map of NINO Region

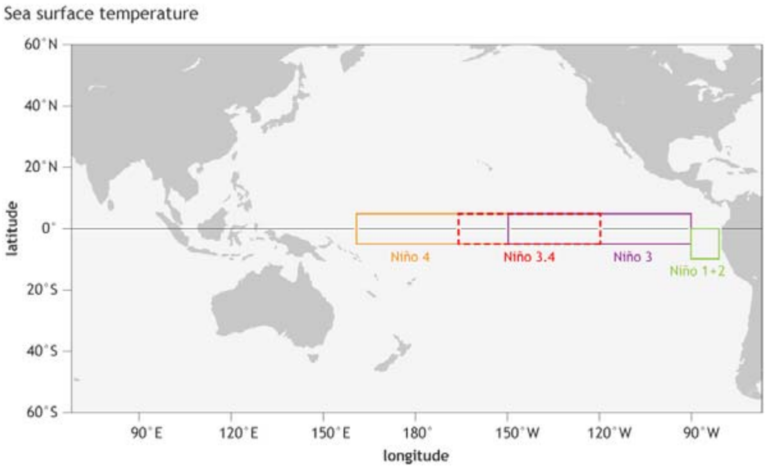
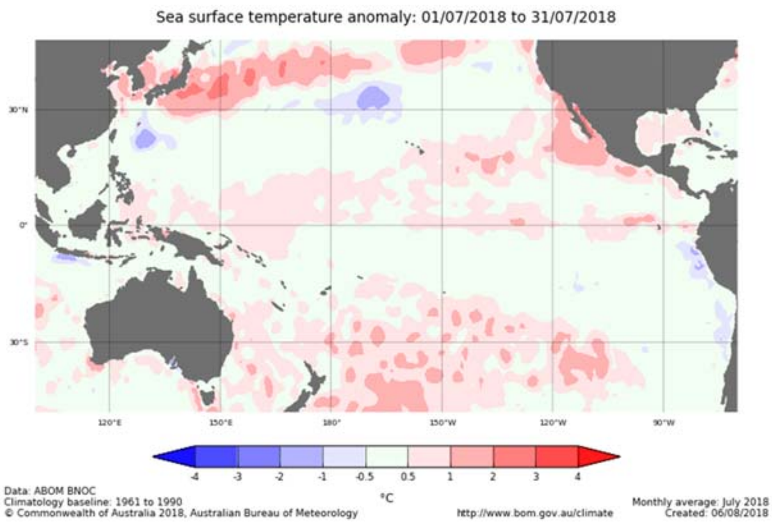


Figure 5.5. July 2018 sea surface temperature departure from the 1961-1990average



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Annex A. Agroclimatic indicators and BIOMSS

Table A.1. April-July 2018 agroclimatic indicators and biomass by global Monitoring and Reporting Unit. All values are averages (TEMP) or totals (RAIN, RADPAR, BIOMSS) over the reporting period

	65 Global MRUs	RAIN Current(mm)	RAIN 15YA dep. (%)	TEMP Current (°C)	TEMP 15YA dep. (°C)	RADPAR Current(MJ/m2)	RADPAR 15YA dep. (%)	BIOMSS Current (gDM/m 2)	BIOMSS 5YA dep. (%)
C01	Equatorial central Africa	364	-3	24.7	-0.1	1056	-2	1109	1
C02	East African highlands	518	-2	20.3	-0.6	1135	-2	1449	0
C03	Gulf of Guinea	660	4	27.5	-0.8	1011	-7	1750	2
C04	Horn of Africa	279	51	22.8	-1.2	1104	-3	756	26
C05	Madagascar (main)	258	29	21.9	-0.5	904	-2	756	26
C06	Southwest Madagascar	67	-4	21.6	-0.5	965	0	270	-1
C07	North Africa-Mediterranean	121	30	20.2	-1.5	1405	-7	442	23
C08	Sahel	424	21	31.2	-0.8	1277	-6	1183	15
C09	Southern Africa	127	36	19.8	-0.2	952	-2	332	9
C10	Western Cape (South Africa)	73	-53	13.7	0.8	681	0	325	-44
C11	British Columbia to Colorado	221	6	11	0.5	1352	-5	850	4
C12	Northern Great Plains	421	13	16.7	-0.2	1319	-1	1276	8
C13	Corn Belt	389	-11	16.2	-0.4	1225	0	1269	-9
C14	Cotton Belt to Mexican Nordeste	439	-5	23.3	-0.4	1288	-2	1326	-2
C15	Sub-boreal America	257	-13	10.7	-0.2	1190	0	1032	-9
C16	West Coast (North America)	92	-23	15.6	0.3	1456	-2	337	-20
C17	Sierra Madre	347	-12	21.1	-0.2	1414	-2	1021	-3
C18	SW U.S. and N. Mexican highlands	129	3	21.5	0.7	1528	-3	495	2
C19	Northern South and Central America	764	-2	26.9	-0.8	1120	0	1641	-5
C20	Caribbean	744	7	26.2	-0.8	1251	-5	1593	-7
C21	Central-northern Andes	362	-8	14.8	-0.3	987	1	837	1
C22	Nordeste (Brazil)	164	-22	26.2	0	1010	0	496	-22
C23	Central eastern Brazil	177	-29	23.6	-0.5	971	4	545	-28
C24	Amazon	659	3	26.7	-0.9	966	1	1451	-3
C25	Central-north Argentina	199	71	16.9	-0.6	701	0	478	28
C26	Pampas	433	5	16.2	0.3	642	-4	1068	3
C27	Western Patagonia	328	-27	5.8	-1.1	461	-4	894	-2
C28	Semi-arid Southern Cone	99	38	9.4	-0.3	656	-2	340	18
C29	Caucasus	197	-14	17.7	0.6	1353	0	761	-12
C30	Pamir area	229	7	17.4	-0.5	1422	-4	700	-2
C31	Western Asia	98	7	23	-0.5	1423	-3	377	3
C32	Gansu-Xinjiang (China)	217	43	17.6	-0.4	1272	-9	730	36
C33	Hainan (China)	1121	53	26.8	-1.3	1102	-6	2003	17
C34	Huanghuaihai (China)	442	10	23	0.4	1067	-15	1277	7
C35	Inner Mongolia (China)	343	24	17.2	0.8	1178	-8	1129	13
C36	Loess region (China)	330	16	18.5	0	1101	-14	1162	11
C37	Lower Yangtze (China)	859	-2	23.9	0.1	1015	-5	1923	1
C38	Northeast China	327	-7	16.6	0.4	1097	-7	1187	1
C39	Qinghai-Tibet (China)	770	8	11.7	0.1	1169	-2	1263	5
C40	Southern China	837	-6	23.9	-0.5	1007	-2	1913	0
C41	Southwest China	638	3	20.8	0	985	-4	1667	2
C42	Taiwan (China)	682	-28	24.4	-0.1	1140	1	1465	-15
C43	East Asia	356	-24	15.5	0.1	1082	-5	1135	-13

