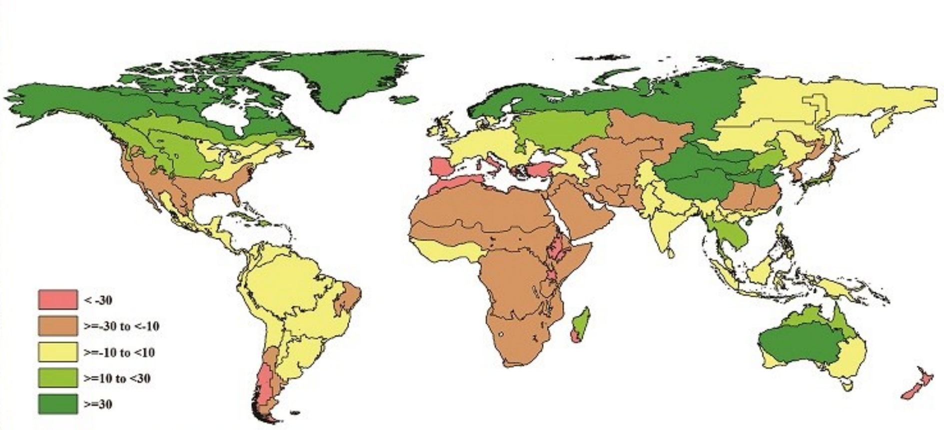

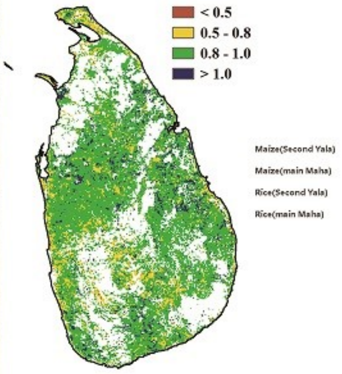

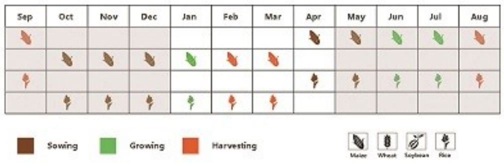

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CropWatch Online Resources: This bulletin along with additional resources is also available on the CropWatch Website at http://www.cropwatch.com.cn.

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Note: 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 January from 2013 to 2017 to April next year; one of the standard reference periods.
15YA	Fifteen-year average, the average for the four-month period from January from 2013 to 2017 to April 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 January and April 2018, a period referred to in this bulletin as the JFMA (January, February, March and April) period or just the "reporting period." The bulletin is the 109th 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 which include 30 countries in previous bulletins and 11 newly increased countries (Afghanistan, Angola, Belarus, Hungary, Italy, Kenya, Sri Lanka, Morocco, Mongolia, Mozambique, Zambia), and 148 Agro-Ecological Zones (AEZs) for those 30 key countries (no sub-national regions are for these newly increased 11 countries in this bulletin). 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 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, and updates on disaster events and El Niño.	

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

This quarterly CropWatch bulletin is based mainly on current remote sensing inputs in addition to detailed and spatially accurate reference data about crops and their management. The scope is global and comprehensive.

The bulletin focuses on crops that were either growing or harvested between January and April 2018. It covers prevailing weather conditions, including extreme factors, as well as crop condition and size of cultivated areas, paying special attention to the major worldwide producers. The bulletin also describes the current crop situation globally - including detailed analyses for China - and presents a first quantitative estimate for crops to be harvested throughout 2018. The estimate is based on partial data and will be updated in the next two CropWatch 2018 bulletins as more countries reach harvest.

The current CropWatch bulletin is prepared jointly by several institutes of the Chinese Academy of Sciences (CAS) under the overall coordination of the Digital Agriculture Division of the Institute of Remote Sensing and Digital Earth (RADI). Several changes were introduced in this issue: 11 countries were added to improve the focus on Africa and Asia, which brings to total from 30 + 1 (China) to 41 +1, including at least 80% of production of the three main cereals (maize, rice, wheat) and soybean. Another new section covers major wheat pests in seven northern hemisphere countries where wheat development is currently in full swing after the end of the cold season dormancy.

Global agroclimatic conditions

Global agroclimatic conditions are monitored using CropWatch agroclimatic indices which are spatial averages over agricultural land only, giving more weight to areas with a large production potential. The indices are referred to as RAIN, TEMP, RADPAR for solar radiation and BIOMSS for the biomass production potential.

At the global scale, RAIN was 8% above the average value of the 15-year reference period (2003-2017). TEMP was average (-0.1°C) while RADPAR was well below average (-5%) in the majority of land areas. Above average RAIN and lower than average RADPAR are the continuation of a pattern that started one year ago and which is bound to negatively affect photosynthesis. Eight Indian States and Bangladesh had a sunshine deficits in excess of 10%. Low sunshine was one of the major and largest global features of the reporting period.

Another dominant and continent-wide feature was cooler than average Equatorial and tropical areas. A more intense cold wave hit western Russia and Kazakhstan extending as far west as Morocco, while a serious heatwave area centred around Iran occurred in late March and early April, extending from Syria to North India while Areas of drought (RAIN values below average) include parts of central, south and east Asia and surrounding areas (-49% in Indian Punjab, -16% in Pakistan, -24% in Yunnan, -23% in Fujian), parts of southern Africa (Malawi -22%, Swaziland -16%) and the Mediterranean (Montenegro -32%, Tunisia -50%), some major agricultural areas centred around north Argentina (-41% in the provinces of the Pampas and Entre Rios) as well as parts of north America including some major wheat producing areas (Manitoba -23%, Oregon -22%, Nebraska -27%, Kansas -58%). For Canada and for the USA as a whole, the percent decrease in cropped area was significant at the end of April: -49% and -25%, respectively, as assessed by the CropWatch Cropped Arable Land Fraction (CALF) indicator. For Argentina, Canada and the USA, the CropWatch Vegetation Condition Index (VCIx) reaches 0.66, 0.62 and 0.65 indicating average crop condition at best.

Positive rainfall anomalies are mentioned mainly for east Africa and some semi-arid areas in central and eastern Asia, the central Gulf of Guinea and the general Caribbean area including Mexico.

Production outlook

The final outcome of the 2018 season will depend on agroclimatic conditions up to the end of the year: for crops that are still growing, the listed estimates assume that environmental and phytosanitary conditions will be average between the time of reporting and harvest.

CropWatch estimates the global 2018 production of the major commodities at 1045 million tonnes of maize, up 1.8% over 2017, 745 millions for rice (up 0.6%), 697 million tonnes of wheat (a 3.2% drop below 2017) and 323 million tonnes of soybeans, virtually equivalent to 2017 (-0.1%). The share of the “minor producers” (142 countries that together contribute less than 20% of world production) has decreased by up to 5.6 percentage points (wheat); soybeans are down 1.3 percentage points illustrating the trend towards the consolidation of the position of the major producers. In terms of 2018 production change compared to 2017, major producers outperform “minor producers” for maize and rice (1.8% Vs. 1.4% and 0.6% Vs. 0.3%, respectively) while minor producers outperform the major producers for wheat (0.5% Vs. -3.5%) and especially soybean (6.4% Vs. -0.5%) as more countries are trying to join the closed club of soybean producers dominated by the USA, Argentina and Brazil and some of their south-American neighbours.

Countries that experienced large **maize production** increases include Brazil (+3.1%), one of the largest global suppliers of the crop (3rd exporter worldwide). The second largest exporter (Argentina) suffered a drop in maize output of 3.8% due to drought in the northern provinces, which affected as well adjoining areas in Uruguay and Brazil. Mixed conditions prevail in southern Africa where maize is a main staple. South Africa is an important exporter (10th worldwide) but suffered a reduced output 6.8% below last year’s. Mexico had a drop in maize production of 1.8% and the Philippines are up 2.2%.

Rice suffered a generalised drop in 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. Countries further to the north (Bangladesh, India, Myanmar, Philippines) increased their output by 3.2%, 2.6%, 1.5% and 3.8%, respectively.

Reductions in **wheat production** exceeding 5.0 % occurred on all continents, affecting some of the major global producers such as Canada (-13.0 %) and the United States (-13.5 %) due to unfavourable weather including poor sunshine, drought, water logging 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 Iran and Turkey (respectively +6.2% and +7.9%, a welcome change in both countries after a run of bad or mixed seasons), Belarus, Poland and Romania (+9.7%, +11.9% and +6.5%, respectively), and Egypt (+7.0%) where the good rice crop comes in addition to increased maize and rice productions.

In the northern hemisphere the **soybean crop** was just planted or is still to be planted. In Argentina the soybean crop production is down (-8.2%) while, in comparison, Brazil did relatively well (+0.8%).

The analysis of the performance of major importers and exporters of cereals and soybean shows that 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.

China

China experienced mixed weather conditions as both rainfall and RADPAR dropped by 8% compared to average at the national scale. CALF was 14% below the average of the previous 5 years and VCIx was rather low at 0.54 indicating both reduced planting and low yield expectations. At the regional scale several northern regions had positive RAIN anomalies in excess of 30% while the Lower Yangtze and Southern China had deficits close to 20%. The highest VCIx values occur in the central part of China.

The unfavourable agro-climatic conditions resulted in a 1.4% decrease in wheat yield compared to the previous season. Winter wheat production is forecast at 112.7 million tons, a decrease of 3.3 million tons or 2.8% below 2017. CropWatch puts the total winter crop production at 122.8 million tons, a 2.8 percent decrease from the 2017's bumper production. Planted areas decreased 1% for Hebei, Jiangsu, Shandong and Henan and 2% in Sichuan. The largest increases of winter wheat hectarage was observed in the provinces of Shanxi (+3%) and Shaanxi (+5%). In addition to poor weather, wheat sheath blight and aphids were widespread: the first causes concern especially in southern China and the Lower Yangtze region where 7% or areas are severely affected; aphids occur in all regions to the extent that more than 35% of fields are infested in southern and south-west China, 10% severely so in the latter.

The largest winter wheat production inter-annual change (+11%) occurred in Shaanxi as a result of both increased planted area and yield. The top three winter wheat producing provinces (Henan, Shandong and Hebei) all suffered from unfavourable conditions and report large production drops of 2%, 6% and 2%, respectively. Hebei mainly suffered from drought while the decreased production for Shandong and Henan was mostly due to delayed crop development.

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 C for definitions and to table 1.1 for 2018 JFMA 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, TMP, RADPAR) at MRU scale derive directly from climatology. For instance, the positive correlation (R=0.425) between rainfall and temperature 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 65% of the MRUs, resulting in RAIN being 8% above the average value of the 15-year reference period (2003-2017). TEMP was average (-0.1°C) in most MRUs while RADPAR was below average in the majority of MRUs (58 out of 65) resulting in a significantly below average value of -5%. Finally, the biomass production potential BIOMSS depends on rainfall and temperature. During the current reporting period 80% of its variations can be ascribed to RAIN variations and 20% only to TEMP. As a result, the global average is 8% above normal (55% of values are above normal).

Above average RAIN and lower than average RADPAR are the continuation of a pattern that started one year ago (Table X1) 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

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%

1.2 Rainfall and BIOMSS anomalies

Since rainfall and biomass are very directly connected, as already mentioned above, the BIOMSS anomalies are mentioned where appropriate in this section arranged according to rainfall anomalies. The following areas are mentioned because they experienced moderately excessive rainfall close to 10% but nevertheless expect a reduction in BIOMSS: MRU 58 (Ukraine to Ural mountains) and MRU 62 (Ural to Altai) . In the Corn Belt (MRU 13), precipitation excess reached a more significant 26% but nevertheless a biomass production potential drop of 8%.

Negative rainfall anomalies

The largest negative rainfall anomalies (below -20%) all affect several MRUs and can be grouped into seven clusters. Although the patterns are largely independent of those observed in 2017, there are, however, some similarities with the highest values (largest positive departures) occurring in Sub-arctic America (a non-cropped area) and in southern Mongolia and surrounding areas or other MRUs in eastern Asia, such as Hainan and Inner Mongolia.

A. China and southern Himalayas

Two MRUs are at the “centre” of the water deficit areas, including Qinghai-Tibet (MRU 39, -34%) and the Southern Himalayan stretch (MRU 44, -30%). Both recorded between 110 and 120 mm of RAIN. They are surrounded on the west and east by other areas of deficit, in particular Punjab to Gujarat (MRU 48, -20%), Southern China (MR4 40, -17%) and the Lower Yangtze (MRU 37, -18%). Both Punjab to Gujarat (MRU 48) and the Lower Yangtze (MRU 37) experienced a water deficit in during the JFMA reporting period in 2017 (-19% and 21%, respectively). In Southern China, the deficit was 7% in 2017.

Throughout this area, due to temperature effects, the drop in rainfall exceeds the drop in BIOMSS (-24% Vs -11%, respectively, on average). The difference is largest in Qinghai Tibet (RAIN -34%, BIOMSS -13%) and in Southern China (RAIN -17%, BIOMSS -4%) and smallest in Punjab to Gujarat (RAIN -20%, BIOMSS -14%).

B. South-west Madagascar

The largest deficit occurred in South-west Madagascar (MRU 06), a mostly semi-arid area which is now at the end of its growing season where 274 mm were recorded instead of more than 500 mm (-46%). The BIOMSS drop is expected to reach 26%, the lowest of all MRUs.

C. Southern Australia

MRU 54 (Queensland to Victoria) had a 25% RAIN deficit and the south-west (MRU 55, Nullarbor to Darling) had a more moderate shortfall of 15 %).

D. North America

Shortage of rainfall affected two areas: the north American west coast (MRU 16, -23%), extending over California and southern British Columbia, as well MRU 18 (South-west U.S. and north Mexican highlands) where the deficit was just 11%. MRU 16 experienced abundant precipitation during the same season last year (+43%).

E. South America

The Pampas (MRU 26) suffered a moderate deficit of 14% which increased to 19% in the semi-arid Southern Cone (MRU 28). The Pampas are currently in their summer crop season and negative impacts are likely. Refer to the section on disasters (Chapter 5.XXX) for details. The same areas had abundant water supply in 2017 (+34% and +21%, respectively). The BIOMSS drop is expected to be less severe than the rainfall deficit in both areas (only 5% in MRU 28) but nevertheless 10% in the Pampas.

F. East and north-east Asia

Three MRU are to be mentioned, in decreasing order of rainfall deficit: East Asia, MRU 43 (-18%) which includes the Korean Peninsula Eastern Siberia (MRU 51, -16%), which is of relevance mostly for fisheries and forest production, and Eastern Central Asia (MRU52, 10%) where livestock production is practised. Of those MRUs, only east Asia had a rather severe deficit in 2017 (43%). In East Asia and eastern Siberia, the BIOMSS index remains close to average in spite of the water deficit.

G. Mediterranean basin

The drought in the area was moderate, affecting more seriously the north African coast (MRU 07, -11%) than southern Europe (MRU 59, -9%). Both areas recorded a more severe deficit in 2017: -20% and -34%, respectively.

Positive rainfall anomalies

Significant positive anomalies need to be mentioned only from two areas in China or bordering China and East Africa.

H. Five MRUs around north-eastern China

The MRUs include essentially MRU 47, southern Mongolia with a spectacular rainfall increase to 276 mm (compared with the average of 117 mm). The departure of +276% follows last years departure of +309%). The four remaining MRUs include MRU 34 Huang Huaihai (+36% in 2018, +15% in 2017), MRU 35 Inner Mongolia (+35%, +60%), MRU36 the Loess Region of China (+38%, +23%) and MRU38 north-east China, MRU 38 (+31%) is the only one which recorded average rainfall last year (-1%). With the exception of southern Mongolia (+177%), the BIOMSS increase is expected to be close to 30%.

I. Hainan

Hainan (MRU 33) with rainfall 57% above average (+52% in 2017) is an isolated excess spot south of a deficit areas and close to Mainland SE Asia (MRU 50) where precipitation was average. Hainan also experience low temperature (-1.0°C).

J. Eastern Africa

The two eastern African MRUs (02 East African highlands and 04, the Horn of Africa) recorded +16% and +26% of rainfall. This indicates early beginning of the rainy season in an area that has suffered drought in previous years (-27% and -30%, respectively). The area is mentioned in the section on disasters because of floods.

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

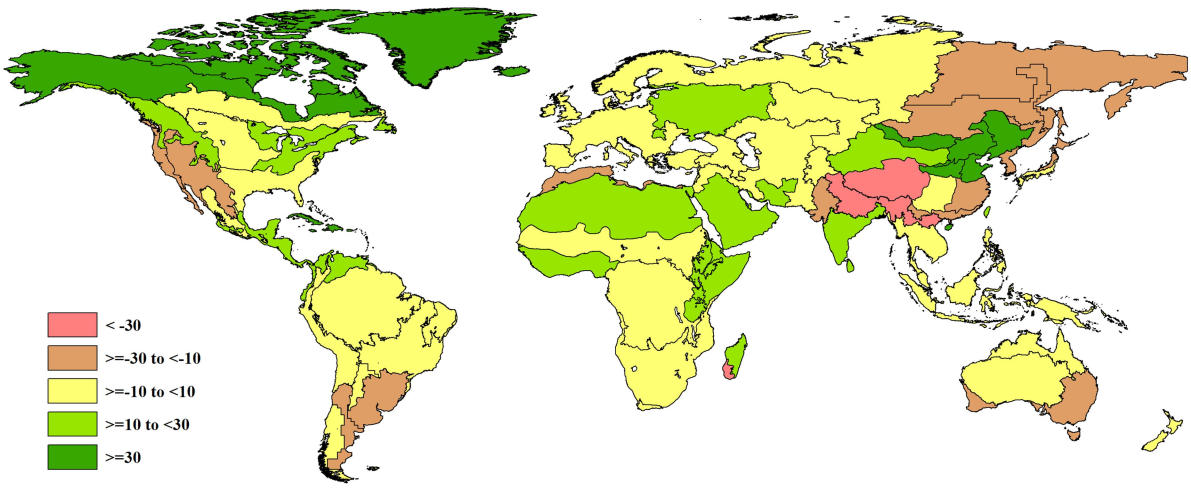
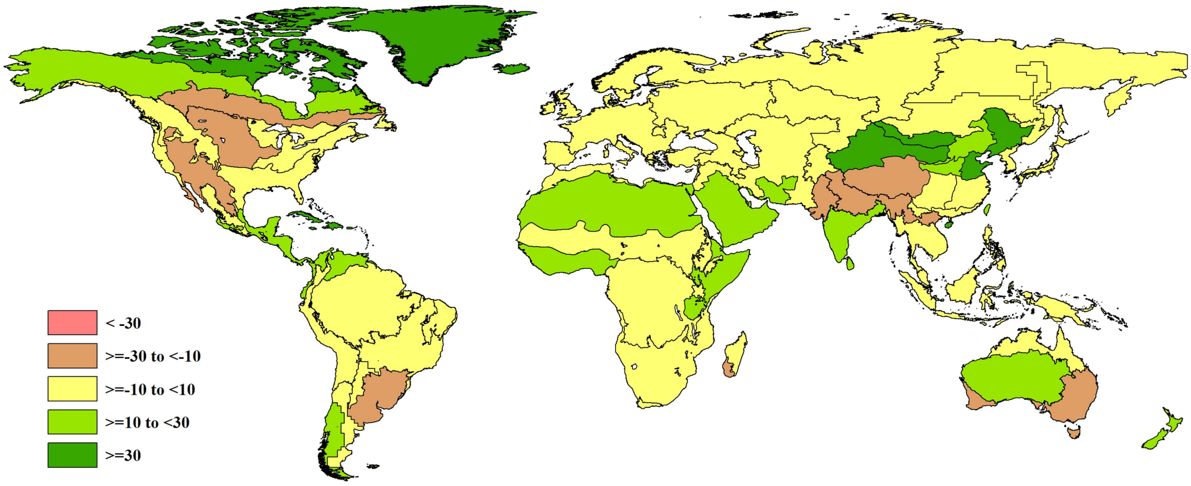


Figure 1.2. Global map of January - April 2018 biomass accumulation (BIOMSS) by MRU, departure from 5YA, (percentage)



1.3 Temperature anomalies

Many areas which recorded high or low temperature compared with average were already mentioned above because of anomalous rainfall. It is also in order to observe that the highest latitudes in north America witnessed spectacular departures (2.1°C to 5.6°C) in areas that are not relevant for crop production – but may become so if the departures persist -. Although the pattern partly overlaps with the RADPAR pattern to be described below, the two are (statistically) unrelated.