C44	**Southern Himalayas**	997	14	26.4	-0.6	1084	-5	1658	5
C45	**Southern Asia**	827	21	29.5	-0.6	1111	-3	1533	13
C46	**Southern Japan and Korea**	682	-8	20	0.6	1100	0	1577	-9
C47	**Southern Mongolia**	364	84	16.3	-0.2	1411	-2	933	37
C48	**Punjab to Gujarat**	446	26	32.2	-0.3	1253	-7	875	13
C49	**Maritime Southeast Asia**	868	-8	25.8	-0.5	972	-2	1921	-7
C50	**Mainland Southeast Asia**	1054	15	27.7	-1.1	1029	-5	1997	2
C51	**Eastern Siberia**	198	-17	9.4	-0.4	1067	-7	890	-11
C52	**Eastern Central Asia**	292	26	11.1	0.2	1140	-8	1050	10
C53	**Northern Australia**	116	-52	24.2	-0.4	1024	3	403	-38
C54	**Queensland to Victoria**	83	-51	12.9	0.3	704	4	366	-42
C55	**Nullarbor to Darling**	164	-23	14	0.1	667	0	586	-20
C56	**New Zealand**	189	-38	9.2	0	451	-4	727	-22
C57	**Boreal Eurasia**	225	-22	11.1	1.9	1115	5	920	-14
C58	**Ukraine to Ural mountains**	237	-4	15.6	0.4	1169	4	975	-5
C59	**Mediterranean Europe and Turkey**	202	23	18	1	1345	-5	745	13
C60	**W. Europe (non Mediterranean)**	275	-5	16.5	1.4	1192	3	1034	-7
C61	**Boreal America**	365	27	6.6	0.2	966	-7	1020	3
C62	**Ural to Altai mountains**	239	11	12.6	-1.8	1139	-6	988	10
C63	**Australian desert**	73	-24	14.5	0.2	742	5	342	-20
C64	**Sahara to Afghan deserts**	75	63	29.1	-0.6	1478	-4	269	42
C65	**Sub-arctic America**	156	62	-6.2	-0.3	537	-3	568	113

Table A.2. April-July 2018 agroclimatic indicators and biomass by country. All values are averages (TEMP) or totals (RAIN, RADPAR, BIOMSS) over the reporting period

42 Countries	42 Countries	RAIN Current (mm)	RAIN 15YA Departure (%)	TEMP Current (°C)	TEMP 15YA Departure (°C)	RADPAR Current (MJ/m2)	RADPAR 15YA Departure (%)	BIOMSS Current (gDM/m2)	BIOMSS 5YA Departure (%)
AFG	Afghanistan	55	-30	20.2	-0.5	1529	-3	184	-32
AGO	Angola	147	20	22.9	1.7	1087	-3	413	24
ARG	Argentina	396	79	14.4	-0.1	610	-7	829	33
AUS	Australia	94	-45	14	0.2	728	3	399	-36
BGD	Bangladesh	1781	23	28.2	-1.4	947	-7	2444	13
BLR	Belarus	288	5	16.4	1.4	1129	4	1108	-4
BRA	Brazil	308	-16	24.1	-0.4	958	2	776	-18
CAN	Canada	245	-18	11	-0.1	1214	1	978	-10
CHN	China	633	1	21	0.1	1049	-6	1423	5
DEU	Germany	194	-33	16.9	1.8	1198	9	834	-28
EGY	Egypt	11	49	24.7	0.5	1553	-3	57	47
ETH	Ethiopia	532	-9	21.5	-0.4	1162	0	1521	-2
FRA	France	266	-1	16.3	1.7	1205	0	1007	-3
GBR	United Kingdom	251	-15	13.1	1.6	1053	4	1006	-13
HUN	Hungary	343	21	19.4	1.3	1235	3	1234	12
IDN	Indonesia	858	-10	25.7	-0.6	949	-2	1851	-8
IND	India	808	17	29.7	-0.4	1146	-4	1377	10
IRN	Iran	75	-10	21.7	-0.4	1424	-5	300	-2
ITA	Italy	287	16	19.4	0.5	1269	-4	999	11
KAZ	Kazakhstan	193	10	14.7	-1.6	1229	-3	804	8
KEN	Kenya	508	48	20.8	-1.2	1055	-5	1194	20
KHM	Cambodia	857	-1	28.4	-1.4	1053	-6	2064	-1
LKA	Sri_Lanka	704	45	27.7	-0.9	1099	-4	1403	18
MAR	Morocco	91	22	18.2	-2.3	1417	-8	329	11
MEX	Mexico	401	-9	24.6	-0.4	1372	-2	989	-3
MMR	Myanmar	1221	20	26.6	-0.8	981	-5	1973	5
MNG	Mongolia	307	40	11.3	0.5	1231	-5	1089	18

42 Countries	42 Countries	RAIN Current (mm)	RAIN 15YA Departure (%)	TEMP Current (°C)	TEMP 15YA Departure (°C)	RADPAR Current (MJ/m2)	RADPAR 15YA Departure (%)	BIOMSS Current (gDM/m2)	BIOMSS 5YA Departure (%)
MOZ	Mozambique	164	61	22.9	-0.6	926	-2	448	31
NGA	Nigeria	678	10	28.5	-0.8	1066	-8	1691	6
PAK	Pakistan	240	5	27.9	-0.6	1352	-7	593	2
PHL	Philippines	871	-5	26.7	-0.5	1123	-2	1901	-3
POL	Poland	238	-12	16.8	1.8	1172	8	928	-17
ROU	Romania	369	14	17.7	0.9	1231	1	1253	5
RUS	Russia	241	-1	13.9	-0.4	1143	-1	1002	-1
THA	Thailand	839	11	27.6	-1.2	1050	-5	1990	4
TUR	Turkey	257	37	18.2	1	1402	-1	892	17
UKR	Ukraine	246	0	18.2	1.1	1240	6	946	-6
USA	United States	396	1	19	-0.2	1301	-2	1151	2
UZB	Uzbekistan	115	5	21.8	-0.5	1414	-2	425	2
VNM	Vietnam	926	11	26.5	-0.8	1024	-6	1967	1
ZAF	South Africa	69	-19	14	0.1	834	-1	298	-15
ZMB	Zambia	76	23	21	-0.4	1060	-3	256	17

Table A.3. Argentina, April-July 2018 agroclimatic indicators and biomass (by province). All values are averages (TEMP) or totals (RAIN, RADPAR, BIOMSS) over the reporting period

	RAIN Current (mm)	RAIN 15YA Departure (%)	TEMP Current (°C)	TEMP 15YA Departure (°C)	RADPAR Current (MJ/m2)	RADPAR 15YA Departure (%)	BIOMSS Current (gDM/m2)	BIOMSS 5YA Departure (%)
Buenos Aires	397	81	11.9	0.3	503	-14	1070	46
Chaco	493	90	18.1	-0.1	720	4	809	8
Cordoba	232	92	13.3	-0.3	583	-13	647	48
Corrientes	529	24	17.5	-0.1	672	-2	1208	6
Entre Rios	637	93	15.1	0.1	575	-11	1265	37
La Pampa	216	62	11.6	0.1	518	-15	687	43
Misiones	315	-54	18.6	0.4	727	2	1034	-35
Santiago Del Estero	376	281	16.5	-0.3	671	-3	588	65
San Luis	166	57	11.4	-0.5	597	-11	512	28
Salta	211	201	16.4	-0.5	779	4	484	103
Santa Fe	684	193	15.7	0.1	611	-8	988	39
Tucuman	59	-13	14.7	-0.4	751	2	242	1

Table A.4. Australia, April-July 2018 agroclimatic indicators and biomass (by state).All values are averages (TEMP) or totals (RAIN, RADPAR, BIOMSS) over the reporting period

	RAIN Current (mm)	RAIN 15YA Departure (%)	TEMP Current (°C)	TEMP 15YA Departure (°C)	RADPAR Current (MJ/m2)	RADPAR 15YA Departure (%)	BIOMSS Current (gDM/m2)	BIOMSS 5YA Departure (%)
New South Wales	73	-56	12.7	0.5	736	6	311	-48
South Australia	113	-33	13	0.2	613	3	472	-28
Victoria	120	-41	11	0.1	545	0	509	-32
W. Australia	154	-24	14.8	0.1	702	1	561	-20

Table A.5. Brazil, April-July 2018 agroclimatic indicators and biomass (by state). All values are averages (TEMP) or totals (RAIN, RADPAR, BIOMSS) over the reporting period

	RAIN Current (mm)	RAIN 15YA Departure (%)	TEMP Current (°C)	TEMP 15YA Departure (°C)	RADPAR Current (MJ/m2)	RADPAR 15YA Departure (%)	BIOMSS Current (gDM/m2)	BIOMSS 5YA Departure (%)
Ceara	317	-2	27.3	-0.2	1072	-1	882	-9
Goias	169	8	23.4	-0.9	1065	4	520	0
Mato Grosso Do Sul	150	-53	23.4	-0.2	936	5	516	-48
Mato Grosso	209	-4	25.7	-1.1	1055	4	638	-10
Minas Gerais	96	-30	21.8	-0.2	942	1	365	-26
Parana	171	-70	20.1	1.1	823	6	601	-58
Rio Grande Do Sul	534	-8	16.9	0.5	644	-4	1519	1
Santa Catarina	285	-51	17	0.7	721	4	954	-35
Sao Paulo	85	-71	21.7	0.6	906	5	369	-61

Table A.6. Canada, April-July 2018 agroclimatic indicators and biomass (by province). All values are averages (TEMP) or totals (RAIN, RADPAR, BIOMSS) over the reporting period

	RAIN Current (mm)	RAIN 15YA Departure (%)	TEMP Current (°C)	TEMP 15YA Departure (°C)	RADPAR Current (MJ/m2)	RADPAR 15YA Departure (%)	BIOMSS Current (gDM/m2)	BIOMSS 5YA Departure (%)
Alberta	220	-17	11.2	0	1228	-2	933	-12
Manitoba	236	-22	12.4	0.2	1269	3	965	-17
Saskatchewan	201	-24	11.8	0.1	1253	1	850	-19

Table A.7. India, April-July 2018 agroclimatic indicators and biomass (by state). All values are averages (TEMP) or totals (RAIN, RADPAR, BIOMSS) over the reporting period

	RAIN Current (mm)	RAIN 15YA Departure (%)	TEMP Current (°C)	TEMP 15YA Departure (°C)	RADPAR Current (MJ/m2)	RADPAR 15YA Departure (%)	BIOMSS Current (gDM/m2)	BIOMSS 5YA Departure (%)
Andhra Pradesh	509	16	30.9	-0.6	1153	-3	1263	6
Assam	1690	5	28.6	0	973	6	2347	-6
Bihar	697	2	30.7	-1.4	1157	-5	1376	-3
Chhattisgarh	825	20	30.3	-0.7	1143	-2	1630	17
Daman and Diu	975	28	29.5	-0.5	1209	-2	950	-1
Delhi	510	58	32.7	-0.3	1214	-10	1140	18
Gujarat	475	-3	31.8	0.1	1267	-1	760	-6
Goa	1015	-23	26.3	-0.5	999	-2	1790	9
Himachal Pradesh	632	6	17	0.7	1285	-8	1326	6
Haryana	435	34	31.6	-0.5	1211	-11	1150	19
Jharkhand	790	16	29.7	-1.1	1140	-6	1781	20
Kerala	1330	18	25.8	-0.9	904	-4	2350	13
Karnataka	723	11	26.6	-0.8	1063	-4	1512	12
Meghalaya	2351	0	24.6	-0.3	936	-1	2463	2
Maharashtra	776	13	30.1	-0.1	1151	-2	1323	11
Manipur	1019	0	22.8	-0.2	973	-3	2005	-4
Madhya Pradesh	809	36	31.8	-0.1	1204	-2	1286	16
Mizoram	1838	30	23.3	-1.2	990	-5	2266	1
Nagaland	1404	10	22.4	0.3	991	1	2185	-2
Orissa	928	23	29.7	-0.8	1103	-4	1922	19
Puducherry	121	-48	31	-0.3	1249	-1	537	-17
Punjab	378	16	30.6	-0.3	1219	-11	1120	20

	RAIN Current (mm)	RAIN 15YA Departure (%)	TEMP Current (°C)	TEMP 15YA Departure (°C)	RADPAR Current (MJ/m2)	RADPAR 15YA Departure (%)	BIOMSS Current (gDM/m2)	BIOMSS 5YA Departure (%)
Rajasthan	498	60	33.1	-0.3	1242	-9	921	20
Sikkim	985	-16	12.5	-1.7	1055	-14	1242	-10
Tamil Nadu	388	14	29.5	-0.6	1184	-3	1170	7
Tripura	2270	29	27.1	-1.3	932	-4	2595	8
Uttarakhand	763	4	20.4	0.2	1239	-5	1381	5
Uttar Pradesh	696	33	32.1	-0.3	1217	-6	1214	8
West Bengal	1279	21	29.7	-1.1	1044	-7	2249	19

Table A.8. Kazakhstan, April-July 2018 agroclimatic indicators and biomass (by province) .All values are averages (TEMP) or totals (RAIN, RADPAR, BIOMSS) over the reporting period

	RAIN Current (mm)	RAIN 15YA Departure (%)	TEMP Current (°C)	TEMP 15YA Departure (°C)	RADPAR Current (MJ/m2)	RADPAR 15YA Departure (%)	BIOMSS Current (gDM/m2)	BIOMSS 5YA Departure (%)
Akmolinskaya	182	10	13	-2.2	1153	-6	820	10
Karagandinskaya	200	16	13	-2	1226	-2	902	15
Kustanayskaya	149	-5	14	-2.1	1180	-3	670	-5
Pavlodarskaya	212	30	13.5	-2.3	1121	-8	952	31
Severo kazachstanskaya	231	13	12.5	-2.3	1082	-8	979	10
Vostochno kazachstanskaya	242	14	12.7	-1.2	1282	-2	956	13
Zapadno kazachstanskaya	94	-18	18.1	-0.5	1288	4	482	-13