K. Cooler than average Equatorial and tropical areas

Most equatorial and tropical areas in America, Africa and Asia experienced slightly below average temperature. Although the departures did not exceed 1°C the pattern is rather consistent spatially. The coldest area is the Horn of Africa (MRU 04) with an anomaly of -1.5°C.

L. Cooler than average central-eastern north America.

The absolute coolest area was the northern Great Plains with a negative departure of 2.2°C. They were surrounded by areas with low temperature, except in the west.

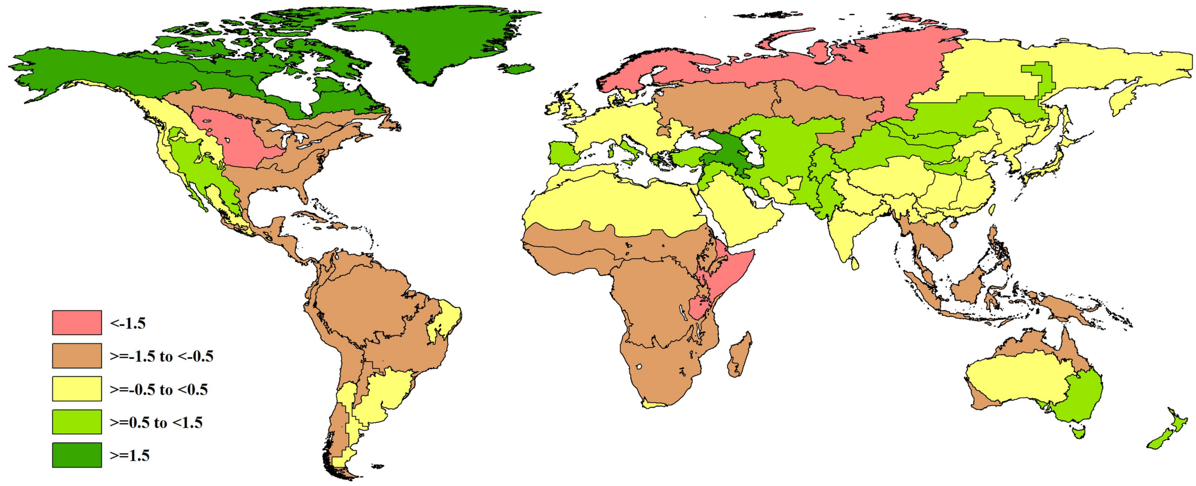
M. Cool area from Ukraine to Altai

The area encompasses two MRUs 58 (Ukraine to Ural mountains) and 62 (Ural to Altai Mountains) with temperature departures of -0.8°C and -1.2°C, respectively.

N. High temperature area of the northern Mediterranean to eastern Asia

The Caucasus (MRU 29) recorded a positive anomaly of 1.9°C, which is significant during winter. In the Pamir area (MRU30) the departure reached 1.4°C. The remaining areas (MRU 59, Northern Mediterranean to Turkey) to the Loess region in China and eastern Northern Central Asia (MRUs 36 and 52) are in the range from 0.5°C to 0.7°C.

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



1.4 Radiation RADPAR anomalies

With the exception of eastern South America, southern Africa, maritime south-east Asia, much of Australia and parts of northern Eurasia, most land areas experienced below average sunshine, representing approximately 90% of land areas.

O. Large Eurasian and African sunshine deficit area centred on China and the southern Himalayan area

Huanghuaihai (MRU 34) experienced the lowest departure from sunshine at -14%, followed by three MRUs with departures of -9% (MRU C37, Lower Yangtze; MRU 36, Loess region and MRU32, Gansu-Xinjiang). The area is bordered to the south by the Southern Himalayas (MRU 44 also at 9%) which provides the transition to western Asia (MRU 31, -7%), southern Asia (MRU 45, -5%) and continental south-east Asia (MRU 50, -7%)

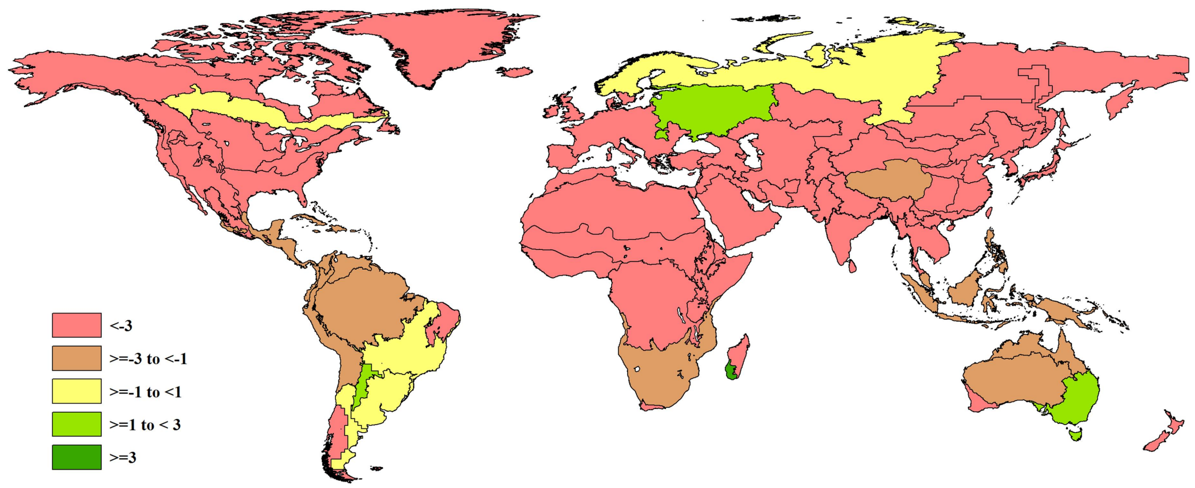
P. Areas with "average" sunshine

Few areas stand out. They include three isolated MRUs, all with a 1% departure: MRU 54 (Queensland to Victoria) in Oceania, MRU 06 (South-west Madagascar) in Africa and MRU 25, central-north Argentina.

Q. Positive sunshine departure

The semi-arid southern cone in Latin America had sunshine in excess of 5% over average.

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



1.5 combinations of extremes

South-west Madagascar (MRU 06) comes first with low rainfall (-46%), a slight temperature deficit (-0.8°C) and RADPAR at +5% above average. The Horn of Africa (MRU04) and Hainan (MRU 33) both experienced high rainfall (+26%, +57%, respectively), low temperature (-1, 5°C and -1.0°C) and a radiation deficit of -6% and -5%, respectively.

The three following MRUs had about average rainfall but below average radiation (-7% to -11%). but below average temperature (-0.9°C to -1.2°C): MRU 62 (Ural to Altai mountains), MRU 03 (Gulf of Guinea) and MRU 50 (mainland south-east Asia). Finally, New Zealand (MRU 56), Mediterranean Europe and Turkey (MRU 59) and the Caucasus (MRU 29) had radiation deficits between -7% and -9% and positive temperature departures (+0.7°C, +0.7 °C and +1.9°C, 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 agro-climatic (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. January-April 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	205	15	28.2	-0.9	1114	-10
South America	605	-11	24.1	-0.3	1130	0
North America	318	4	3.6	-1.4	771	-5
South and SE Asia	118	-5	24.5	-0.2	1089	-7
Western Europe	210	-1	5.5	-0.4	547	-7
C. Europe and W. Russia	192	9	-1.6	-0.6	534	1

*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 (January-April) for 2003-2017.*

Table 2.2. January -April 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	639	12	52	-7	0.64
South America	1561	-9	98	-1	0.77
North America	677	-12	32	-29	0.62
S. and SE Asia	402	2	75	5	0.81
Western Europe	830	2	93	-2	0.84
Central Europe and W Russia	612	-3	48	-30	0.75

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

2.2 West Africa

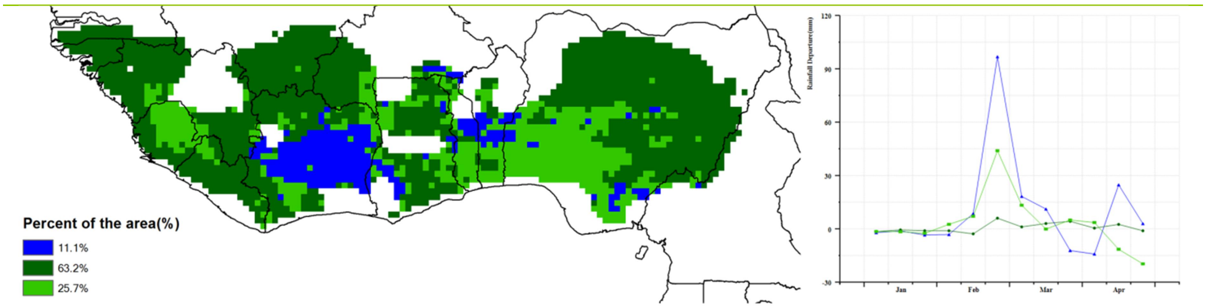
The end of the current monitoring period from January to April of 2018 covers the onset of the main growing season for main crops (maize, sorghum, millet, and yams and cassava) throughout the West African region. This period is also the beginning of the main long rainy season lasting till the end of April to mid-July in the south, and from July to September in the semi-arid Sahel. Most of the cropped land is currently in the coastal parts areas while the northern drier parts are uncropped (this is of relevance mostly for Nigeria.)

The West African region as a whole, experienced average cumulative rainfall of 206 mm (15% above average), with positive departures recorded in Gambia (+66%), Togo (+42%), Burkina Faso (+32%), Nigeria (+25%), Equatorial Guinea (+12%), and Ghana (+11%) , on the other hand, there were negative departures in Gabon (-9%), Guinea (-7%) and Liberia (-4%). Precipitation is currently building up, marking the transition from the short dry season into the main rainy season starting with the southern coastal areas. Average temperature of 28.2°C (-0.9°C departure) and sunshine (RADPAR 1114 MJ/m², departure -7%) were experienced during this period. The largest departure for radiation occurred in Cote d Ivoire (-10%), Ghana (-10%), Nigeria (-11%) and Equatorial Guinea (-11%).

The fraction of cropped arable land (CALF) represents 52% of West African arable land, predominantly in the coastal areas while the northern drier parts are uncropped (mostly in northern Nigeria. This is observed in the biomass production potential of 639 gDM m^{-2} (+12% over 5YA) in the MPZ. Low departures (BIOMSS departures <-20%) occur in the northern areas that are still uncropped and in coastal areas with bimodal rainfall patterns. These results are supported by the VCIx map, an alternative index of the relative vegetation health and crop condition and a proxy to detect potential drought; the maximum VCI intensity for the MPZ was 0.63, low value area concentrated in north Nigeria.

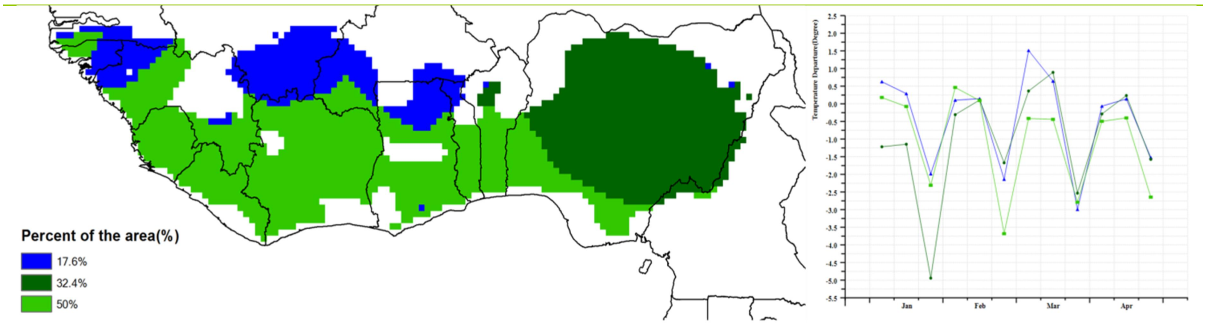
The CropWatch indicators depict stable and coherent climatic conditions and indicate a favorable onset of the main long growing season of the MPZ.

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



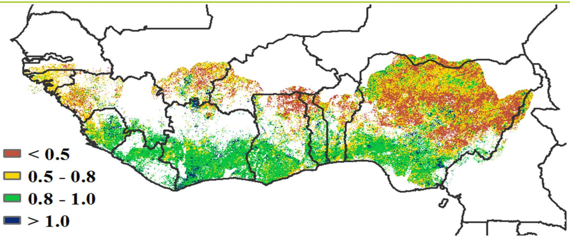
a. Spatial distribution of rainfall profiles

b. Profiles of rainfall departure from average (mm)

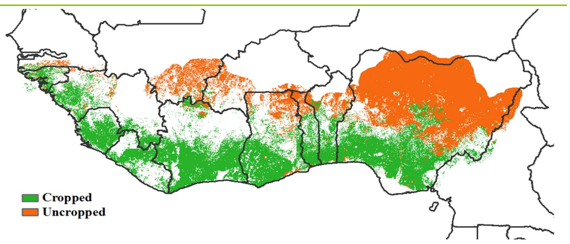


c. Spatial distribution of temperature profiles

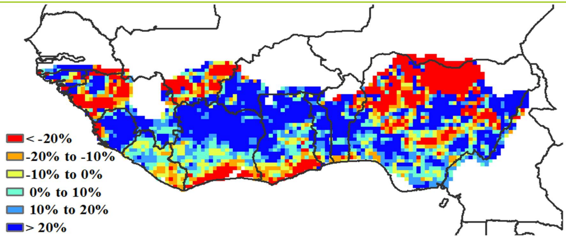
d. Profiles of temperature departure from average (mm)



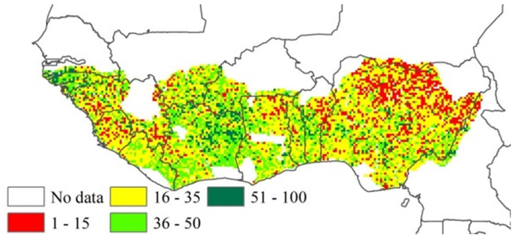
e. Maximum VCI



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

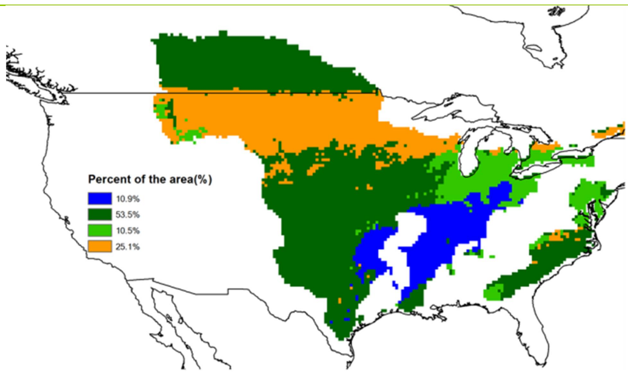
This reporting period covers January to April 2018 and it is the core of the winter crops season of North America. Due to unfavorable weather, crop condition was below the 5YA in general.

The agro-climatic indicators show that rainfall was 4% above average, while temperature and RADPAR were significantly below average by 1.4°C and 5%, respectively. The spatial distribution of rainfall profiles indicates that the negative trend of precipitation observed in the Southern Plains and the Prairies started during late February 2018. The major winter crops zones that suffered from below average precipitation and RADPAR include the Cotton Belt to the Mexican Nordeste (-3%), the Northern Great Plains (-4%) as well as the SW U.S. and N.Mexican highlands (-11%). In the same areas, RADPAR was down 5%, 4%, and 4%, respectively.

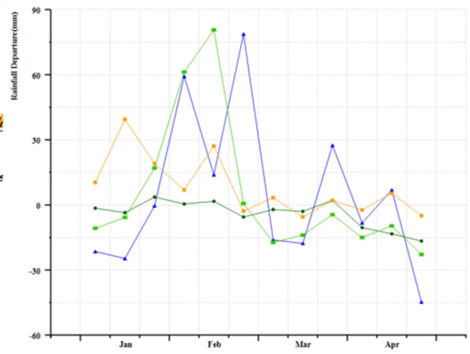
The map of minimum VHI indicates drought occurred in the Southern Plains. The generally below average crop condition in the MPZ is confirmed by a low average VCIx value (0.62), with especially low values (0.5) in the Great Plain, indicating poor crop condition. Unfavorable weather condition resulted in a biomass accumulation potential drop of 12%, especially in the west and north of the Great Plains, where the decrease exceeds 20%. As an important factor of production, the cropped arable land fraction was down 29% compared to 5YA average.

Considering the unfavorable weather and agronomic indicators performance, CropWatch projects below average production of winter wheat in 2018.

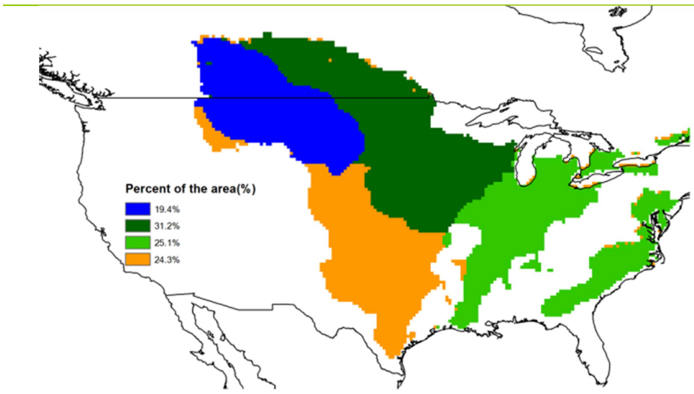
Figure 2.2. North America MPZ: Agroclimatic and agronomic indicators, February 2018 to April 2018.