Table A.9. Russia, April-July 2018 agroclimatic indicators and biomass (by oblast).All values are averages (TEMP) or totals (RAIN, RADPAR, BIOMSS) over the reporting period

	RAIN Current (mm)	RAIN 15YA Departure (%)	TEMP Current (°C)	TEMP 15YA Departure (°C)	RADPAR Current (MJ/m2)	RADPAR 15YA Departure (%)	BIOMSS Current (gDM/m2)	BIOMSS 5YA Departure (%)
Bashkortostan Rep.	230	2	13	-1.4	1136	-2	1029	6
Chelyabinskaya Oblast	211	-5	12.4	-1.9	1090	-5	956	0
Gorodovikovsk	306	5	21	1.1	1352	10	1063	-7
Krasnodarskiy Kray	188	-31	15.4	0.2	1196	0	844	-23
Kurganskaya Oblast	223	2	12.2	-2.2	1079	-6	1010	8
Kirovskaya Oblast	298	15	12.3	-1	1075	-1	1188	9
Kurskaya Oblast	227	-1	16.5	0.2	1202	5	959	-4
Lipetskaya Oblast	209	-5	16	0.2	1201	5	929	-4
Mordoviya Rep.	201	-15	14.8	-0.3	1169	3	909	-11
Novosibirskaya Oblast	295	37	11.3	-2	1069	-8	1220	31
Nizhegorodskaya O.	223	-11	14.3	-0.2	1132	3	962	-9
Orenburgskaya Oblast	136	-16	15.2	-1	1231	2	656	-10

	RAIN Current (mm)	RAIN 15YA Departure (%)	TEMP Current (°C)	TEMP 15YA Departure (°C)	RADPAR Current (MJ/m2)	RADPAR 15YA Departure (%)	BIOMSS Current (gDM/m2)	BIOMSS 5YA Departure (%)
Omskaya Oblast	239	8	11.4	-2.1	1063	-7	1029	7
Permskaya Oblast	297	9	11.6	-1.2	1052	-4	1251	10
Penzenskaya Oblast	193	-13	15.1	-0.4	1174	2	867	-11
Rostovskaya Oblast	181	-12	19.5	0.6	1323	9	756	-15
Ryazanskaya Oblast	195	-19	15.4	0.2	1173	5	882	-15
Stavropolskiy Kray	200	-23	20.5	1	1321	8	847	-20
Sverdlovskaya Oblast	262	0	11.5	-1.7	1049	-5	1122	3
Samarskaya Oblast	144	-25	15.1	-0.8	1217	3	687	-19
Saratovskaya Oblast	156	-7	16.8	-0.4	1237	4	683	-11
Tambovskaya Oblast	204	-6	15.8	0	1191	4	922	-4
Tyumenskaya Oblast	218	-8	11.5	-2	1076	-5	971	-4
Tatarstan Rep.	215	0	13.8	-1.2	1155	0	915	-2
Ulyanovskaya Oblast	180	-14	14.9	-0.6	1190	3	793	-14
Udmurtiya Rep.	284	16	12.4	-1.3	1079	-3	1172	12
Volgogradskaya O.	174	8	18.6	0	1269	5	679	-8
Voronezhskaya Oblast	217	9	17.1	0.4	1211	4	897	1

Table A.10. United States, April-July 2018 agroclimatic indicators and biomass (by state). All values are averages (TEMP) or totals (RAIN, RADPAR, BIOMSS) over the reporting period

	RAIN Current (mm)	RAIN 15YA Departure (%)	TEMP Current (°C)	TEMP 15YA Departure (°C)	RADPAR Current (MJ/m2)	RADPAR 15YA Departure (%)	BIOMSS Current (gDM/m2)	BIOMSS 5YA Departure (%)
Arkansas	440	-14	23	-0.2	1308	0	1523	1
California	79	-7	17	0.3	1569	-2	268	-10
Idaho	188	18	12.5	0.2	1404	-5	752	11
Indiana	410	-18	19.1	-0.3	1247	-2	1374	-9
Illinois	456	-7	19.3	-0.5	1277	-2	1401	-5
Iowa	551	5	17.6	-0.6	1276	-2	1499	-2
Kansas	524	15	20.7	-0.2	1365	-1	1497	11
Michigan	236	-33	14.4	-0.3	1267	0	896	-28
Minnesota	519	33	14.7	-0.6	1273	2	1475	13
Missouri	443	-20	20.9	-0.1	1303	-1	1428	-9
Montana	275	22	12.9	-0.4	1323	-5	1095	18
Nebraska	607	47	17.6	-0.5	1316	-4	1667	25
North Dakota	450	53	14.5	0	1323	2	1447	31
Ohio	407	-10	18.2	-0.3	1210	-3	1451	-2
Oklahoma	486	-2	22.8	-0.4	1373	0	1475	7
Oregon	120	-18	14.2	0.6	1375	-2	552	-7
South Dakota	516	49	16.2	-0.4	1309	-3	1588	31
Texas	268	-22	25.3	0.1	1397	1	914	-12
Washington	111	-23	14.4	0.4	1313	-3	512	-11
Wisconsin	457	3	14.8	-0.6	1260	1	1286	-9

Table A.11. China, April-July 2018 agroclimatic indicators and biomass (by province). All values are averages (TEMP) or totals (RAIN, RADPAR, BIOMSS) over the reporting period

	RAIN Current (mm)	RAIN 15YA Departure (%)	TEMP Current (°C)	TEMP 15YA Departure (°C)	RADPAR Current (MJ/m2)	RADPAR 15YA Departure (%)	BIOMSS Current (gDM/m2)	BIOMSS 5YA Departure (%)
Anhui	730	1	23.8	0.2	1031	-11	1725	2
Chongqing	698	4	21.6	0.3	953	-5	1856	3
Fujian	993	3	23.4	0.3	1037	0	1972	-2
Gansu	928	-14	25.4	-0.2	1021	2	1924	-8
Guangdong	319	21	15.9	0	1125	-11	1023	12
Guangxi	904	-10	24.9	-0.5	971	-1	2107	3
Guizhou	638	-9	21.5	0.3	964	0	1689	-3
Hebei	387	19	20.4	0.5	1106	-13	1224	11
Heilongjiang	464	7	23.3	0.1	1026	-16	1414	9
Henan	348	9	15.9	0.3	1098	-6	1205	7
Hubei	656	-4	22.8	0.2	994	-10	1710	-2
Hunan	771	-6	23.7	0.1	984	-4	1953	2
Jiangsu	310	-17	17.4	0.7	1101	-7	1163	-4
Jiangxi	524	-6	23.1	0.2	1034	-12	1425	-2
Jilin	1032	2	24.7	0.2	1026	-3	2149	4
Liaoning	295	-26	18.8	0.5	1092	-10	1113	-12
Inner Mongolia	328	23	16.5	0.8	1179	-7	1118	15
Ningxia	212	36	17.9	0.2	1182	-13	767	19
Shaanxi	756	32	19.3	0	999	-4	1673	9
Shandong	429	9	22.4	0.3	1090	-14	1240	6
Shanxi	379	6	19.4	-0.1	1045	-14	1218	4
Sichuan	324	11	18.4	0.3	1110	-15	1134	7
Yunnan	563	-2	19.3	-0.7	1045	-3	1569	1
Zhejiang	976	18	23.1	0.3	1020	-5	2050	8

Annex B. 2018 production estimates

Tables B.1-B.5 present 2018 CropWatch production estimates for Argentina, Brazil, Canada, Australia, and the United States.

Table B.1. Argentina, 2018 maize and soybean production, by province (thousand tons)

	Maize		Soybean	
	2018	Δ%	2018	Δ%
Buenos Aires	7063	-8	12693	-7
Córdoba	5658	-23	9250	-22
Entre Rios	1157	-9	3474	-9
San Luis	866	-20		
Santa Fe	4230	-1	9941	-3
Santiago Del Estero	1052	-13		
Sub total	**20026**	**-12**	**35359**	**-11**
Others	8058	14	11855	3
Argentina	**28084**	**-6**	**47214**	**-7**

Δ% indicates percentage difference with 2017.

Table B.2. Brazil, 2018 maize, rice, and soybean production, by state (thousand tons)

	Maize		Rice		Soybean	
	2018	Δ%	2018	Δ%	2018	Δ%
Goias	8725	0			10302	0
Mato Grosso	20109	0			27923	-1
Mato Grosso Do Sul	7138	-8			6900	1
Minas Gerais	6484	2			3430	0
Parana	16096	-1			18163	-1
Rio Grande Do Sul	5113	6	8849	1	14728	8
Santa Catarina	2892	-2	1129	0	1763	-2
Sao Paulo	4020	2			2244	2
Sub total	**70577**	**0**	**9978**	**1**	**85452**	**1**
Others	14905	14	1688	17	10858	-10
Brazil	**85482**	**2**	**11666**	**3**	**96311**	**0**

Δ% indicates percentage difference with 2017.

Table B.3. Canada, 2018 wheat production, by province (thousand tons)

	Wheat	
	2018	Δ%
Alberta	8952	1.5
Manitoba	3512	-5.4
Ontario	1774	-4.7
Saskatchewan	12375	-2.0
Sub total	**26613**	**-1.5**
others	4128	12.9
Canada	**30741**	**0.2**

Δ% indicates percentage difference with 2017.

Table B.4. Australia, 2018 maize and wheat production, by province (thousand tons)

	Wheat	
	2018	Δ%
New South Wales	4053	-32.2
South Australia	2969	-26.9
Victoria	2332	-39.3
Western Australia	11882	14.0

	Wheat	
	2018	Δ%
Sub total	**21236**	**-12.6**
others	220	-26.1
Australia	**21456**	**-12.8**

Δ% indicates percentage difference with 2017.

Table B.5. United States, 2018 maize, rice, wheat, and soybean production, by state (thousand tons)

States	Maize		Rice		Wheat		Soybean	
	2018	**Δ%**	**2018**	**Δ%**	**2018**	**Δ%**	**2018**	**Δ%**
Alabama	1231	2					530	2
Arkansas	2675	-2	6526	17	595	-9	4723	0
California			1857	11	623	-14		
Colorado	3931	4			1763	-5		
Georgia	1456	1			324	1		
Idaho					2473	-14		
Illinois	63809	5			826	-32	16075	5
Indiana	27595	3			521	-31	8756	2
Iowa	58155	-1					13472	-1
Kansas	16185	2			6053	-22	3648	-7
Kentucky	5585	-4			922	-8	2124	-4
Louisiana	1724	-3	1648	7			2225	-1
Maryland					443	-11	589	-8
Michigan	9450	-4			1030	-4	2376	-4
Minnesota	25961	-10			1604	-9	7594	-10
Mississippi	2417	3	893	19	359	-1	3313	1
Missouri	15491	-5	900	31	890	-25	6598	-5
Montana					5423	17		
Nebraska	43743	4			2054	5	8094	3
New York	2523	-4			171	-3		
North Carolina	2715	-1			1186	-1	1938	-1
North Dakota	7413	-5			9492	21	4917	-8
Ohio	14151	-1			942	-24	7046	-1
Oklahoma	1339	2			948	-30		
Oregon					980	-16		
Pennsylvania	3722	-6			220	-18	724	-8
South Carolina					285	1		
South Dakota	18915	0			5104	36	6430	0
Tennessee	3719	-2			705	-7	1993	-3
Texas	6012	-5	546	11	1445	-28		
Virginia	1393	-4			485	-3	690	-3
Washington					2385	-29		

Wisconsin	11811	-9			437	21	2246	0
Sub total	**353120**	**0**	**12371**	**15**	**50689**	**-4**	**106102**	**-1**
Other states	17997	13	282	31	1968	5	2626	11
United States	**371118**	**0**	**12653**	**16**	**52658**	**-4**	**108728**	**-1**

Δ% indicates percentage difference with 2017.