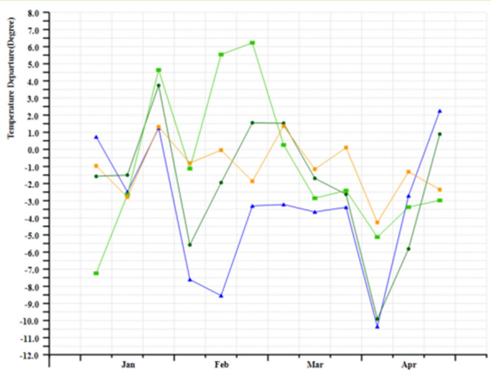
a. Spatial distribution of rainfall profiles



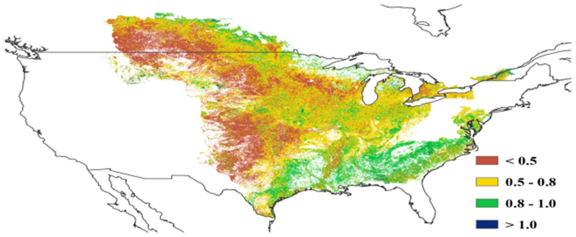
b. Profiles of rainfall departure from average (mm)



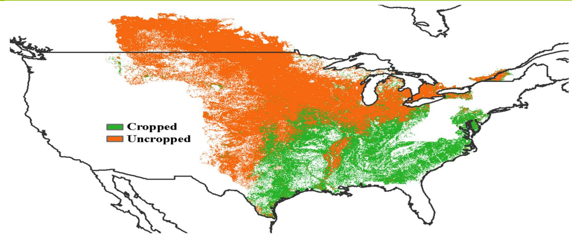
c. Spatial distribution of temperature profiles



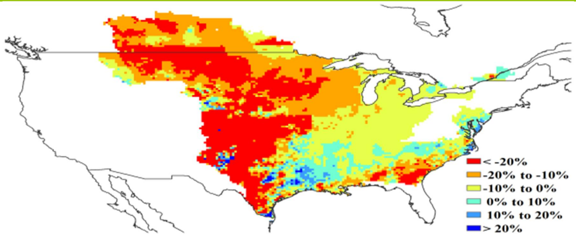
d. Profiles of temperature departure from average (mm)



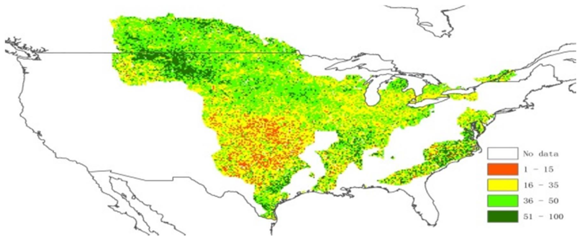
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

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

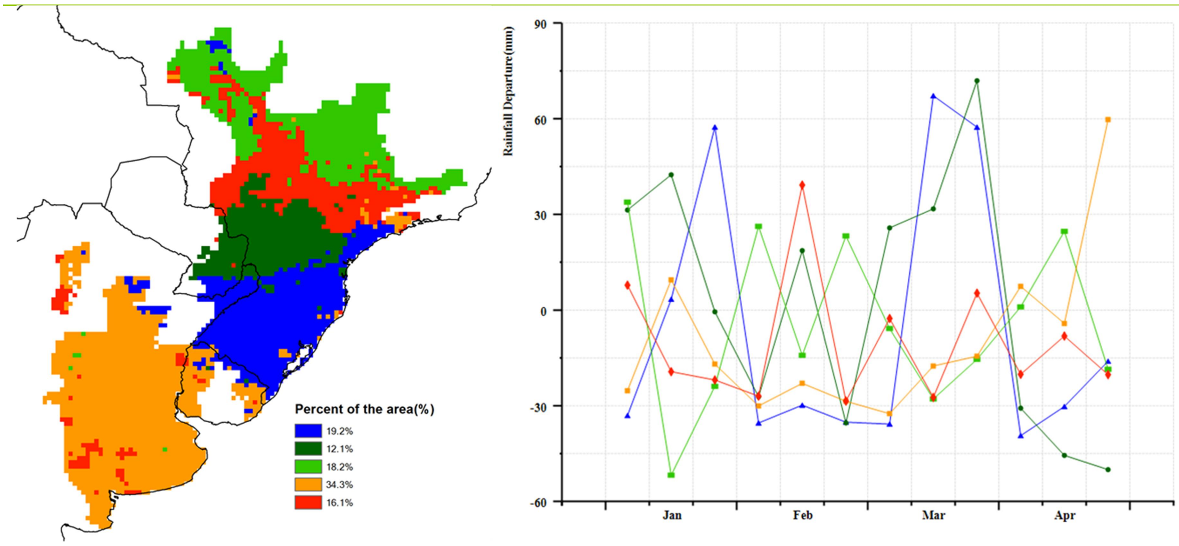
2.4 South America

A high contrast is observed among countries and sub-regions in agro-climatic indicators, particularly those related to rain. The whole region showed a large drop in RAIN (11% below average) during the reporting period, quite larger than the other major agricultural zones in the world (Table 2.1). The rainfall map shows a very different pattern among sub-regions, being most critical in the Argentinian Pampas and Chaco regions and in Uruguay with a negative anomaly during most of the summer period, when soybean and maize were at their development peak. In addition, this sub-region recorded a large positive rainfall anomaly in April, just before the harvest. Southern Brazil, including mostly Rio Grande do Sul and Paraná also showed a negative anomaly in summer but of shorter duration than in the South. TEMP showed a drop of 0.3°C following the global tendency to a decrease during this period. The temperature map shows a relatively homogeneous pattern in the region, except during April when the southern regions show a large positive anomally which could benefit rare late crops that are still growing at this time. RADPAR was at average level, in contrast with most of the other regions where a decrease was found, probably associated to observed low rain conditions.

These climatic conditions led to a decrease in accumulated biomass potential of 9%. Significant negative BIOMSS departure from average was observed (-20% or more) in the Argentinian Pampas (excepting low lands in South-East Buenos Aires province) and Misiones province, as well as in a small part of Uruguay, Paraguay and Paraná in Brazil. The tendency was also low but of a lesser magnitude (-10% to -20%) in most of southern Brazil.

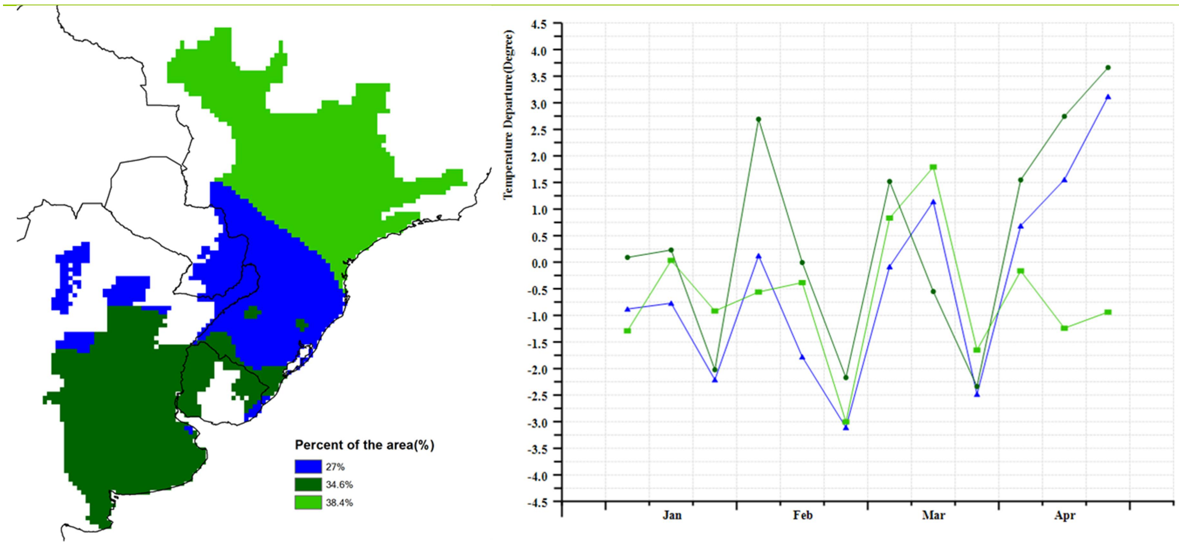
Average VCIx for the whole MPZ is 0.77. According to the VCIx map, low values occurred in the Pampas, particularly in the south West and North East. The map of cropped and uncropped arable land shows that the adverse climatic conditions could have affected planting in the South-West of the Pampas, where part of the area appears as uncropped. VHI shows discontinuous patterns with large intra-subregional bariations. This indicator is lowest in the Pampas, which confirms water stress conditions.

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



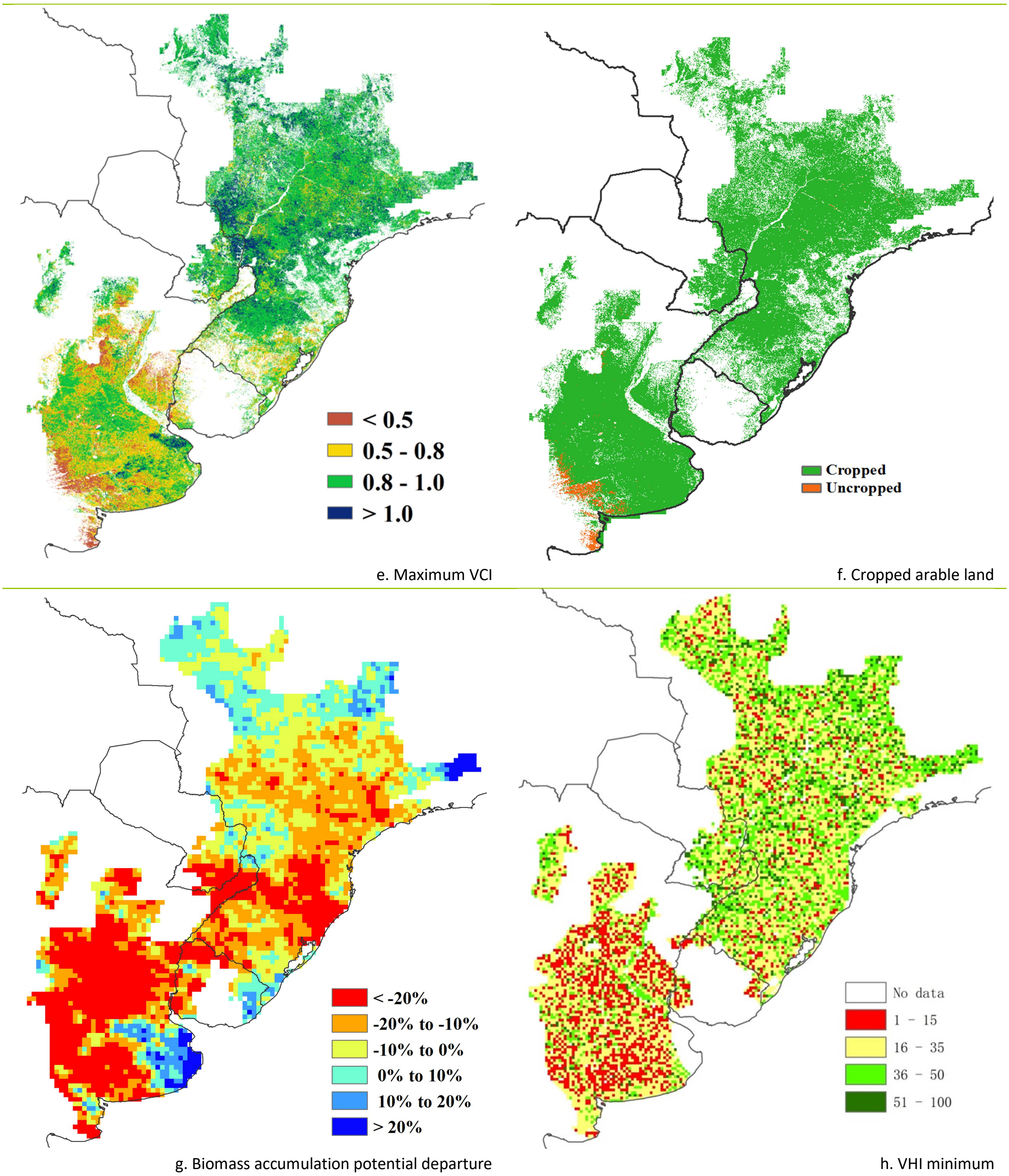
a. Spatial distribution of rainfall profiles

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

The South and Southeast Asia MPZ with its vast geographical and latitudinal spread have equally vast diversity in crop phenology. Rice is grown in all of the countries, whereas maize, wheat and soybean are cultivated are less ubiquitous. Country specific crop phenology during the reporting period is presented here: In Bangladesh Rice (Boro) and wheat crops went from sowing/planting to harvesting; Cambodia had Rice (Main wet season) planting to harvesting and rice (Dry season) was harvested; India wheat and rice (Boro) sowing/planting to harvesting; Myanmar maize, rice (Second) wheat were in growing to harvesting; Nepal had wheat sowing to growing stages; Thailand rice (Main) was harvested, rice(Second) planting –

harvesting), and Maize in sowing stage; and in Vietnam rice (Spring/winter both North/South) was in planting to harvesting stages.

Sunshine (RADPAR) is the most important agroclimatic parameter governing crop growth, with RAIN conditioning the extent to which PAR can be absorbed by plants. During the reporting period countries in the zone experienced varying conditions of RAIN compared with average: Afghanistan (0%), Lao PDR (-1%), Thailand (+2%) and Cambodia (+4%). Bangladesh with +20% was the only country receiving higher rainfall. Myanmar (-9%), Nepal (-13%), India (-15%) and Vietnam (-21%) all received below average RAIN.

RAIN was evenly distributed in most areas. Exceptions include one spell of high values in peninsular India in March, and one in Bangladesh, patches in Eastern Gangetic plains in India, few patches in Thailand and Vietnam in April. Low values occurred in north eastern India in April.

Temperature remained near average in Nepal (+0.1°C), India (+0.2°C), Afghanistan (+0.8°C), Myanmar (-0.3°C) and Vietnam (-0.7°C). Bangladesh, Lao PDR and Thailand experienced lower TEMP by 1.1°C; Cambodia with -1.4°C had maximum deviation from average. Warmer TEMP prevailed near the Tropic of Cancer and north of it. Moreover, there was a gradient TEMP from the east to west during the period.

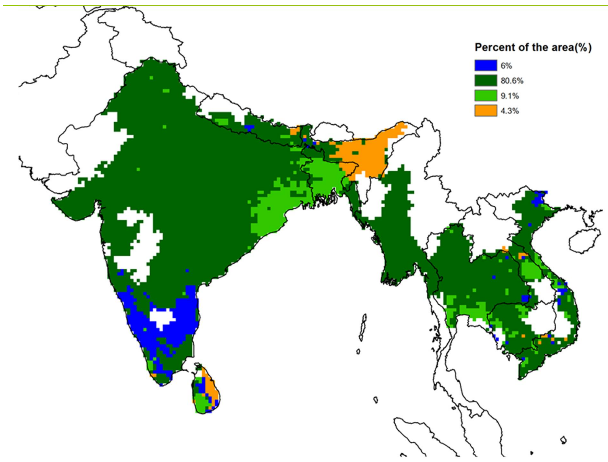
All the countries in the MPZ received lower than average RADPAR ranging from -5% in Afghanistan to -12% for Bangladesh. Combination of these factors led to different scenario for BIOMSS for countries: Myanmar with 356MJ/m2 was perfectly average, Afghanistan (+1%), Lao PDR (+3%), Cambodia (+6%), Thailand (+9%) and Bangladesh was highest (+32%). However, India (-4%), Nepal (-5%) and Vietnam (-12%) were at the lower end. Low BIOMSS was spread over south to western India, coastal Vietnam, northern Vietnam, parts of Myanmar and Thailand.

Lao PDR, Bangladesh and Vietnam achieved 95% CALF while Afghanistan (5%) was lower than average by 63%. India was also low with only 64%, with most low values in the central and peninsular region, but remaining countries did better: Nepal (82%), Thailand (84%), Myanmar (86%), Cambodia (87%). The largest positive CALF departures from 5YA were achieved in Myanmar (+12%) and Cambodia (+16%).

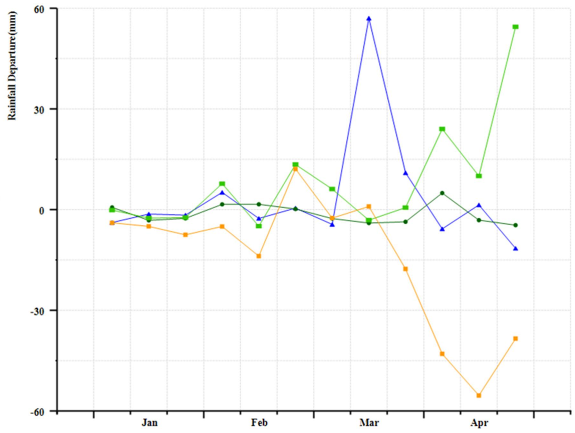
Crop condition as assessed by VCIx was good only in Nepal (0.94), Lao PDR (0.92) and Bangladesh (0.91); Afghanistan was the lowest with only 0.31 while remaining countries were in the range of 0.78 and 0.86. Low VCIx was distributed over central and peninsular India and Thailand. Bangladesh experienced good VHI, while low VHI was found almost equally distributed over all parts of the MPZ indicating overall water stress.

In summary, the South and Southeast Asia MPZ presented low crop condition as a result of dry weather, as indicated by low NDVI and CALF. Moreover, crop production is likely to drop according to low VCIx and VHI.

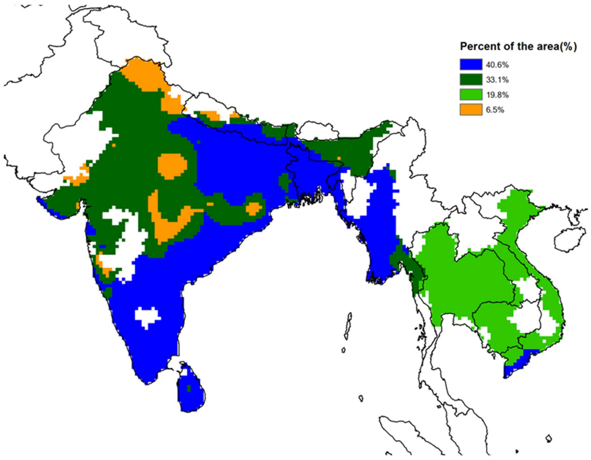
Figure 2.4. South and Southeast Asia MPZ: Agroclimatic and agronomic indicators, January-April 2018



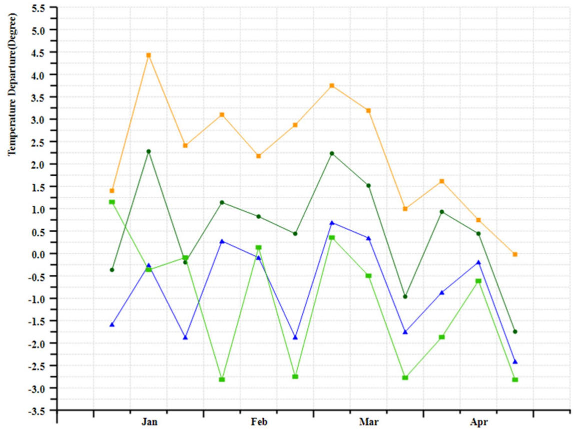
a. Spatial distribution of rainfall profiles



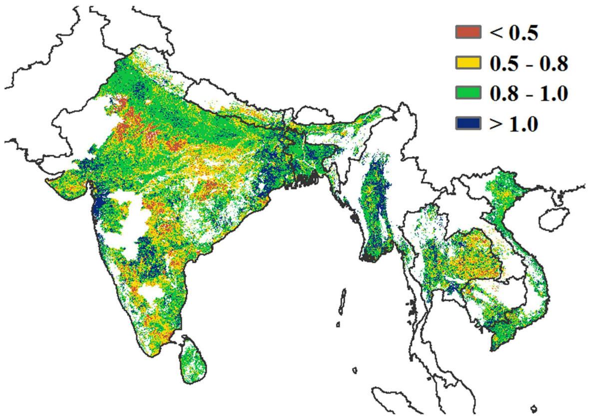
b. Profiles of rainfall departure from average (mm)



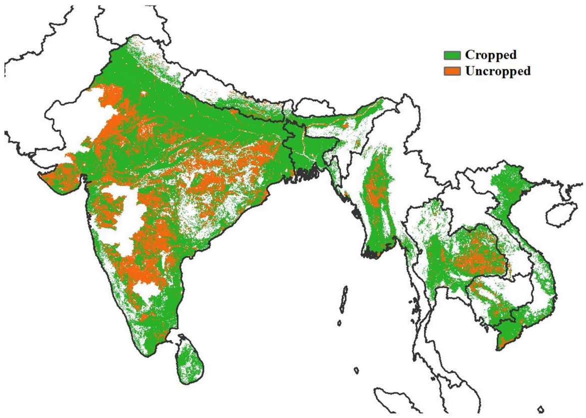
c. Spatial distribution of temperature profiles



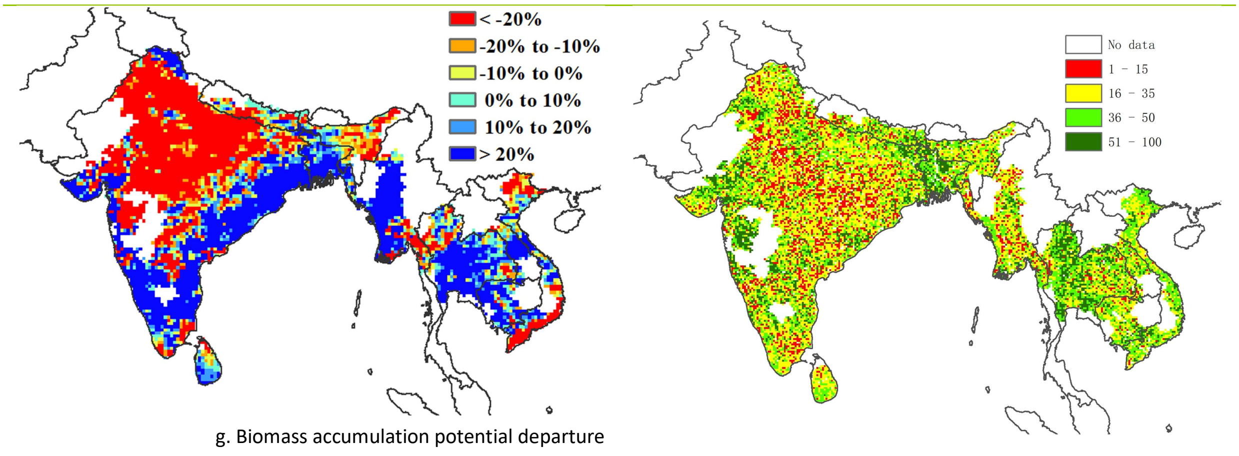
d. Profiles of temperature departure from average (mm)



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

During this reporting period, winter crops were overwintering or beyond and summer crops have been planted. Crop condition was above average in many parts of the continental Western European MPZ based on the integration of agroclimatic and agronomic indicators (figure 2.5).