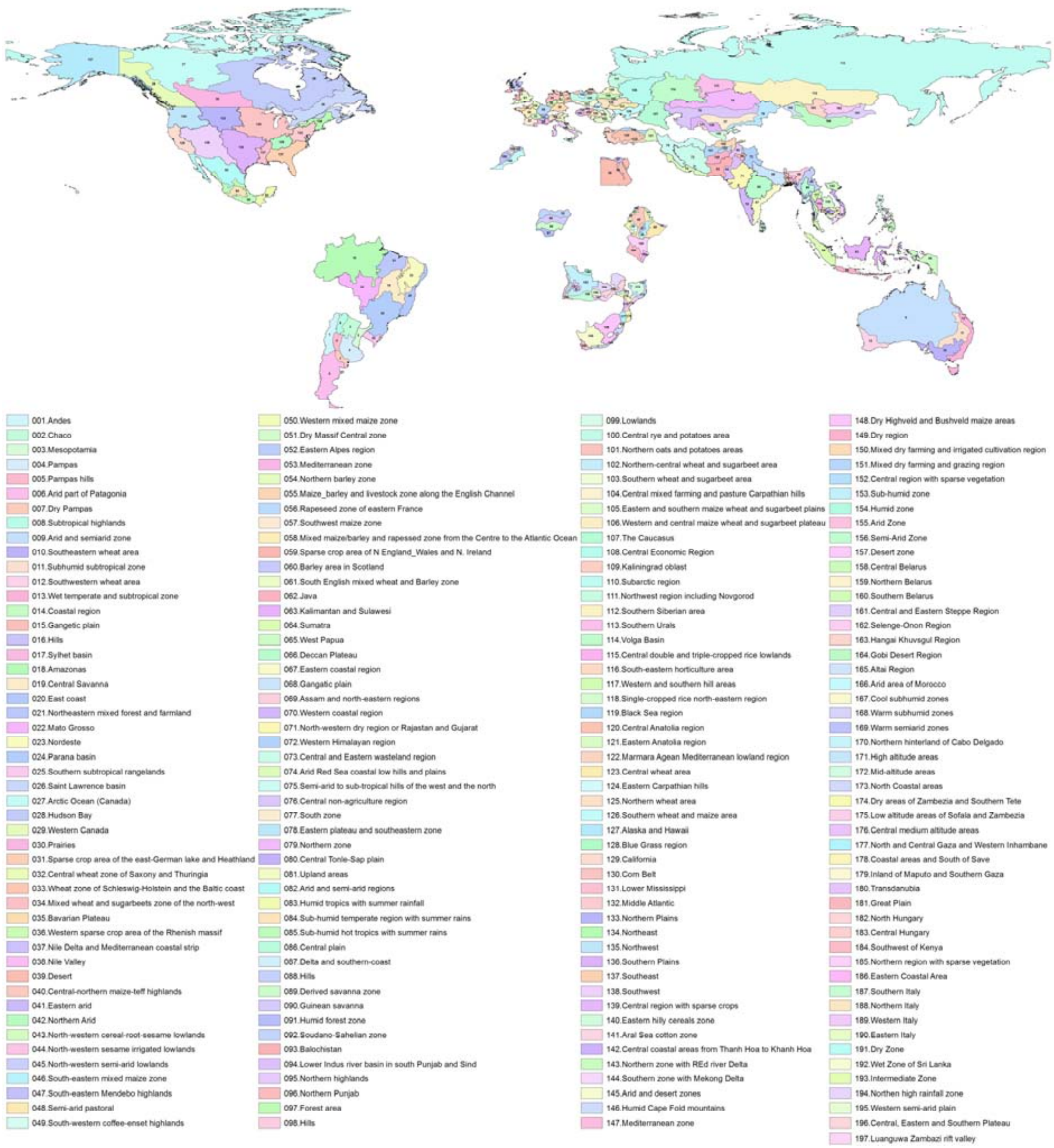
Annex C. Quick reference to CropWatch indicators, spatial units and methodologies

The following sections give a brief overview of CropWatch indicators and spatial units, along with a description of the CropWatch production estimation methodology. For more information about CropWatch methodologies, visit CropWatch online at www.cropwatch.com.cn**.**

Sub-national regions for 31 key countries

Overview

42 key agricultural countries are divided into 197 sub-national regions based on cropping systems, climatic zones, and topographic conditions. Each countries are considered separately. A limited number of regions (e.g., region 001, region 031, and region 122) are not relevant for the crops currently monitored by CropWatch but are included to allow for more complete coverage of the 42 key countries. Some regions are more relevant for rangeland and livestock monitoring which is also essential for food security.



CropWatch indicators

The CropWatch indicators are designed to assess the condition of crops and the environment in which they grow and develop; the indicators—RAIN (for rainfall), TEMP (temperature), and RADPAR (photosynthetically active radiation, PAR)—are not identical to the weather variables, but instead are value-added indicators computed only over crop growing areas (thus for example excluding deserts and rangelands) and spatially weighted according to the agricultural production potential, with marginal areas receiving less weight than productive ones. The indicators are expressed using the usual physical units (e.g., mm for rainfall) and were thoroughly tested for their coherence over space and time. CWSU are the CropWatch Spatial Units, including MRUs, MPZ, and countries (including first-level administrative districts in select large countries). For all indicators, high values indicate "good" or "positive."

INDICATOR			
BIOMSS			
Biomass accumulation potential			
Crop/ Ground and satellite	Grams dry matter/m^2, pixel or CWSU	An estimate of biomass that could potentially be accumulated over the reference period given the prevailing rainfall and temperature conditions.	Biomass is presented as maps by pixels, maps showing average pixels values over CropWatch spatial units (CWSU), or tables giving average values for the CWSU. Values are compared to the average value for the last five years (2012-2016), with departures expressed in percentage.
CALF			
Cropped arable land and cropped arable land fraction			
Crop/ Satellite	[0,1] number, pixel or CWSU average	The area of cropped arable land as fraction of total (cropped and uncropped) arable land. Whether a pixel is cropped or not is decided based on NDVI twice a month. (For each four-month reporting period, each pixel thus has 8 cropped/ uncropped values).	The value shown in tables is the maximum value of the 8 values available for each pixel; maps show an area as cropped if at least one of the 8 observations is categorized as "cropped." Uncropped means that no crops were detected over the whole reporting period. Values are compared to the average value for the last five years (2012-2016), with departures expressed in percentage.
CROPPING INTENSITY			
Cropping intensity Index			
Crop/ Satellite	0, 1, 2, or 3; Number of crops growing over a year for each pixel	Cropping intensity index describes the extent to which arable land is used over a year. It is the ratio of the total crop area of all planting seasons in a year to the total area of arable land.	Cropping intensity is presented as maps by pixels or spatial average pixels values for MPZs, 31 countries, and 7 regions for China. Values are compared to the average of the previous five years, with departures expressed in percentage.
NDVI			
Normalized Difference Vegetation Index			
Crop/ Satellite	[0.12-0.90] number, pixel or CWSU average	An estimate of the density of living green biomass.	NDVI is shown as average profiles over time at the national level (cropland only) in crop condition development graphs, compared with previous year and recent five-year average (2012-2016), and as spatial patterns compared to the average showing the time profiles, where they occur, and the percentage of pixels concerned by each profile.
RADPAR			
CropWatch indicator for Photosynthetically Active Radiation (PAR), based on pixel based PAR			
Weather /Satellite	W/m^2, CWSU	The spatial average (for a CWSU) of PAR accumulation over agricultural pixels, weighted by the production potential.	RADPAR is shown as the percent departure of the RADPAR value for the reporting period compared to the recent fifteen-year average (2002-2016), per CWSU. For the MPZs, regular PAR is shown as typical time profiles over the spatial unit, with a map showing where the profiles occur and the percentage of pixels concerned by each profile.
RAIN			
CropWatch indicator for rainfall, based on pixel-based rainfall			
Weather /Ground and satellite	Liters/m^2, CWSU	The spatial average (for a CWSU) of rainfall accumulation over agricultural pixels, weighted by the production potential.	RAIN is shown as the percent departure of the RAIN value for the reporting period, compared to the recent fifteen-year average (2002-16), per CWSU. For the MPZs, regular rainfall is shown as typical time profiles over the spatial unit, with a map showing where the profiles occur and the percentage of pixels concerned by each profile.

INDICATOR			
TEMP			
CropWatch indicator for air temperature, based on pixel-based temperature			
Weather /Ground	°C, CWSU	The spatial average (for a CWSU) of the temperature time average over agricultural pixels, weighted by the production potential.	TEMP is shown as the departure of the average TEMP value (in degrees Centigrade) over the reporting period compared with the average of the recent fifteen years (2002-16), per CWSU. For the MPZs, regular temperature is illustrated as typical time profiles over the spatial unit, with a map showing where the profiles occur and the percentage of pixels concerned by each profile.
VCIx			
Maximum vegetation condition index			
Crop/ Satellite	Number, pixel to CWSU	Vegetation condition of the current season compared with historical data. Values usually are [0, 1], where 0 is "NDVI as bad as the worst recent year" and 1 is "NDVI as good as the best recent year." Values can exceed the range if the current year is the best or the worst.	VCIx is based on NDVI and two VCI values are computed every month. VCIx is the highest VCI value recorded for every pixel over the reporting period. A low value of VCIx means that no VCI value was high over the reporting period. A high value means that at least one VCI value was high. VCI is shown as pixel-based maps and as average value by CWSU.
VHI			
Vegetation health index			
Crop/ Satellite	Number, pixel to CWSU	The average of VCI and the temperature condition index (TCI), with TCI defined like VCI but for temperature. VHI is based on the assumption that "high temperature is bad" (due to moisture stress), but ignores the fact that low temperature may be equally "bad" (crops develop and grow slowly, or even suffer from frost).	Low VHI values indicate unusually poor crop condition, but high values, when due to low temperature, may be difficult to interpret. VHI is shown as typical time profiles over Major Production Zones (MPZ), where they occur, and the percentage of pixels concerned by each profile.
VHIn			
Minimum Vegetation health index			
Crop/ Satellite	Number, pixel to CWSU	VHIn is the lowest VHI value for every pixel over the reporting period. Values usually are [0, 100]. Normally, values lower than 35 indicate poor crop condition.	Low VHIn values indicate the occurrence of water stress in the monitoring period, often combined with lower than average rainfall. The spatial/time resolution of CropWatch VHIn is 16km/week for MPZs and 1km/dekad for China.

Note: Type is either "Weather" or "Crop"; source specifies if the indicator is obtained from ground data, satellite readings, or a combination; units: in the case of ratios, no unit is used; scale is either pixels or large scale CropWatch spatial units (CWSU). Many indicators are computed for pixels but represented in the CropWatch bulletin at the CWSU scale.

CropWatch spatial units (CWSU)

CropWatch analyses are applied to four kinds of CropWatch spatial units (CWSU): Countries, China, Major Production Zones (MPZ), and global crop Monitoring and Reporting Units (MRU). The tables below summarize the key aspects of each spatial unit and show their relation to each other. For more details about these spatial units and their boundaries, see the CropWatch bulletin online resources.

SPATIAL LUNITS	
CHINA	
Overview	*Description*

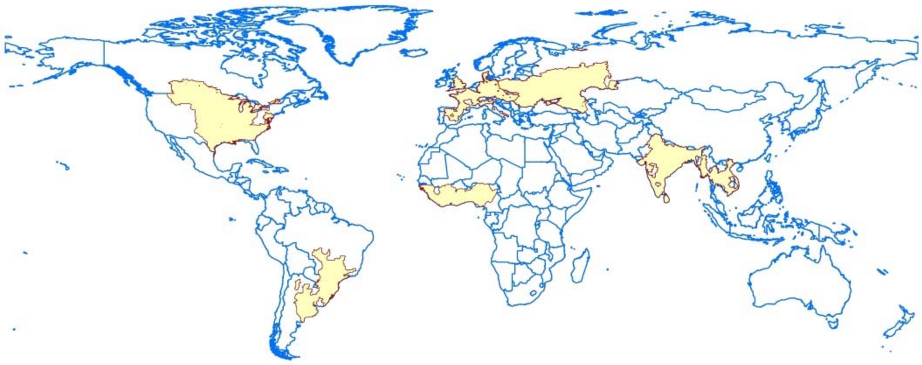
Seven monitoring regions	The seven regions in China are agro-economic/agro-ecological regions that together cover the bulk of national maize, rice, wheat, and soybean production. Provinces that are entirely or partially included in one of the monitoring regions are indicated in color on the map below.

Countries (and first-level administrative districts, e.g., states and provinces)

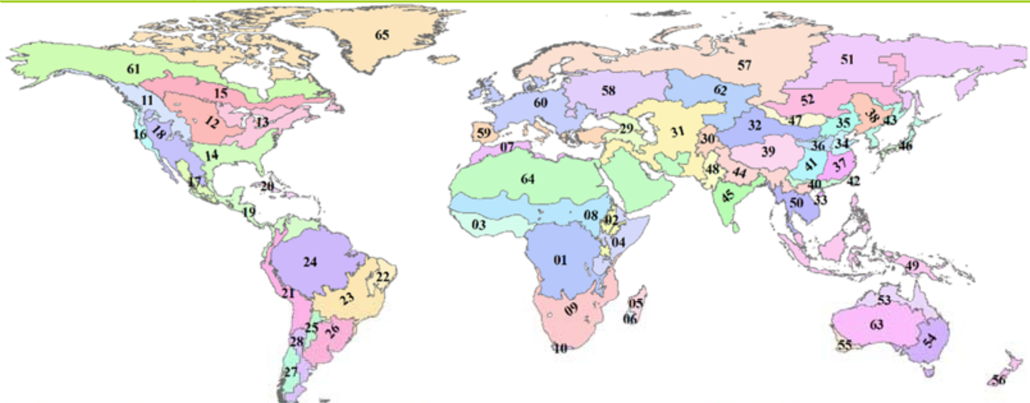
Overview	*Description*
"Thirty plus one" countries to represent main producers/exporters and other key countries.	CropWatch monitored countries together represent more than 80% of the production of maize, rice, wheat and soybean, as well as 80% of exports. Some countries were included in the list based on criteria of proximity to China (Uzbekistan, Cambodia), regional importance, or global geopolitical relevance (e.g., four of five most populous countries in Africa). The total number of countries monitored is "thirty plus one," referring to thirty countries and China itself. For the nine largest countries—, United States, Brazil, Argentina, Russia, Kazakhstan, India, China, and Australia, maps and analyses may also present results for the first-level administrative subdivision. The CropWatch agroclimatic indicators are computed for all countries and included in the analyses when abnormal conditions occur. Background information about the countries' agriculture and trade is available on the CropWatch Website, **www.cropwatch.com.cn**.

Major Production Zones (MPZ)

Overview	*Description*
Seven globally important areas of agricultural production	The six MPZs include West Africa, South America, North America, South and Southeast Asia, Western Europe and Central Europe to Western Russia. The MPZs are not necessarily the main production zones for the four crops (maize, rice, soybean, wheat) currently monitored by CropWatch, but they are globally or regionally important areas of agricultural production. The seven zones were identified based mainly on production statistics and distribution of the combined cultivation area of maize, rice, wheat and soybean.



Global Monitoring and Reporting Unit (MRU)	
Overview	*Description*
65 agro-ecological/agro-economic units across the world	MRUs are reasonably homogeneous agro-ecological/agro-economic units spanning the globe, selected to capture major variations in worldwide farming and crops patterns while at the same time providing a manageable (limited) number of spatial units to be used as the basis for the analysis of environmental factors affecting crops. Unit numbers and names are shown in the figure below. A limited number of units (e.g., MRU-63 to 65) are not relevant for the crops currently monitored by CropWatch but are included to allow for more complete coverage of global production. Additional information about the MRUs is provided online under **www.cropwatch.com.cn** .