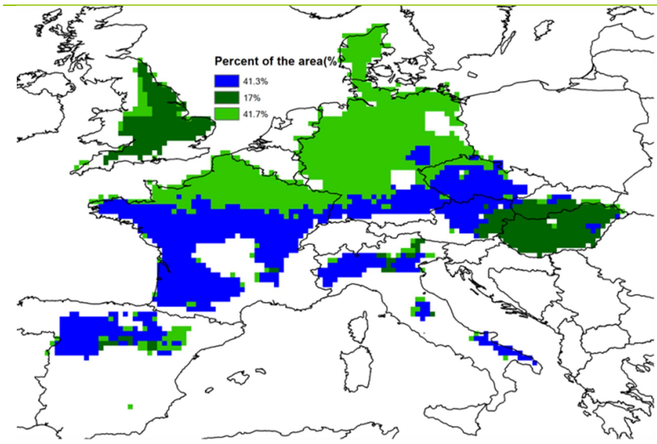
Although total rainfall was very close to average (+1%) vastly different patterns were recorded across the MPZ. Marked negative departures occurred in (1) vast areas in the United Kingdom, Hungary, east of Austria and south of Slovakia from January to early-February; (2) large parts of the Mediterranean region (Iberian Peninsula, Italian Peninsula), the Czech Republic, northeast of Austria and south of Germany from mid-January to early-February and after late-March; (3) Denmark, most of Germany and north of France from early-February to late-February. The most severely affected countries were the Czech Republic (RAIN, -23%), Italy (-19%), Austria (-14%), France (-13%) and Spain (-10%). Rain is badly needed in these regions to restore soil water reserves and create favorable conditions for the growth of winter crops. Abundant precipitation occurred at the end of February and the beginning of March in large parts of Spain, Italy, France and UK). The excess of rain caused delays to spring and summer crop sowing in large regions of France, Italy, the UK and Hungary.

Radiation for the MPZ as a whole was 7% below average, and so was temperature (-0.4°C). Below average temperatures were observed in most parts of the MPZ from late-January to mid-March. During the end of February and the begin of March, the central region of the MPZ was under the influence of a cold spell, with minimum temperatures that ranged from -10.0°C and below (France and Germany) to -20.0°C (Czech Republic, Slovakia and Hungary). A second cold spell affected the central region of the MPZ during the second half of March, with minimum temperatures below -8.0°C. Such conditions caused delays to the start of spring crop sowing and hampered the growth and development of winter crops; they did not, however, cause substantial damage to the crops.

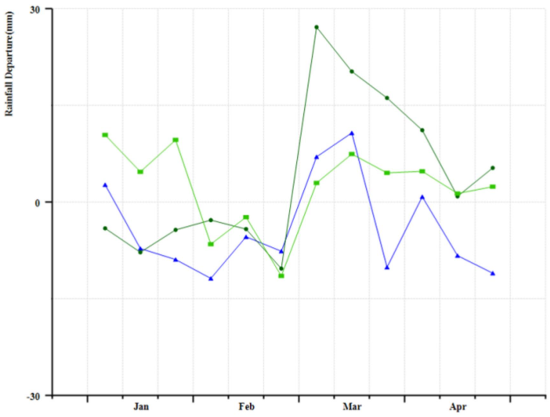
Due to uneven distribution of the rainfall and overall suitable temperature, the biomass accumulation potential BIOMSS was 2% above the recent five-year average. The lowest BIOMSS values (-20% and less) occurred in the central and west of France, north of Italy, most of the Czech Republic and Austria. In contrast, BIOMSS was above average (sometimes exceeding a 10% departure) over north of the France, most of Germany and Hungary, east of UK and most of Spain. More than 93% of arable lands were cropped, which is 2% below the recent five-year average. Most uncropped arable land is concentrated in Spain, northern Italy, and south-eastern France, as well as discrete distributions in in Austria, Hungary, and southwest England. The average maximum VCI for the MPZ reached 0.84 during this reporting period, indicating favorable crop condition.

Generally, crop condition of winter crops in Western Europe was favorable, but more rain will be needed in several important crop production areas to ensure an adequate soil moisture supply for the ongoing winter crop season to sustain good yields.

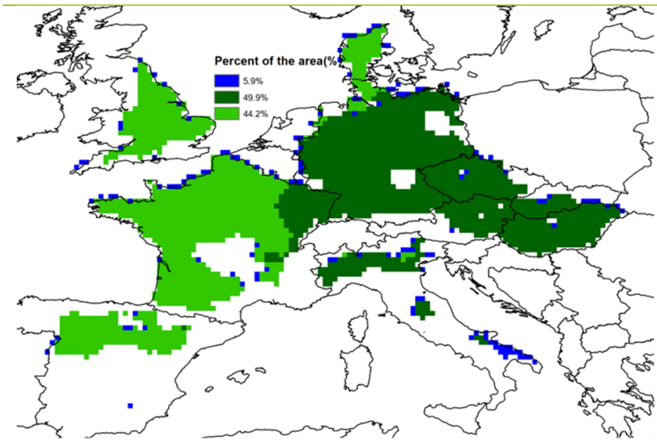
Figure 2.5. Western Europe MPZ: Agroclimatic and agronomic indicators, February 2018 to April 2018.



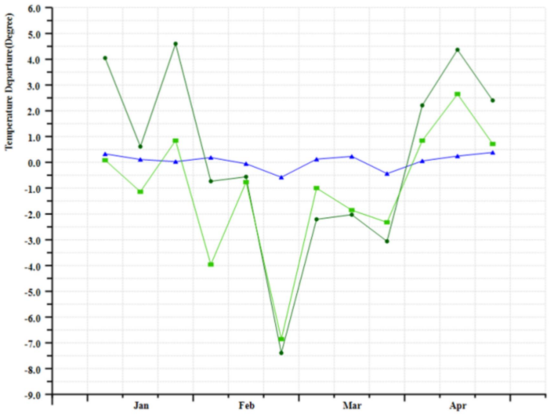
a. Spatial distribution of rainfall profiles



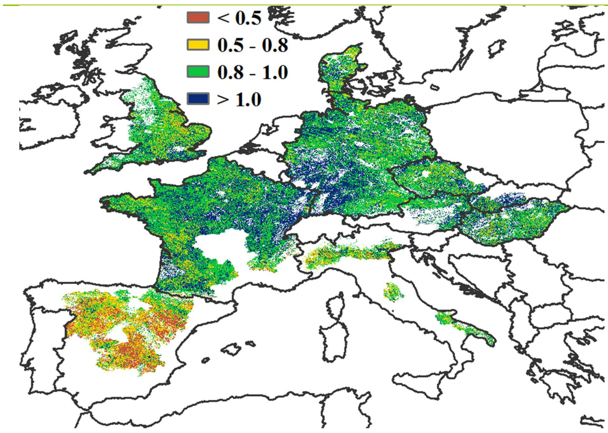
b. Profiles of rainfall departure from average (mm)



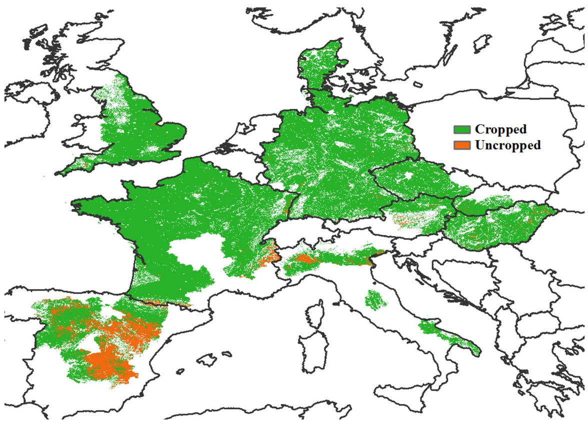
c. Spatial distribution of temperature profiles



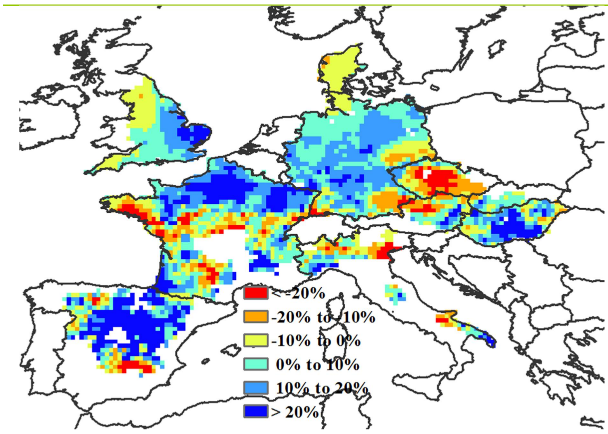
d. Profiles of temperature departure from average (mm)



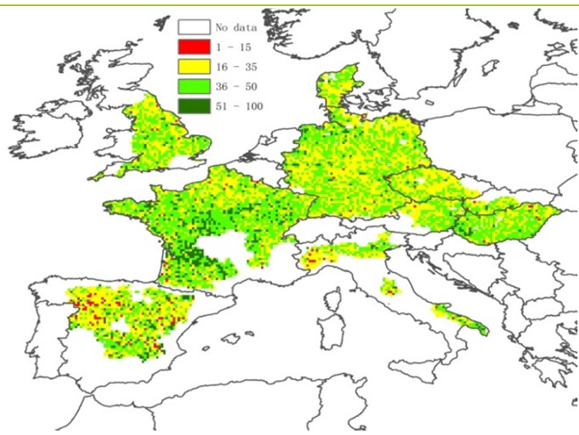
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

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

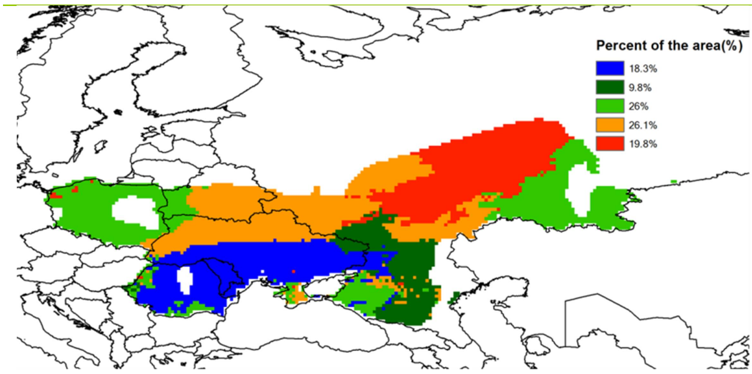
2.7 Central Europe to Western Russia

During the current monitoring period, main winter crops in central Europe to western Russia were in the field and dormant. On average, agro-climatic indicators show favourable conditions, with a 9% increase of rainfall over average, a 0.6°C decrease in temperature and stable radiation (figure 2.6).

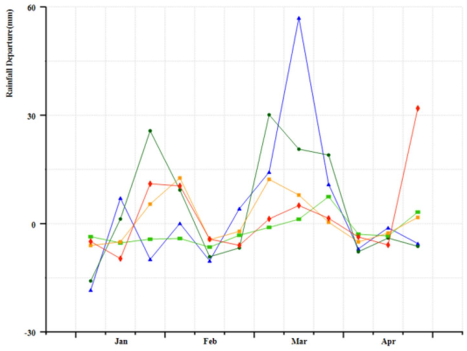
The rainfall profiles of the broad middle region of central Europe to western Russia—about half of the MPZ, experienced above average rainfall during the monitored period, especially in January and March, including Ukraine (RAIN, +15%), Moldova (RAIN, +61%), Romania (RAIN, +9%), and central and southern West Russia. The maximum precipitation occurred in March when precipitation was close to 60% above average in Romania, Moldova and in the south of Ukraine. Slightly below rainfall was observed in January and February within the following regions, including the eastern part of the Western Russia (Republic of Bashkortostan and the Oblasts of Chelyabinsk and Orenburg), the southern part of Western Russia (the Kray of Krasnodar), Western Belarus and Poland. Temperature profiles displayed below average values from February to March for almost whole Western Russia, most part of Ukraine and Moldova (as much as 3.5-7°C below average, affecting 65.4% of the MPZ), which might have some negative effects on the winter crops. However, the temperature in most areas started to rise from April, and more than 2.0°C to 5.0°C above average were recorded in western Belarus, Poland, Western Romania and western Ukraine in middle-April.

Altogether, the biomass accumulation potential (BIOMSS) of the MPZ was at an average level, being 3% below the recent five-year value. Largest increases (more than 20%) occurred in Moldova and the Kray of Stavropol in the southern part of Western Russian. According to the maximum VCI map values were above 0.8 in Poland, Belarus, Western Ukraine, Moldova and Romania. The maximum VCI was below 0.5 in most of the Western Russia, where the arable land was uncropped. For the MPZ as a whole CALF dropped 30 percentage points compared to the recent five-year average; a negative impact on production is likely.

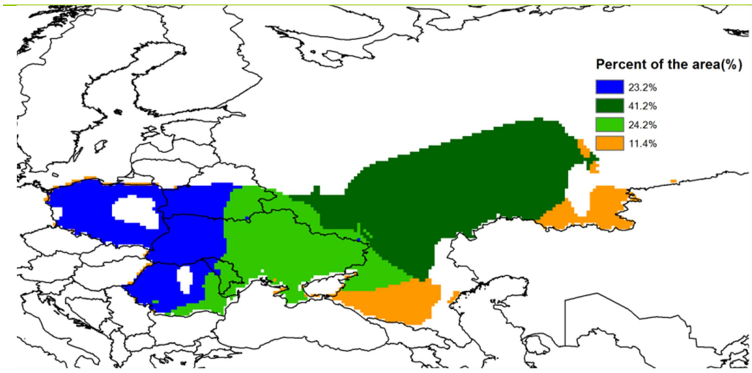
Figure 2.6. Central Europe-Western Russia MPZ: Agroclimatic and agronomic indicators, February 2018 to April 2018.



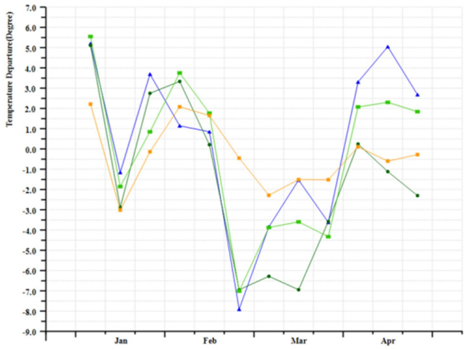
a. Spatial distribution of rainfall profiles



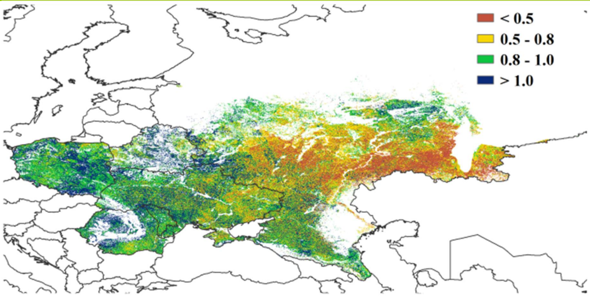
b. Profiles of rainfall departure from average (mm)



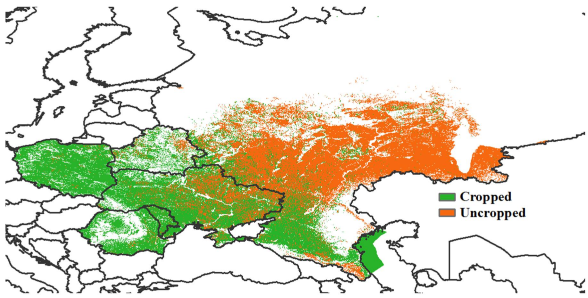
c. Spatial distribution of temperature profiles



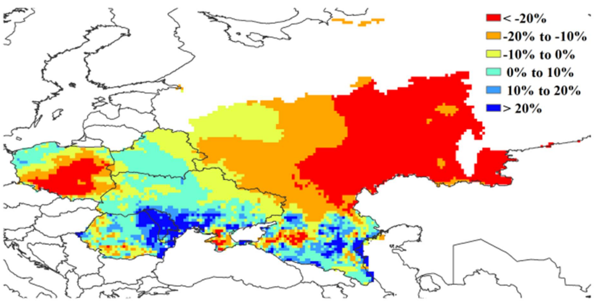
d. Profiles of temperature departure from average (mm)



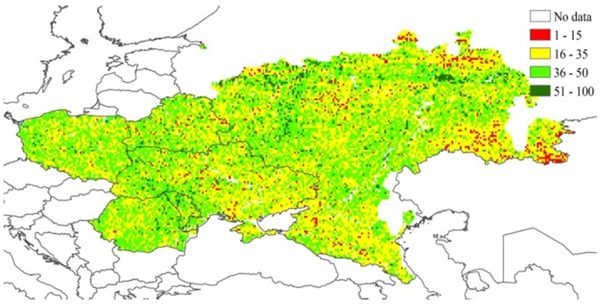
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



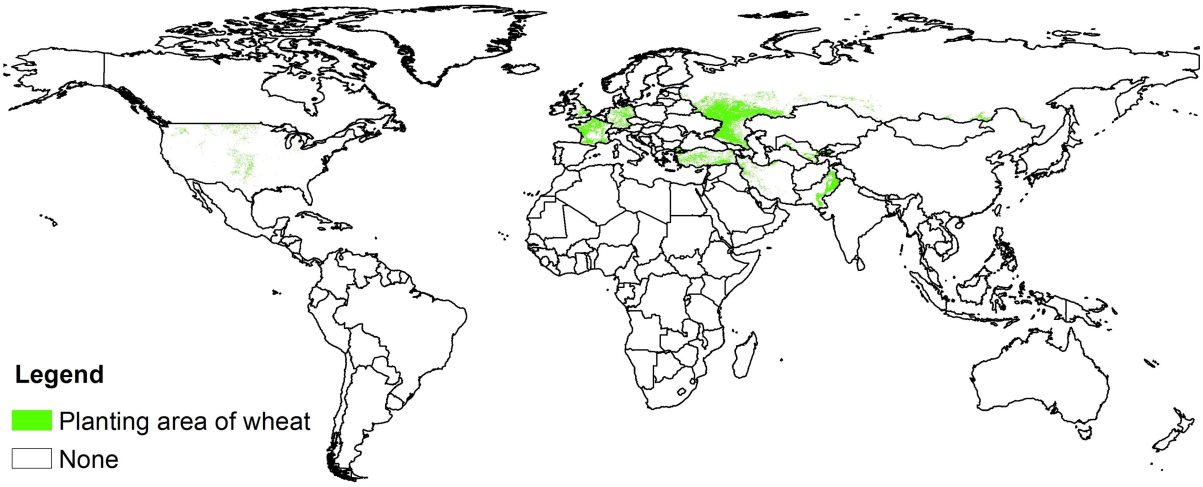
h. VHI minimum

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

2.8 Pests and diseases for winter wheat in north Hemisphere

In early May 2018, wheat pests and diseases were monitored using remote sensing in Russia, France, Turkey, Pakistan, United States, Germany, Iran, Uzbekistan, and the United Kingdom, generally showing only slight infestation levels. The distribution of wheat in 2018 is shown for the countries of interest in Figure 2.7. Cultivated areas are listed in Table 2.3 below.

Figure 2.7. Distribution of some winter wheat cultivation areas in north Hemisphere (2018)

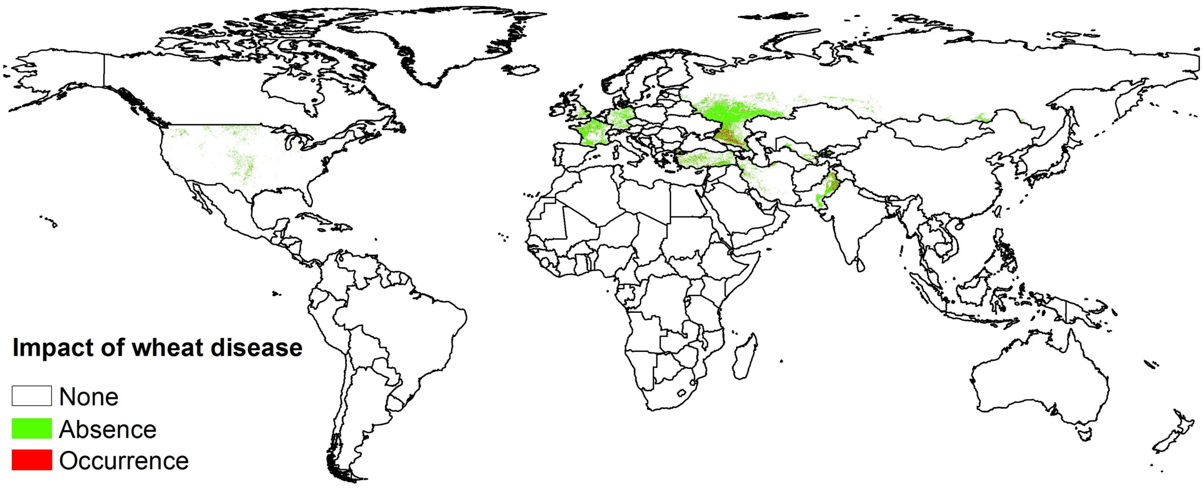


Distribution of wheat pests and diseases

The distribution of winter wheat pests and diseases in the northern hemisphere during early May 2018 is shown in Figure 2.8 and Figure 2.9. Statistics of winter wheat diseases and pests are listed in Table 2.3.

The area affected by **wheat rust** in Russia accounts for 9% of the total wheat area, with the disease mainly occurring in the Caucasus and the central economic region. In France, the disease occurs mainly in the maize, barley and livestock zone along the English Channel and the mixed maize/barley and rapeseed zone from the center to the Atlantic Ocean (4% of cultivated areas). 12% of wheat areas are infested in Turkey, mainly in central Anatolia, and the Marmara, Aegean and Mediterranean lowland region. Affected areas in Pakistan reach 17%, essentially the northern highlands and northern Punjab. The affected areas in Iran (10%) occur mainly in the semi-arid to sub-tropical hills of the west and the north. In Uzbekistan the rust affects 14% of wheat areas, mainly in eastern hilly cereals zone and in the Aral Sea cotton zone. In the United Kingdom the pathogen occurs in 8% of wheat areas, mainly in the south English mixed wheat and barley zone, and sparse crop area of N England, Wales and N. Ireland. **Fusarium head blight** is mentioned essentially for the United States where the fungus occurs in 5% of wheat growing areas, mainly in the southern plains, California, and the northwest.

Figure 2.8. Distribution of winter wheat diseases in the northern Hemisphere (early May 2018)



The area affected by **wheat aphids** in Russia accounts for 10% of the total wheat area, with the pest mainly occurring in the Volga basin, the Caucasus, and the central economic Region. The affected area in France is the same as the one mentioned above for wheat rust. In Pakistan, the insect affects 22% of wheat areas, mainly in the northern highlands, northern Punjab, and lower Indus river basin in south Punjab and Sindh. In the United States infested areas cover 5% of wheat areas mainly in the southern plains and the northwest. In Germany, the central wheat zone of Saxony and Thuringia, Schleswig-Holstein and the Baltic coast, and the mixed wheat and sugar beets zone of the north-west are affected, representing 9% of wheat areas. In Iran, 12% of wheat areas suffered from aphids, mainly in the western hills and the north. The affected area in Uzbekistan encompasses 17% of wheat producing areas, mainly in the east. The affected area in the United Kingdom accounts for 11% of wheat land, mainly in the south English mixed wheat and barley zone.

Figure 2.9. Distribution of winter wheat pest for in the northern Hemisphere (early May 2018)

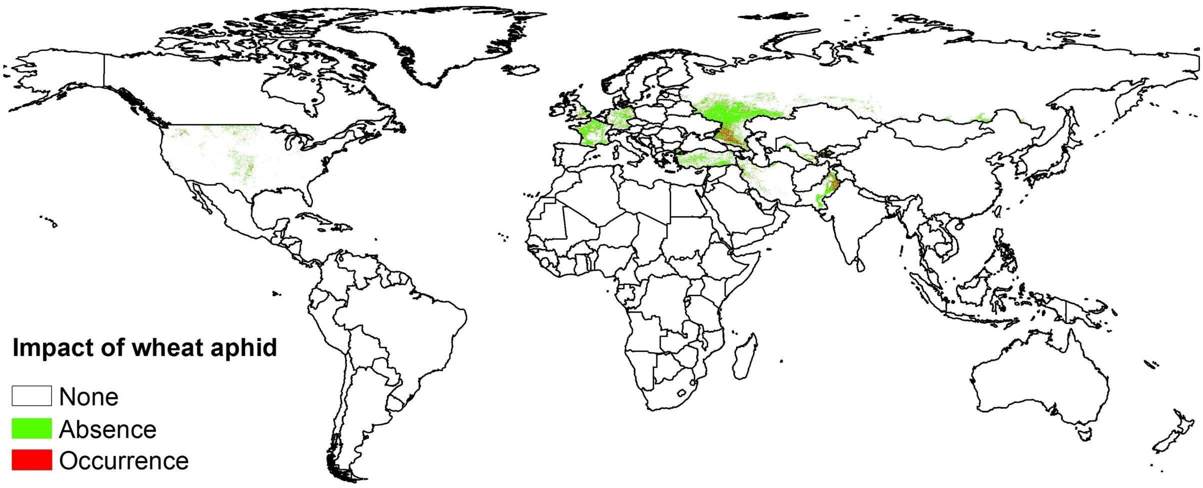


Table 2.3. Statistics of winter wheat diseases and pests in the northern Hemisphere (early May 2018)

Countries	Disease and pest occurrence ratio / %			Total planted area/ million hectares
	Rust	Fusarium head blight	Aphids	
Russia	9	/	10	15.5
France	4	/	5	3.7
Turkey	12	/	/	3.7
Pakistan	17	/	22	3.2
United States	/	5	5	2.5
Germany	/	/	9	1.9
Iran	10	/	12	1.5
Uzbekistan	14	/	17	1.2
United Kingdom	8	/	11	0.7

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 41 countries that together produce and commercialize more than 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 30+11+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.

Rainfall anomalies

The current reporting period is characterized by an unusually large number of countries with anomalous rainfall. Interestingly, few water-related disasters were reported, including essentially drought in parts of South America (Uruguay with RAIN at -14% and N. Argentina, with the national RAIN departure at -18%) and some floods in Europe and, especially the Horn of Africa (Chapter 5.2). Table 3.1 provides an overview of countries and groups of countries with positive and negative rainfall departures in excess of 25%.

[LEGEND Table 3.1: Groups of countries with rainfall anomalies in excess of -25% and +25%. Numbers between square brackets indicate the number of countries where the departure for each variable has the same sign as the average. Countries and territories are identified by their ISO 3166-1 alpha-3 codes given at the end of the table.

Table 3.1: Groups of countries with rainfall anomalies in excess of -25% and +25%

	Region	N	Countries	ΔRAIN	ΔTEMP	ΔRADPAR	ΔBIOMSS
				%	**°C**	**%**	**%**
1	amc	2	DMA, TTO	-57 [2]	-1.0 [2]	-1 [2]	-41 [2]
2	asw	2	OMN, ARE	-51 [2]	-0.1 [1]	-1 [2]	-34 [2]
3	afo	3	MRT, NER, TCD	-47 [3]	-0.8 [3]	-5 [3]	-48 [3]
4	med	5	MNE, CYP, TUN, SVN, PRT	-37 [5]	+0.3 [4]	-7 [5]	-14 [4]
5	ass	1	JAK	−36	+2.0	−2	−8
6	ams	2	GUF, ECU	-35 [2]	-1.3 [2]	-3 [2]	-17 [2]
7	afe	2	ERI, SDN	-35 [2]	-1.3 [2]	0 [1]	-41 [2]

8	asc	1	MNG	+31	+1.5	−3	+27
9	eur	2	GBR, IRL	+36 [2]	-1.9 [2]	-12 [2]	-5 [2]
10	asse	1	PHL	+38	−0.5	−2	+18
11	asw	7	ISR, AZE, IRQ, JOR, ARM, YEM, KWT	+46 [7]	+1.0 [6]	-7 [7]	+29 [7]
12	afo	5	BFA, TGO, BEN, GMB, GNB	+52 [5]	-0.8 [5]	-7 [5]	+43.8 [5]
13	eur	1	MDA	+61	+0	+2	+28
14	afe	3	SSD, KEN, SOM	+66 [3]	-1.5 [3]	-5 [3]	44 [3]
15	amc	10	JAM, CRI, GTM, NIC, PAN, HTI, CUB, SLV, BLZ, MEX	+67 [10]	-0.3 [7]	-2 [10]	30 [10]

Notes. Region codes: afe east Africa, afo west Africa, amc central America and Caribbean including Mexico, ams south America, asc central Asia, ass southern Asia, asse south-east Asia, asw western Asia, eur Europe, med Mediterranean including Portugal. Country codes: ARE United Arab Emirates, ARM Armenia, AZE Azerbaijan, BEN Benin, BFA Burkina Faso, BLZ Belize, CRI Costa Rica, CUB Cuba, CYP Cyprus, DMA Dominica, ECU Ecuador, ERI Eritrea, GBR United Kingdom, GMB Gambia, GNB Guinea Bissau, GTM Guatemala, GUF French Guyana, HTI Haiti, IRL Ireland, IRQ Iraq, ISR Israel, JAK Jammu and Kashmir, JAM Jamaica, JOR Jordan, KEN Kenya, KWT Kuwait, MDA Macedonia, MEX Mexico, MNE Montenegro, MNG Mongolia, MRT Mauritania, NER Niger, NIC Nicaragua, OMN Oman, PAN Panama, PHL Philippines, PRT Portugal, SDN North Sudan, SLV Slovenia, SOM Somalia, SSD South Sudan, SVN Slovenia, TCD Chad, TGO Togo, TTO Trinidad and Tobago, TUN Tunisia, YEM Yemen.]

Table 3.2. CropWatch agroclimatic and agronomic indicators for January to April 2018, departure from 5YA and 15YA

Country	Agroclimatic Indicators				Agronomic Indicators	
	Departure from 15YA (2002-2016)				Departure from 5YA (2012-2016)	Current
	RAIN (%)	TEMP (°C)	RADPAR (%)	BIOMSS (%)	CALF (%)	Maximum VCI
Argentina	-18	0.1	1	-11	-3	0.66
Australia	-7	0.3	0	-13	-34	0.45
Bangladesh	20	-1.0	-12	32	1	0.91
Brazil	1	-0.7	-2	0	1	0.75
Cambodia	4	-1.4	-7	6	16	0.78
Canada	25	-0.8	-3	-9	-49	0.62
China	-8	0.1	-8	7	-14	0.54
Egypt	-20	1.0	-6	20	1	0.74
Ethiopia	1	-1.3	-2	1	4	0.63
France	-13	-0.7	-11	-1	0	0.88
Germany	6	0.1	1	6	0	0.90
India	-15	0.2	-6	-4	5	0.79
Indonesia	-2	-0.6	-2	-1	0	0.83
Iran	-8	1.4	-9	-8	5	0.61
Kazakhstan	16	-1.2	-8	0	-46	0.52
Mexico	31	0.0	-4	9	-2	0.72
Myanmar	-9	-0.3	-9	0	12	0.86
Nigeria	25	-1.0	-11	21	-15	0.59
Pakistan	-16	0.9	-4	-10	-2	0.67
Philippines	38	-0.5	-2	18	0	0.87
Poland	-19	0.1	3	-11	-1	0.92
Romania	9	0.9	-3	14	0	0.86
Russia	9	-0.9	-2	-9	-57	0.67
S. Africa	1	-0.4	-1	0	4	0.65
Thailand	2	-1.1	-8	9	6	0.79
Turkey	0	2.8	-4	10	10	0.92
Ukraine	8	-1.9	-8	-11	1	0.89
United Kingdom	18	1.4	-13	8	13	1.04
United States	-9	-0.1	-1	-3	5	0.91
Uzbekistan	-7	0.3	2	-11	-	0.95
Vietnam	38	-0.4	-14	27	0	0.93

Note: No sign means a positive (+) departure.

A first observation is that the 15 country groups based on their rainfall departures from average are rather consistent for other variables as well. For instance, in group 12 which groups five West African countries (BFA, TGO, BEN, GMB, GNB), the departures for TEMP, RADPAR and BIOMASS indicate colder than average weather, low sunshine and larger than average biomass production potential in all five countries.

The three first groups do not raise concern as they are currently in their dry seasons or normally do not practice much agriculture.

Group 4 (RAIN -37%), is part of the Mediterranean basin where the current winter season is also the main cereal growing period. Rainfall was nevertheless fair over Slovenia (201 mm), Montenegro (333 mm) and Portugal (179 mm) where evapotranspiration and crop water demand were low. In Cyprus and Tunisia, however, crop water requirement reaches 50 to 100 mm per month, so that the recorded amounts (97 mm and 74 mm over the 4 months JFMA reporting period) may result in crop water stress.

In Jammu and Kashmir (Group 5), the winter crop season is coming to an end in the lowlands. High temperature, however, which is part of the heatwave which has affected Pakistan and surrounding areas, has increased crop water requirements and water stress is likely to have occurred.

The two countries in Group 6 (French Guyana and Ecuador) are basically unrelated, and they are separated by countries with above average precipitation such as Colombia and Venezuela. The deficit should not have seriously affected crops, which are at the end of their growing season in the Pacific lowlands in Ecuador. The Amazonian (eastern) part of Ecuador and French Guyana has very long equatorial seasons which are rather resilient against water stress.

Group 7 (Eritrea and Sudan) are currently beyond harvest, with Sudan cultivating winter crops which are, however, mostly irrigated.

Among the remaining groups, many are semiarid and excess rainfall – with the exception of possible local floods – is mostly a useful source of soil moisture, even if present temperature (i.e. winter) conditions do not permit much biomass development. This applies, for instance, to Mongolia (Group 8). The countries of Group 11 (+46% RAIN on average) as well as 13 (Macedonia) mostly cultivate winter crops and the additional moisture is welcome, especially where irrigated crops dominate the agricultural landscape (Israel, Jordan…).

Some of the West African countries in Group 12 (Burkina Faso, Gambia and Guinea) are currently not in their rainy season, which will start in summer. The abundant rainfall can be interpreted as an early start of the season. Togo and Benin have two rainy seasons in the south, with the first starting around March. Both countries have benefited from the abundant precipitation which has provided a good start for the first season.

Of the countries of Group 14, two have large semi-arid stretches (Kenya, Somalia) where drought staples are livestock prevail. Both are at planting stage for their main season (long rains in Kenya and Gu season in Somalia). South Sudan normally enjoys much wetter conditions, especially in the west. Kenya and Somalia floods are mentioned in the section on disasters (Chapter 5.X) but much of the problems are linked to large displaced populations. In general, the abundant precipitation should have benefited farming and food production.

A wide diversity of crop situations exists among the 10 countries of Group 15. Most of them grow winter crops (including winter maize) and it can be assumed that the abundant precipitation was favourable to winter crops nearing the end of their cycles, especially in Mexico where normal winter rainfall tends to be low.

Temperature anomalies

Some below average temperatures close to larger than 2.0 °C occurred in Norway, Ireland (as part of the cold spell referred to as “The Beast from the East” (refer to Chapter 5.X on Disasters) and Yemen, where a marked excess of rainfall was recorded. The “Beast of the East” also affected much of western Russia and Kazakhstan, Scandinavia and Western Europe from France to Spain as well as Morocco.

The highest temperature departures are those associated with the late March- early April heat wave centered around Iran (refer to figure 5XB in the section on disasters). They include Syria (+2.9°C), Turkey (+2.8°C), Armenia (+2.4°C), Iraq and Jammu and Kashmir (both at +2.0°C). Other countries of the same group, although they report smaller temperature excesses, include Iran, Mongolia, Jordan, Tajikistan and Georgia with departures increasing from +1.4°C to +1.9°C. Spatially, the area is easy to recognize in Figure 5.2.

RADPAR anomalies

As stressed in chapter 1, at the global scale negative sunshine departures predominate. In India, for instance, all States had below average sunshine, resulting in a national departure of -6%. Individual States had record negative departures between 10 and 13% (Meghalaya, Mizoram, Manipur, Tripura, Nagaland, Assam, Sikkim and West Bengal). Neighbouring Bangladesh reached -12%, one of the lowest values at the national level, comparable to the United Kingdom and Ireland (also at -12%) and exceeded only by Liberia (-13%).

Countries with positive departures are few; they include Uruguay (+4% RADPAR) and Ecuador (+3%; both suffered drought conditions) and Poland (+3%, accompanied by a 19% drop in rainfall). Uruguay is part of an area that stretches from Buenos Aires to the north-western provinces of Argentina. Poland, on the other hand, is the westernmost part of an area that reaches north as far as Finland (+2%) and Norway (+1%) and east to Ukraine (+2%) and Russia (Mordovia +3% and the Oblasts of Kursk +3%, Ryazan +3%, Nizhny Novgorod +4% and Kirov 7%.

BIOMSS

Due to the dominant role of water as a limiting factor of biomass production, the distribution of the BIOMSS indicator closely follows the distribution of RAIN… at least as long as TEMP does not interfere too much. For the present reporting period, we noted in chapter 1 that, globally, “80% of its variations or BIOMSS can be ascribed to RAIN variations and 20% only to TEMP”.