Production estimation methodology

The main concept of the CropWatch methodology for estimating production is the calculation of current year production based on information about last year's production and the variations in crop yield and cultivated area compared with the previous year. The equation for production estimation is as follows:

$$Production_i = Production_{i-1} * (1 + \Delta Yield_i) * (1 + \Delta Area_i)$$

Where i is the current year, $\Delta Yield_i$ and $\Delta Area_i$ are the variations in crop yield and cultivated area compared with the previous year; the values of $\Delta Yield_i$ and $\Delta Area_i$ can be above or below zero.

For the 31 countries monitored by CropWatch, yield variation for each crop is calibrated against NDVI time series, using the following equation:

$$\Delta Yield_i = f(NDVI_i, NDVI_{i-1})$$

Where $NDVI_i$ and $NDVI_{i-1}$ are taken from the time series of the spatial average of NDVI over the crop specific mask for the current year and the previous year. For NDVI values that correspond to periods after the current monitoring period, average NDVI values of the previous five years are used as an average expectation. $\Delta Yield_i$ is calculated by regression against average or peak NDVI (whichever yields the best regression), considering the crop phenology of each crop for each individual country.

A different method is used for areas. For China, CropWatch combines remote-sensing based estimates of the crop planting proportion (cropped area to arable land) with a crop type proportion (specific type area to total cropped area). The planting proportion is estimated based on an unsupervised classification of high resolution satellite images from HJ-1 CCD and GF-1 images. The crop-type proportion for China is obtained by the GVG instrument from field transects. The area of a specific crop is computed by multiplying farmland area, planting proportion, and crop-type proportion of the crop.

To estimate crop area for wheat, soybean, maize, and rice outside China, CropWatch relies on the regression of crop area against cropped arable land fraction of each individual country (paying due attention to phenology):

$$Area_i = a + b * CALF_i$$

Where a and b are the coefficients generated by linear regression with area from FAOSTAT or national sources and CALF the Cropped Arable Land Fraction from CropWatch estimates. $\Delta Area_i$ can then be calculated from the area of current and the previous years.

The production for "other countries" (outside the 31 CropWatch monitored countries) was estimated as the linear trend projection for 2014 of aggregated FAOSTAT data (using aggregated world production minus the sum of production by the 31 CropWatch monitored countries).

Classification of pests and diseases

The criteria for the classification of pests and diseases in this report are based on industry standards and plant protection survey and evaluation specifications issued by the Chinese Ministry of Agriculture, combined with crop growth information and conditions obtained through remote sensing.

Table C.1 presents the criteria for determining the level of wheat yellow rust occurrence, which is based on the “Rules for the investigation and forecast of wheat yellow rust” (GB/T15795-2011). Based on this standard, a disease index model was established, integrating the remote sensing disease data and in-field survey disease data. The term “mildly severe” used in this report to describe the occurrence of wheat yellow rust corresponds with levels 1 and 2, while “moderately severe” refers to level 3, and “severe” comprises levels 4 and 5.

Table C.1. Criteria for wheat yellow rust occurrence level

Index	Level				
	1	2	3	4	5
Disease index	0.001<Y≤5	5＜Y≤ 10	10＜Y≤20	20＜Y≤30	Y＞30
Disease field rate/%	1<R≤5	5＜R≤10	10＜R≤20	20＜R≤30	R＞30

Note: In the table, Y is the disease index; it shows the impact of the disease and is defined as: Y=F*D*100, in which F is the rate of disease leaves and D is the average of the severity level of disease leaves. R is the disease field rate, which means the rate of disease field in the whole region.

Source: Standardization Administration of China, Rules for the investigation and forecast of wheat yellow rust (GB/T 15795-2011), 2011. http://doc.mbalib.com/view/2e0ae53c7f397af70deb37edb07c5a12.html

Tables C.2 and C.3 respectively list the criteria for wheat sheath blight (table C.2 and based on the “Rules for the investigation and forecast of wheat sheath blight” (NY/T614-2002)) and wheat aphid (table C.3, following “Rules for the investigation and forecast of wheat aphid” (NY/T612-2002)). The terms mildly severe, moderately severe, and severe—as used in this report—again refer to levels 1-2, 3, and 4-5 in the table.

Table C.2. Criteria for wheat sheath blight occurrence level

Index	Level				
	1	2	3	4	5
Disease index	Y≤5	5＜Y≤15	15＜Y≤25	25＜Y≤35	Y＞35

Source: Standardization Administration of China, Rules for the investigation and forecast of wheat sheath blight (NY/T614-2002), 2002. http://doc.mbalib.com/view/4c9d23d380f36d038af855fcdf089f93.html

Table C.3. Criteria for wheat aphid occurrence level

Index	Level				
	1	2	3	4	5
Aphid (heads/ hundred plants, Y)	Y≤500	500＜Y≤1500	1500＜Y≤2500	2500＜Y≤3500	Y＞3500

Source: Standardization Administration of China, Rules for the investigation and forecast of wheat aphid (NY/T612-2002), 2002. http://www.doc88.com/p-7708315673411.html

Data notes and bibliography

Notes

[1] Although Yemen is not part of the Horn of Africa (HoA), it is geographically close and maintains close links to the region. The countries of the HoA are grouped in the regional development association IGAD (Inter-governmental Authority on Development, with headquarters in Djibouti). IGAD has recently established the IGAD Drought Disaster Resilience and Sustainability Initiative (IDDRSI, 2016).

[2] Under-investment in agriculture was one of the main drivers of the 2008 crisis of high food prices (Mittal 2009, ATV 2010), even if several other local and global triggering factors can be identified (Evans 2008).

[3] Previous large humanitarian crises were those of the West African Sahel (from the early sixties to the mid-eighties), the Ethiopian droughts of the mid-eighties, the Indian Ocean tsunami of 2004, several large earthquakes (for example, Haiti, 2010), and floods and medical emergencies (such as the West African Ebola outbreak, 2013-16).

[4] http://www.agrhymet.ne/eng/index.html

[5] http://www.icpac.net/

[6] Belg is harvested before or during July.

[7] "Purely man-made disasters" is, however, a concept that deserves a closer look, as many wars and insurgencies are partially triggered by shortages of natural resources, including land. As such, most “man-made disasters” do have an environmental component.

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Online resources

Online Resources posted on www.cropwatch.com.cn

This bulletin is only part of the CropWatch resources available. Visit www.cropwatch.com.cn for access to additional resources, including the methods behind CropWatch, country profiles, and other CropWatch publications. For additional information or to access specific data or high-resolution graphs, simply contact the CropWatch team at cropwatch@radi.ac.cn.

CropWatch bulletin introduces the use of several new and experimental indicators. We would be very interested in receiving feedback about their performance in other countries. With feedback on the contents of this report and the applicability of the new indicators to global areas, please contact:

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