Because of the large temperature anomaly associated with the “Beast from the East”, it appears clearly, when comparing figures 3.1 and 3.4, that rainfall excesses over Russia are associated with BIOMSS deficits. In fact, as clearly shown in Figures 3.5 and 3.6, temperature dominates BIOMSS: in the major production zones of Russia, the role of RAIN in the variability of BIOMSS is negligible during the current reporting period, just 1% (R^2=0.0079). TEMP, on the other hand, accounts for 72%. It is likely that higher percentages would be achieved if the reference periods for TEMP and RAIN (2003-2017) and BIOMSS (2013-2017) were identical.

Figure 3.1. Global map of January to April 2018 rainfall (RAIN) by country and sub-national areas, departure from 15YA (percentage)

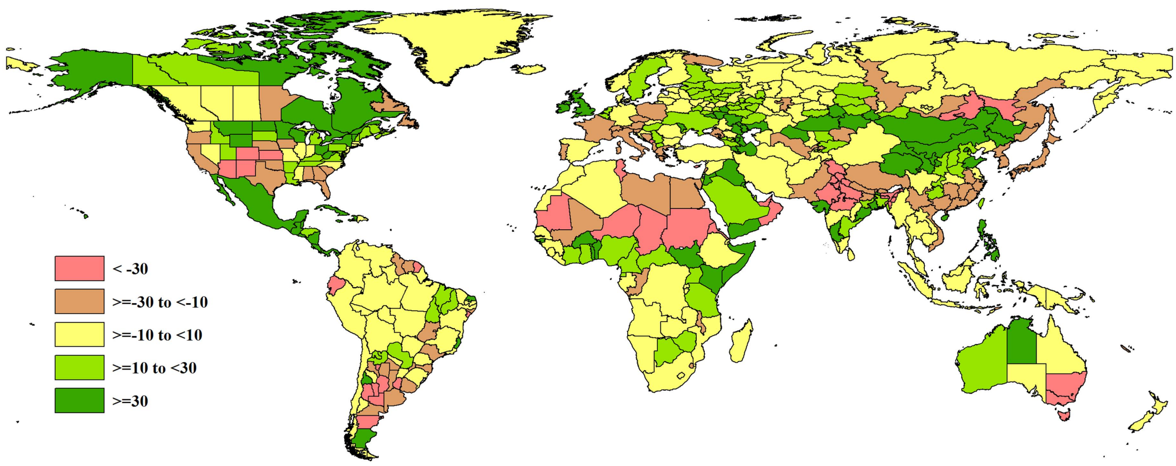


Figure 3.2. Global map of January to April 2018 temperature (TEMP) by country and sub-national areas, departure from 15YA (degrees)

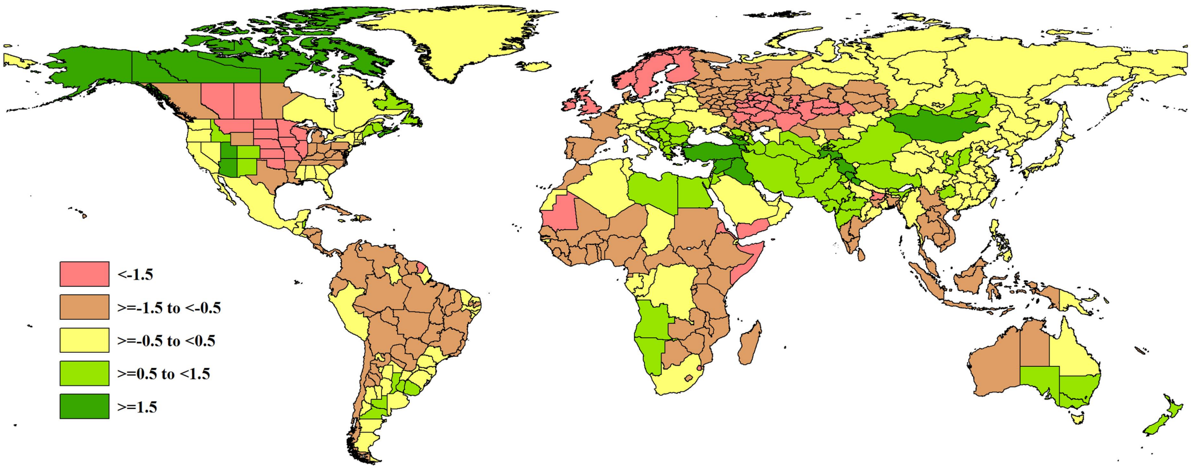


Figure 3.3. Global map of October January to April 2018 PAR (RADPAR) by country and sub-national areas, departure from 15YA (percentage)

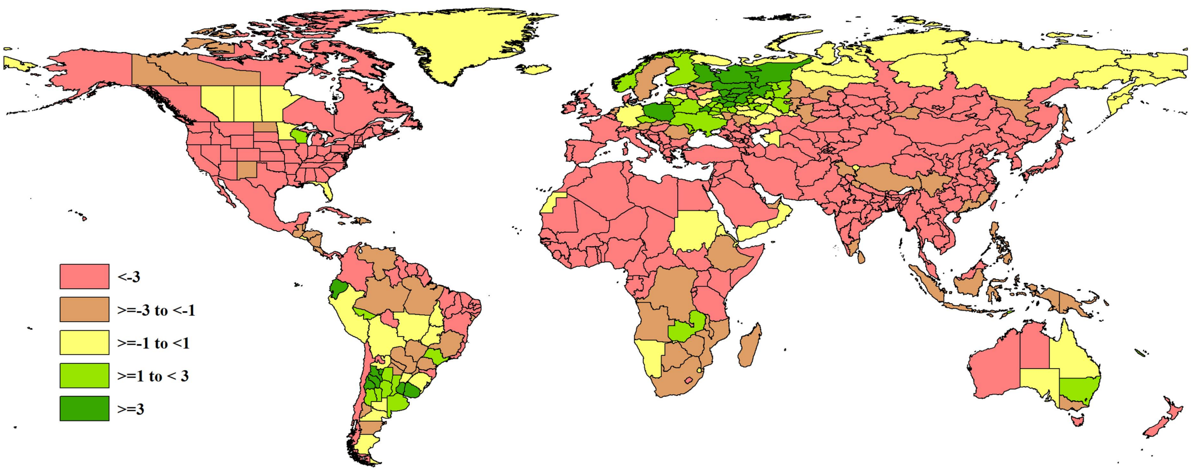


Figure 3.4. Global map of January to April 2018 biomass (BIOMSS) by country and sub-national areas, departure from 15YA (percentage)

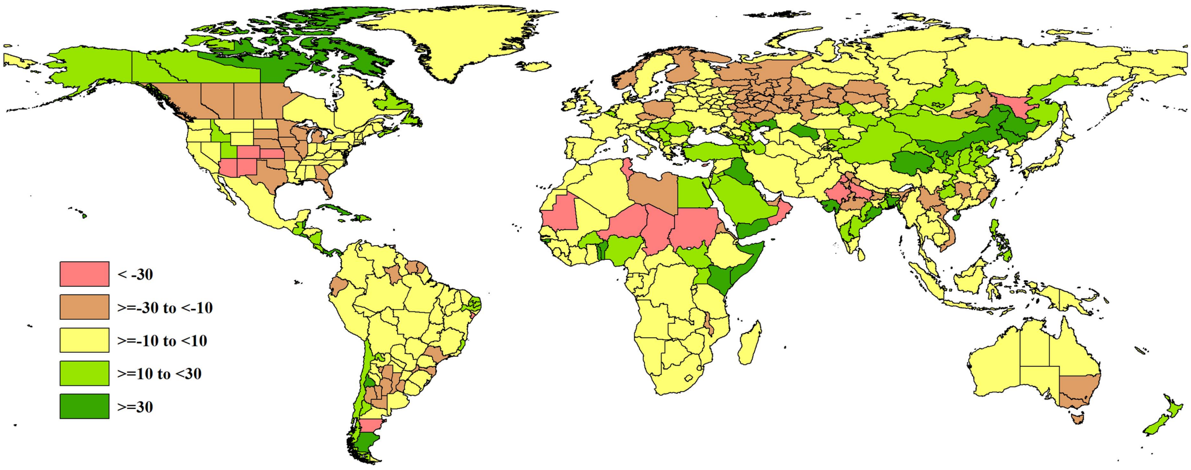


Figure 3.5 : Dependence of percent BIOMSS departure from 2013-17 average on RAIN percent departure from 2003-2017 average.

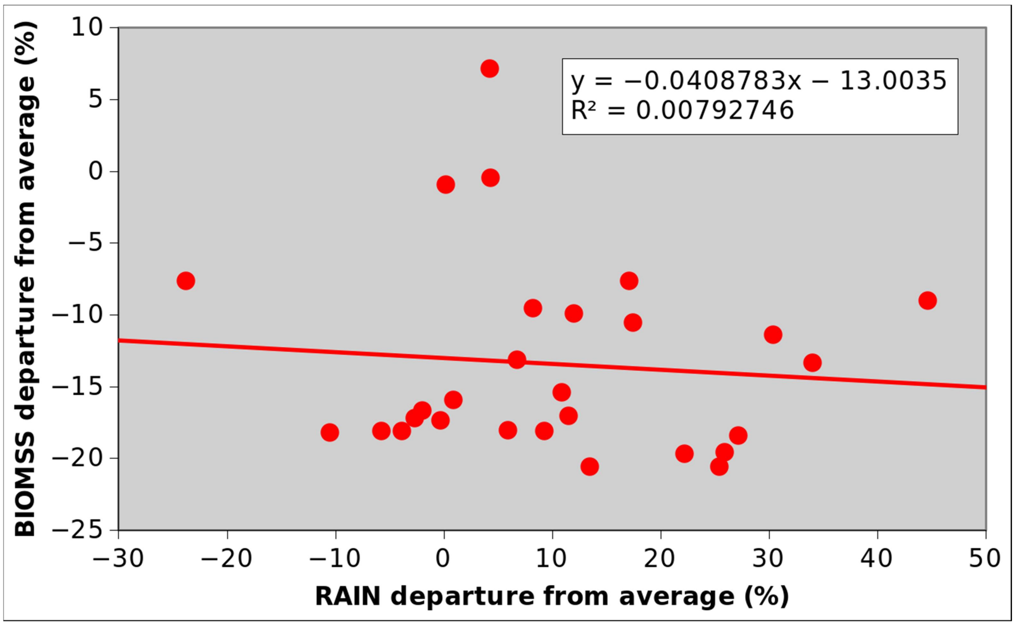
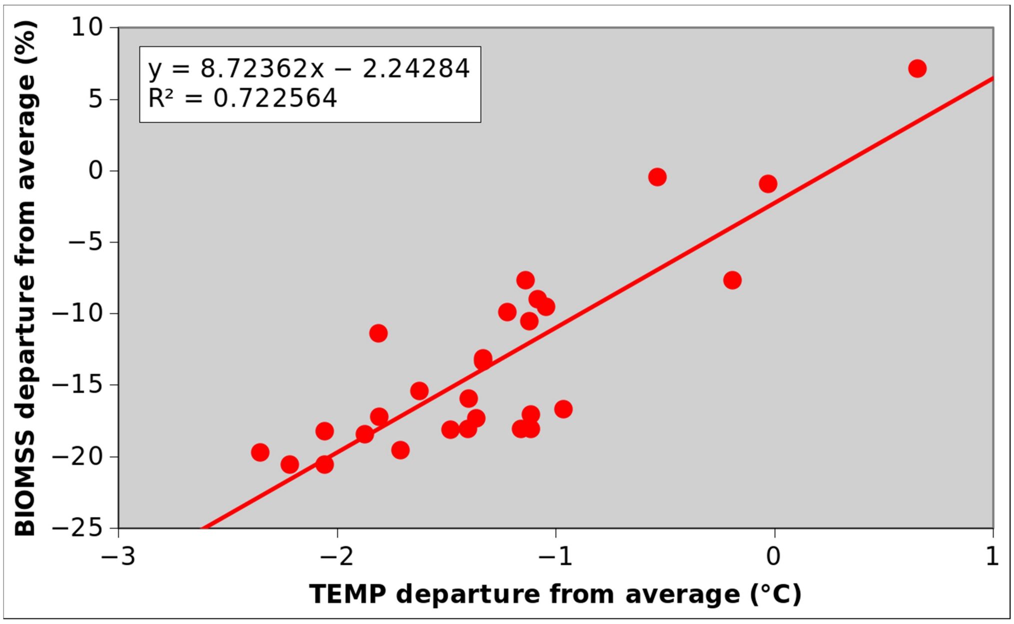


Figure 3.6: Dependence of percent BIOMSS departure from 2013-17 average on TEMP percent departure from 2003-2017 average.



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 January-April 2018 period to the previous season and the five-year average (5YA) and maximum; (c) Maximum VCI (over arable land mask) for January-April 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 January-April 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 3.7 - 3.47.; Crop condition for individual countries ([AFG] Afghanistan - [ZMB] Zambia) including sub-national regions during January-April 2018.

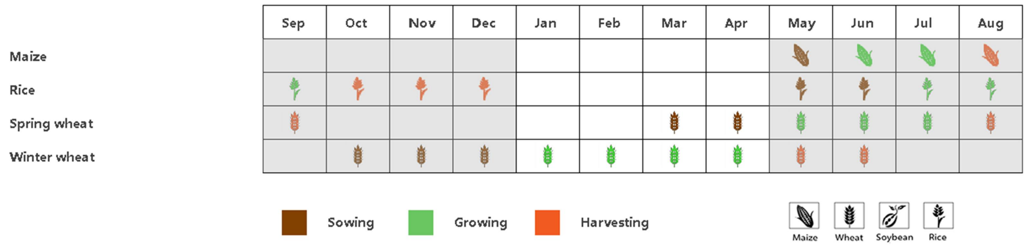
AFG AGO ARG AUS BGD BLR BRA CAN DEU EGY ETH FRA GBR HUN IDN IND IRN ITA KAZ KEN KHM LKA MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[AFG] Afghanistan

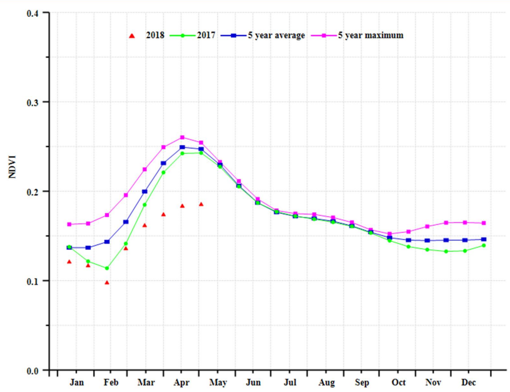
Afghanistan is a new inclusion in CropWatch system. The country is part of the semi-arid climate area that extends from the Sahara to central Asia. Wheat is by far the major cereal but maize, barley and rice are also grown. The reporting period corresponds to winter wheat and early spring wheat. The country recorded average rainfall (203 mm), above average TEMP (6.7°C, +0.8°C) and below average RADPAR (979 MJ/m², -5%), which resulted in average BIOMSS (640 gDM/m², +1%) .

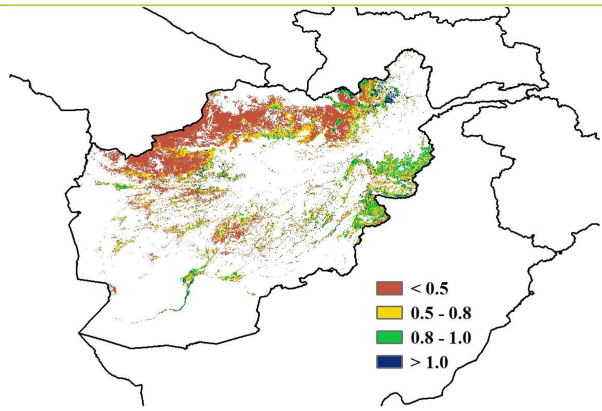
The cropped arable land fraction (CALF) was only 5%, which represents a very significant drop (-63%) below the 5YA. According to the NDVI profiles for the country, 74.6% of the areas had below average crop condition. NDVI was very low (below 5 year average), and it was below 0.2 even at its peak. Low VCIx (0.31) indicates poor crop condition; there are only some patches of high VCIx in the east. CropWatch estimates the production of wheat in the country to be 21.7% below last year's.

Figure 3.7. Afghanistan's crop condition, January-April 2018



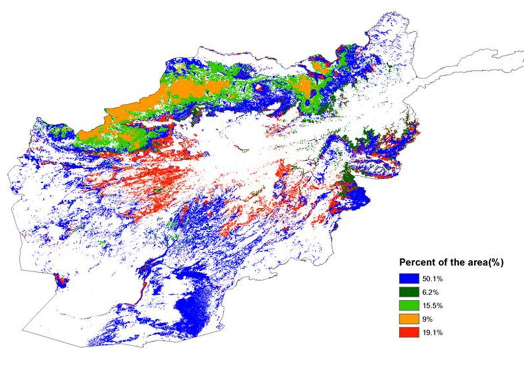
(a). Phenology of major crops

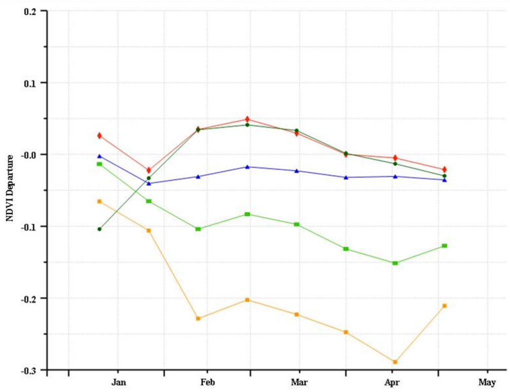




(b) Crop condition development graph based on NDVI

(c) Maximum VCI





(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles

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

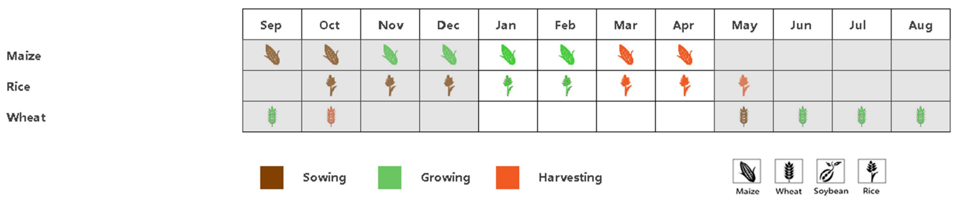
Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Wheat	4280.0	-24.6%	3.9%	3353	-21.7%

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

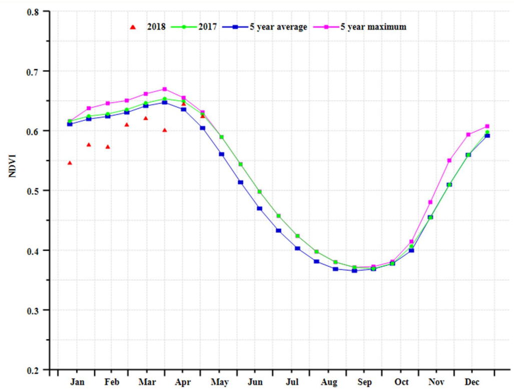
[AGO] Angola

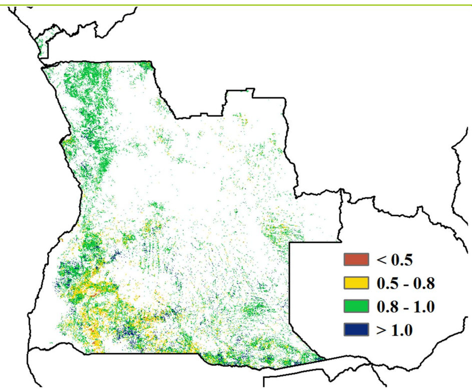
The majority of the maize, an important staple in Angola, was at peak growth stage at the commencement of monitoring period. Similarly rice, an equally important staple and export crop was at peak biomass development and both were being harvested in late April (VCIx 0.53) . Apart from these cereals, grain legumes such as soybeans play a growing role in the Angola agricultural sector. These crops mostly depend on a unimodal rainfall type, which is common to most countries in Southern Africa. Crop conditions were favorable between January and April as reflected in parts of Zaire, Bengo, Cuanza Sul, and Cuando-Cubango Provinces with VCIx between 0.8 and 1.0. Accumulated rainfall (RAIN) was above the average (+5%), while the temperature increased by 0.6°C. Radiation on the other hand (RADPAR) was slightly below average (-2%). The Biomass was above average (BIOMSS +3%) due to good conditions that prevailed during growing season as the crop water requirements were sufficiently met. The CALF was unchanged despite last season's droughts that ravaged the region. CropWatch's estimated production for maize is slightly, though not significantly higher than that of the previous season.

Figure 3.8. Angola's crop condition, January-April 2018



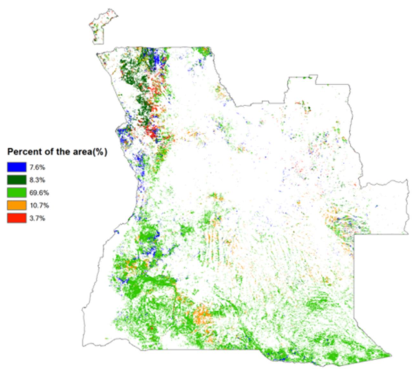
(a). Phenology of major crops

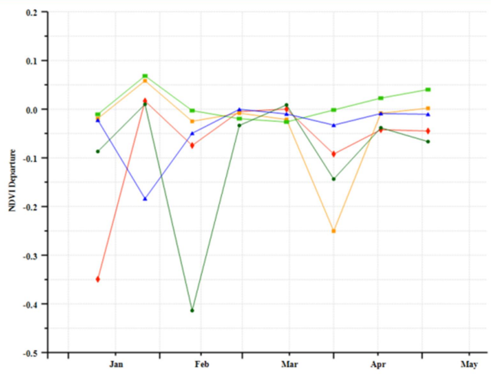




(b) Crop condition development graph based on NDVI

(c) Maximum VCI





(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles

Table 3.4. CropWatch-estimated Maize production for Angola in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Maize	2680	2.1%	2.0%	2791	4.1%

[ARG] Argentina

The peak of the summer crops (soybean, maize and rice) growing season of as well as maturity of early summer crops occurred during the period being reported on. Early summer crops were being harvested at the end of the period and late crops are near maturity.

Rainfall showed a marked negative anomaly (-18%), while temperature and radiation were close to average (+0.1°C and 1%, respectively). These conditions led to a significant reduction in BIOMSS of 11%.

The crop condition development graph based on NDVI shows much lower values than both average and last year, with a peak near 0.55 compared to an average peak near 0.65. The spatial distribution of NDVI profiles identify negative anomalies for all the groups over February to April, while two groups show negative values for most of the period. The strongest negative anomaly is observed in the South-West, north-eastern Pampas and South Mesopotamia.

Maximum VCI below 0.8 for almost half of the national cropland reflects the poor climatic conditions observed in the country. In particular, the lowest VCI values are observed in the south-eastern and north-eastern Pampas and the south of Mesopotamia. The CropWatch estimates for Soybean, Maize and Rice are 8%, 4% and 15% below previous year's production.

Regional analysis

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.

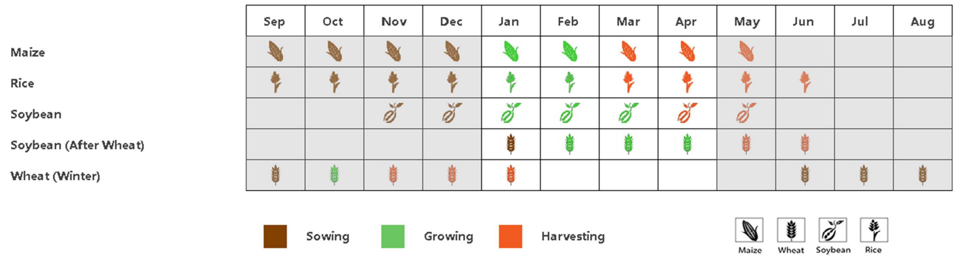
Two of the regions, the Pampas and Mesopotamia, showed a similar behavior with reductions in RAIN of 27% (Pampas) and 23% (Mesopotamia), minor increments in TEMP (0.4°C in the Pampas and 0.1°C in Mesopotamia) and an increase in RADPAR consistent with low rainfall (+2% for areas). The Chaco region showed a lower reduction in RAIN (-7%) and about average temperature and RADPAR (-1%).

The Subtropical highlands, however, recorded average RAIN with a slight reduction in TEMP (-0.5 degree) and an increment in RADPAR (1%). Changes in BIOMSS for each regions were associated to the magnitude and sign of the anomaly in RAIN, with a high decrease in the Pampas (-17%), followed by Mesopotamia (-14%) and the Chaco (-5%). The Subtropical Highlands show an increment in BIOMSS of 1%. Unexpectedly, VCIx was highest for the Pampas (0.72), with an average of 0.63 for the four regions.

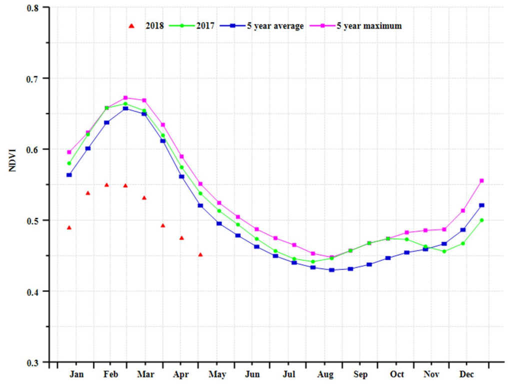
According to the cropped arable land fraction indicator (CALF), Mesopotamia and Chaco underwent almost no change, while the Pampas showed a reduction of 2% and Subtropical highlands an increment of 1%.

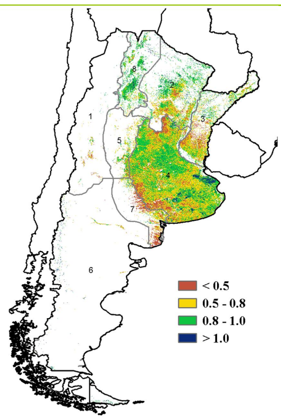
Regional NDVI profiles show a similar negative anomaly pattern during the first three months (critical period for growing) for the regions with negative RAIN anomaly (Pampas, Mesopotamia and Chaco). Subtropical highlands show a pattern that is near to average conditions.

Figure 3.9. Argentina's crop condition, January-April 2018

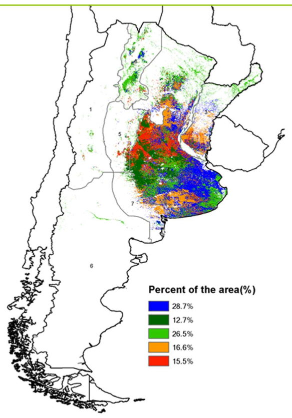


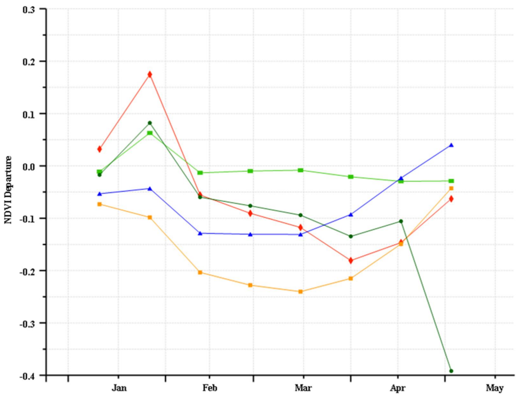
(a). Phenology of major crops



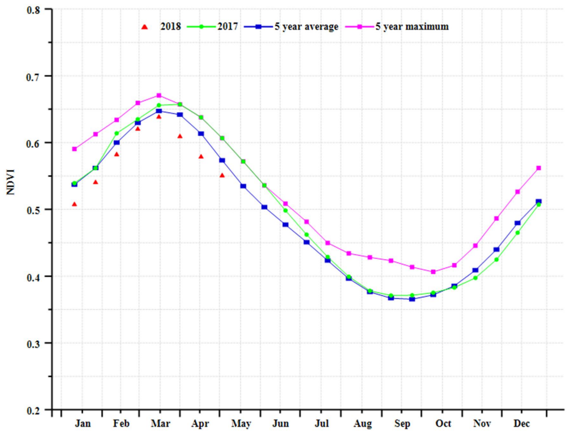


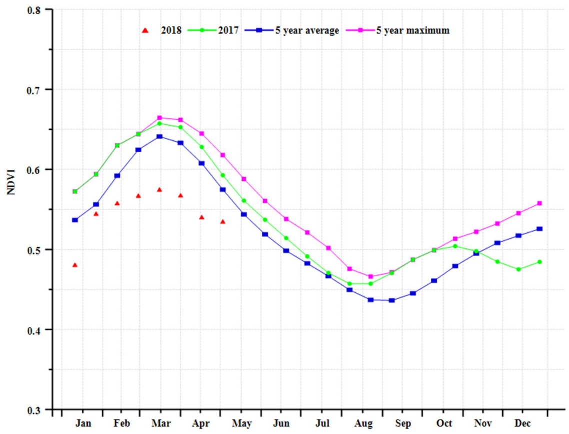
(b) Crop condition development graph based on NDVI (c) Maximum VCI



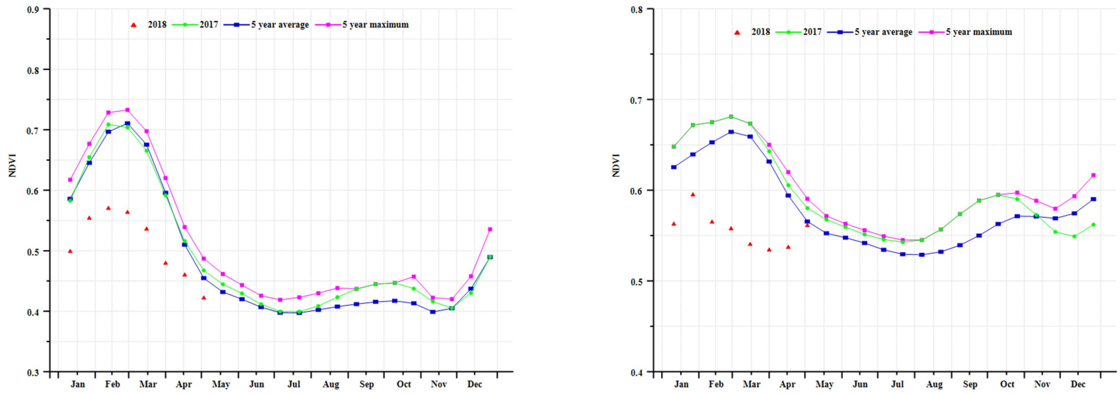


(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles





(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 3.5. Argentina's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	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
Chaco	517	-7	25.6	-0.1	1134	-1
Mesopotamia	499	-23	24.7	0.1	1178	2

Table 3.6. Argentina's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	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 3.7. 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

Wheat and barley, the main cereal crops of Australia, are usually planted from May to July and harvested from October to January. The monitored period thus covers only the end of the last harvesting season with no crops in the field for most of the reporting period.

Agroclimatic indicators in Australia show overall average condition for January to April: RAIN 7%, TEMP +0.3°C, RADPAR 0%. As a result, the biomass accumulation potential shows a decrease of 13% compared with recent years. Positive departures of rain (+19%) were recorded in Western Australia, contributing to favorable soil moisture conditions for the planting of wheat and barley in the coming month. The maximum VCI is 0.45 all over the region, except for southeastern Queensland (0.8), where cotton has reached maturity. Although CALF decreased by 34 percentage points compared with the recent five-year average, this does not necessarily indicate a reduction of the planted area at this time of the season.

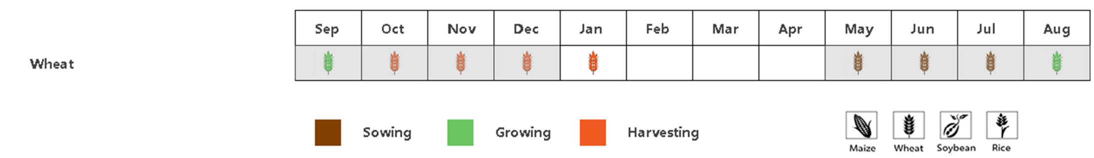
Regional analysis

This analysis adopts five agro-ecological regions for Australia, namely the Southeastern Wheat Zone, Southwestern Wheat Zone, Arid and Semi-arid Zone, Wet Temperate and Subtropical Zone, and Sub-humid Subtropical Zone.

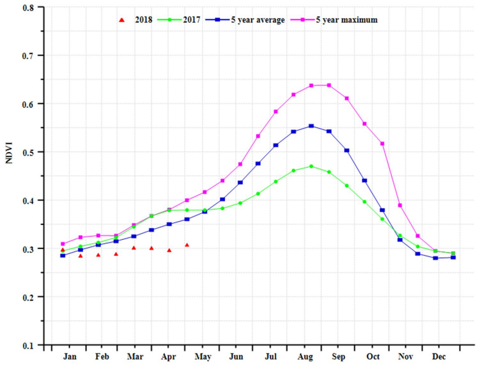
Compared with the last 15 year average, the rainfall for these 5 sub-regions was as follows: -31%, -14%, +48%, -11% and -14% respectively. Low rainfall, especially for the Southeastern Wheat Zone, will possibly have some negative impact on the soil moisture, while the Arid and Semi-arid Zone has enjoyed an increase of rainfall over average. The temperature and RADPAR both keep relatively stable for these 5 sub-regions with 0.7℃, -0.8℃, -0.6℃, 0.1℃, 0.7℃ for the former and 0%, -5%, -3%, 0%, 3% for the latter, which are within the normal fluctuation range. As a result, the potential accumulated biomass shows values of -18%, -11%, +7%, -14% and -13%, compared with the last 5 year average.

In summary, the agroclimatic conditions in Australia have been average so far, except for some low rainfall, which complementary irrigation can make up for. CropWatch will keep on monitoring the crop condition of the planting season in the next bulletin.

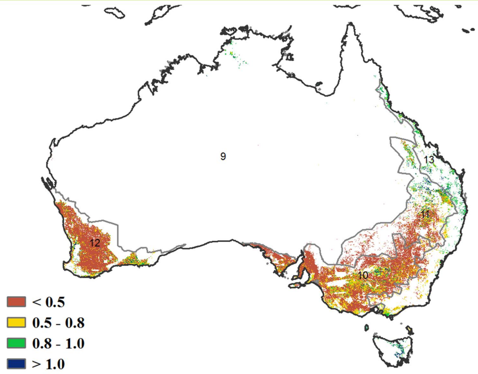
Figure 3.10. Australia's crop condition, January-April 2018



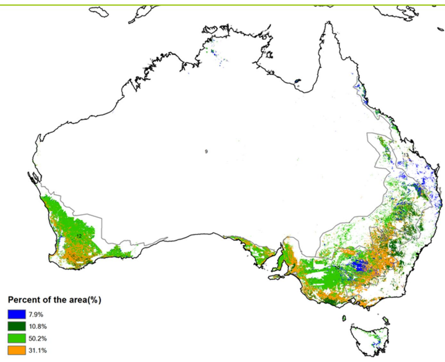
(a). Phenology of major crops



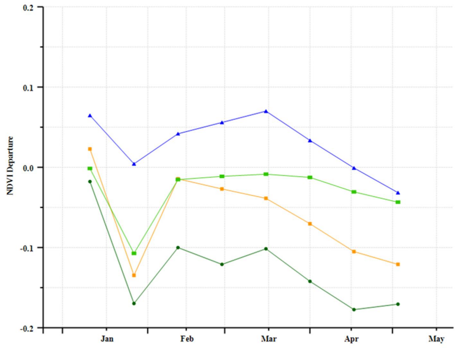
(b) Crop condition development graph based on NDVI



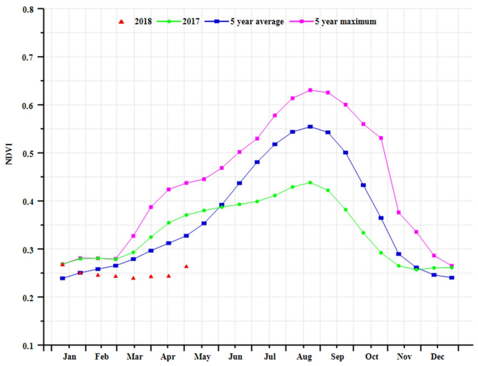
(c) Maximum VCI

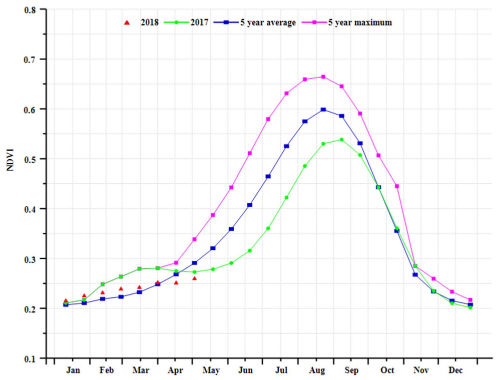


(d) Spatial NDVI patterns compared to 5YA

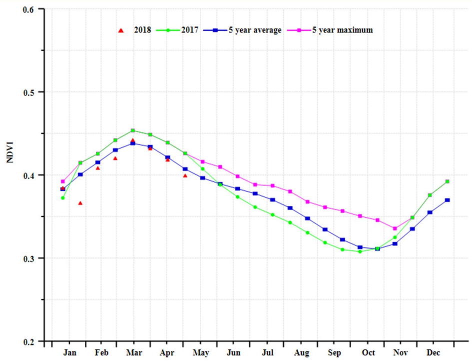


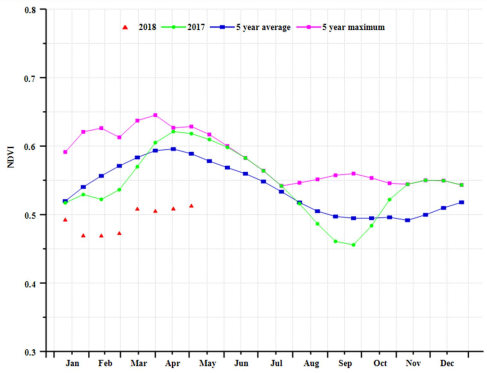
(e) NDVI profiles



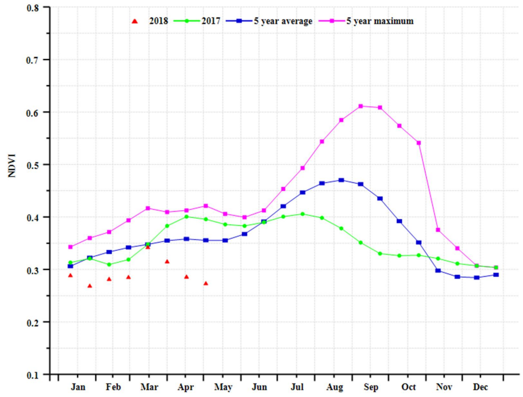


(f) Crop condition development graph based on NDVI (South-eastern wheat zone (left) and South-western wheat zone (right))





(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 3.8. Australia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Southeastern wheat zone	101	-31	21.7	0.7	1251	0
Southwestern wheat zone	88	-14	20.8	-0.8	1235	-5
Arid and semiarid zone	1239	48	27.2	-0.6	1156	-3
Wet temperate and subtropical zone	375	-11	21.2	0.1	1134	0
Subhumid subtropical zone	205	-14	24.8	0.7	1294	3

Table 3.9. Australia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 2018

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Southeastern wheat zone	474	-18	15	-51	0.42
Southwestern wheat zone	387	-11	11	-49	0.35
Arid and semiarid zone	1416	7	66	-2	0.69
Wet temperate and subtropical zone	932	-14	88	-9	0.46
Subhumid subtropical zone	689	-13	31	-28	0.49

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[BGD] Bangladesh

The Reporting period covers the full cycle of dry season rice (Boro) and wheat crops; both winter crops are irrigated. Field preparation and planting of rice (Aus) also took place. Although the period between January and April does not correspond to the monsoon the country nevertheless received 256mm rainfall which is about 20% above average. Temperature at 23.0°C was just 1.0°C lower than average and provided a good growing environment for the crops. Although Bangladesh is mostly cloudless during the reporting period, the recorded RADPAR of 972 MJ/m2 was lower than average by about 12%. Due to good growing environmental conditions CALF reached 96%; initially low NDVI eventually exceeded 0.6, a value above most years. Similarly, VCIx too remained high at 0.9. All the indicators point towards very good prospects for rice (Boro) as well as wheat crops for country.

Regional analysis

Bangladesh with its varied agro-ecological conditions is divided in four regions namely: the Coastal region, the Gangetic plain, the Hills and the Sylhet basin. Detailed analysis is reported below.

The Coastal region received excessive rainfall (237mm, +62% over average) and TEMP at 24.2°C (-0.8°C) was good for the crops. RADPAR reached 1014 MJ/m2 (-11%). The excessive rainfall resulted in 65% higher than 5YA BIOMSS accumulation potential. The NDVI was initially low in January and February but rose in March and April and almost reached the 5 year average. Low NDVI, CALF at 82% and VCIx at 0.74 indicate an average performance.

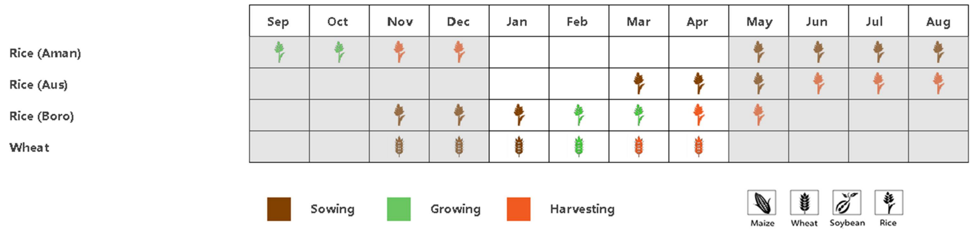
The Gangetic plains region received high rain (210mm, +42% over average) and TEMP remained 1.1°C below average, while RADPAR was down 12%. The NDVI was initially low in January and February but rose to nearly the 5 year average in March and April. High CALF (96%) and VCIx at 0.93 with BIOMSS up 39% (against 5YA) indicate good prospects.

The largest precipitation amount (336mm) was received by the Sylhet Basin, which is average for the region. TEMP was cooler by -0.8°C and RADPAR was -12% below average. The BIOMSS potential of 945 gDM/m^2(the highest for any region) is also 22% above the 5YA. NDVI was initially low but exceeded 0.6 in March- early April then decreased to average. With a CALF of 99% and VCIx of 0.9 (even higher than 1.0 in large patches in the region), crop prospects are probably the most favourable in the country.

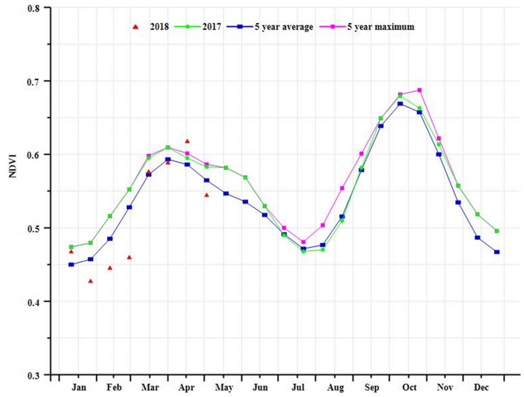
The Hills region recorded 209 mm, only 10% above average, with below average TEMP at 23.2°C (-1.1°C) and a below average RADPAR of 1016MJ/m2 (-11%), the highest in the country. NDVI was high at 0.6 in January, decreased to below average from January to February and increased to nearly the 5YA average from March to April. Although BIOMSS was above average and CALF as high as 98%, crop condition with poor at 0.69 VCIx.

Overall, prospects for rice (Boro) and wheat crops are good in most parts of Bangladesh, barring the Hills region. It will be important to watch weather during May, which corresponds to the harvest of Boro rice and the planting of Aus, the early monsoon rice.

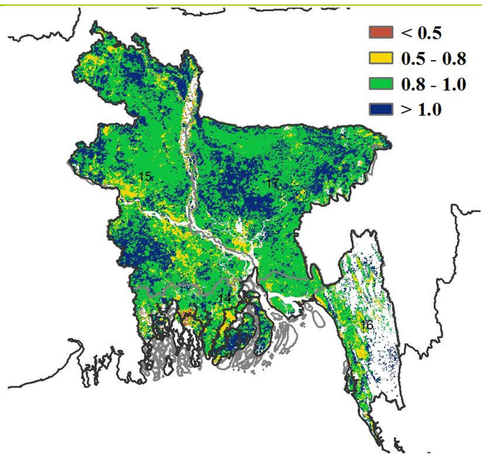
Figure 3.11. Bangladesh’s crop condition, January-April 2018



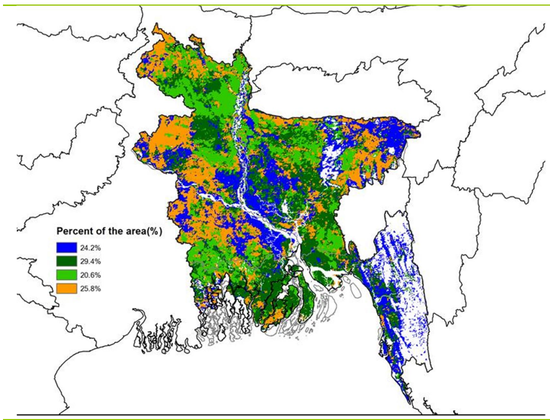
(a). Phenology of major crops



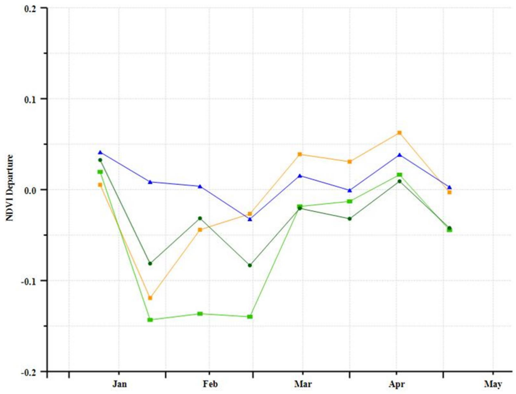
(b) Crop condition development graph based on NDVI



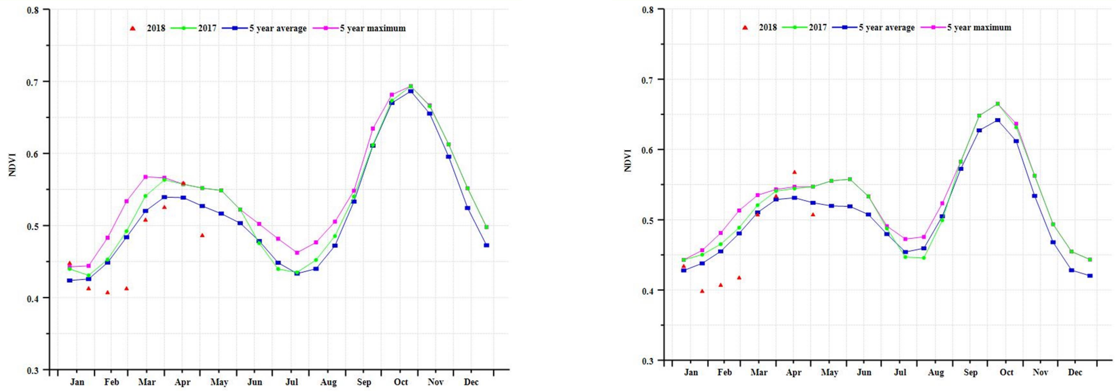
(c) Maximum VCI



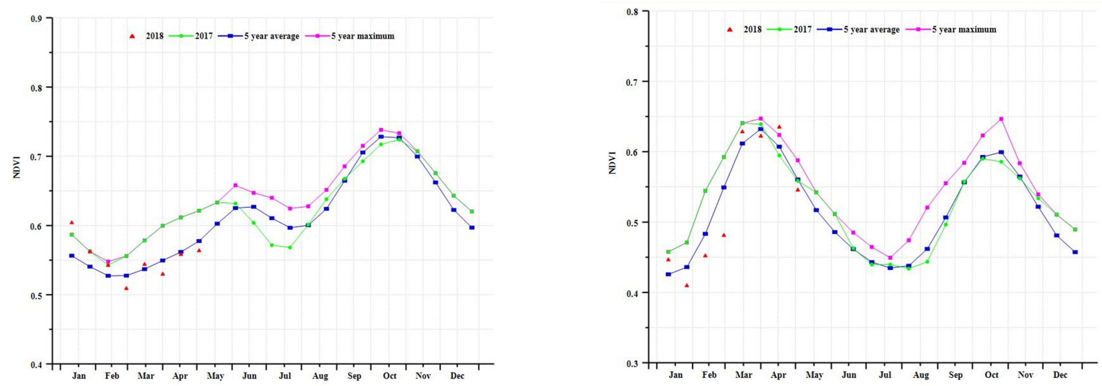
(d) Spatial NDVI patterns compared to 5YA



(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 3.10. Bangladesh's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 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)	237	62	24.2	-0.8	1014	-11
Gangetic plain (Bangladesh)	210	42	22.6	-1.1	977	-12
Hills (Bangladesh)	209	10	23.2	-1.1	1016	-11
Sylhet basin (Bangladesh)	336	1	22.6	-0.8	927	-12

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

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Coastal region (Bangladesh)	765	51	82	1	0.74
Gangetic plain (Bangladesh)	739	39	96	1	0.93
Hills (Bangladesh)	750	27	98	0	0.69
Sylhet basin (Bangladesh)	945	22	99	1	0.96

Table 3.12. CropWatch-estimated rice and wheat production for Bangladesh in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Rice	45274.0	3.6%	-0.3%	46724	3.2%
Wheat	1344.0	7.3%	0.4%	1448	7.7%

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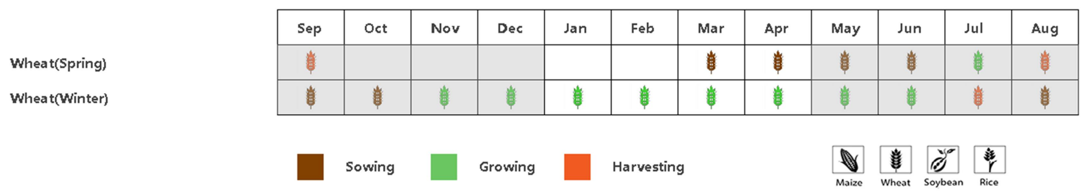
[BLR] Belarus

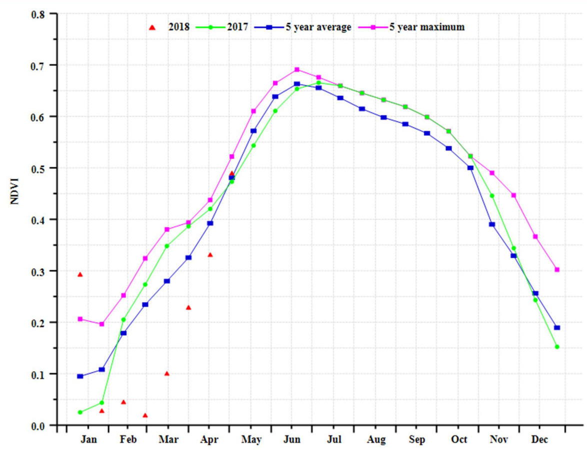
Winter wheat is still growing while farmers in Belarus started to sow spring wheat and summer crops in March.

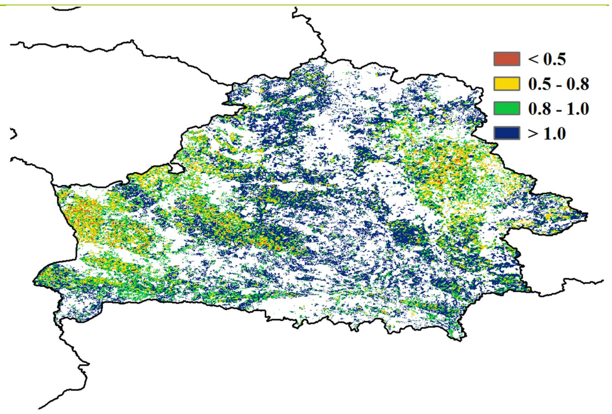
At the national level, CropWatch agroclimatic indices show that rainfall was abundant for winter wheat growth (RAIN 171 mm, +40%), with average temperature (TEMP) and radiation above average (RADPAR 488 MJ/m², +1.8%). The conditions result in a biomass production potential increase of 3.5% over the recent 5-year average. CALF reached 80%, with relatively low values (0.5 to 0.8) concentrated in western and eastern areas; a moderate maximum vegetation condition index (0.76) indicates overall moderate condition. Both national NDVI and spatial NDVI pattern showed that most areas of Belarus experienced a dramatic drop in January but subsequently recovered to 5-year average levels until late April. CropWatch forecasts the production of wheat to increase 9.7% in 2018, as compared to 2017.

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



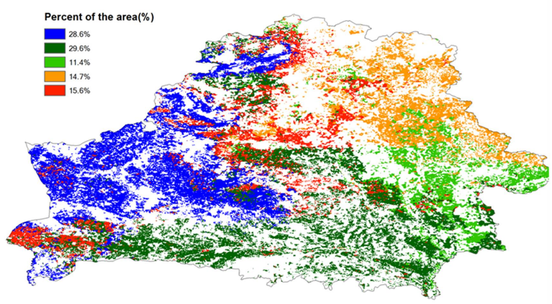
(a). Phenology of major crops

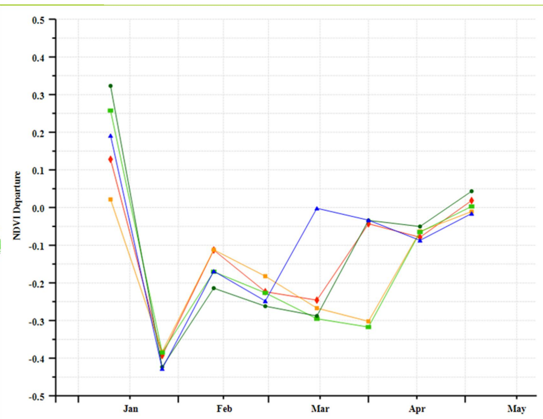




(b) Crop condition development graph based on NDVI

(c) Maximum VCI





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

Table 3.13. CropWatch-estimated Wheat production for Belarus in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Wheat	2766	7.1%	2.4%	3033	9.7%

[BRA] Brazil

This bulletin covers the sowing of maize in northeastern Brazil and second maize in Central-South areas; the main maize crop in Central-South has reached harvest time. Rice in Central-South and soybean are also at harvesting stage. Wheat has been sown from the end of April.

Generally, crop condition in Brazil was average compared to the same period in the previous five years. Nationwide, the CropWatch agroclimatic indicators shown average weather conditions compared with average (15YA). Rainfall (870 mm) was 1% above average temperature (25.7 °C) was 0.7 °C lower than average. Together with 2% below average radiation, BIOMSS was at same level as the previous five years average. Most states received close to average rainfall except for Sao Paulo and Santa Catarina where rainfall was 22% and 19% below average. It needs to be highlighted that temperature in every major agricultural state was lower than average except Rio Grande Do Sul. RADPAR over each state was also generally lower than average, coinciding with the low-temperature areas. Rainfall dominates the potential Biomass accumulation as indicated by the same trend between rainfall departure and BIOMSS departure over each state.

In spite of average weather conditions, crops in Brazil were still at below average conditions according to the national NDVI profile for Brazil from January to April 2018. Spatial and temporal patterns of crop condition during the monitoring period are shown by NDVI departures cluster and map. Most areas with significantly below average crop condition are located in the Amazonas zone and south of Rio Grande Do Sul State (bordering similarly stressed areas in Uruguay and Argentina) while other areas stayed average or departed little from average. National maximum vegetation condition index (VCIx), however, presents lower value only in southern Rio Grande Do Sul State and the Southern Subtropical rangelands zone. Average VCIx value for Brazil was 0.75 during the monitoring period. Almost 99% of arable land was cultivated, 1% above 5YA.

Maize and soybean production for Brazil is projected at 86607 ktons and 97495 ktons, up 3% and 1% compared to that in 2017 season. Rice production is projected at 2% below 2017 mainly due to the lower rainfall.

Regional analysis

Based on cropping systems, climatic zones, and topographic conditions, eight agro-ecological zones are identified for Brazil. They include the Amazonas, Central Savanna, Eastern coastal zone, Northeastern mixed forest and farmland, Mato Grosso, Nordeste, Parana basin, and Southern subtropical rangelands. Over the recent reporting period, only one AEZ (Parana basin) received below average rainfall (-12%). RAIN in all other seven AEZ was above average, ranging from 2% in Central Savannas to 17% on the East Coast. Generally, above average rainfall resulted in lower or average temperature and RADPAR for all the AEZs.

Crop condition in the Central Savanna was generally below average throughout the monitoring period. Even if weather conditions were close to average, maximum VCI was just 0.54, indicating below-average crop condition mainly due to the significantly below average rainfall during the previous monitoring period. Average condition was insufficient for vegetation to recover.

In the Eastern coastal zone, sufficient rainfall softened the drought effect as described in the previous bulletin. Generally, 17% above average rainfall resulted in 10% above 5YA BIOMSS. Favorable conditions benefited crops there and almost all arable land is cultivated, 2% higher than 5YA. The VCIx value at 0.79

further confirms the favorable crop condition.

Shortage of rainfall in the Parana basin zone resulted in lower than average NDVI and crop condition from late February. BIOMSS was 9% below 5YA which also confirms the inadequate weather. CALF is nevertheless close to 100% because of favourable weather conditions during the previous monitoring period (covering sowing to growing period). Crops are now close to maturity and an average output is expected.

As indicated in national NDVI departure clustering map, crops in the Amazonas zone were generally below average due to lack of rainfall during the previous monitoring period. According to the NDVI profile of the zone, crop condition was significantly below average. Average VCIx is a low 0.63 and CALF is at 5YA level. Since this is still early season for the crops, the output will crucially depend on the weather conditions in the near future.

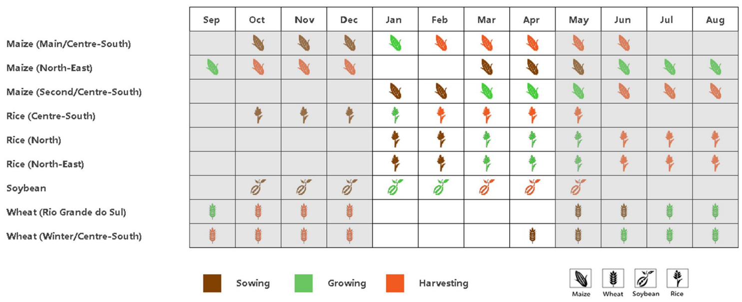
The Mato Grosso zone, as the top maize and soybean producer in Brazil, covers the states of Mato Grosso and Rondonia, as well as the northern part of Mato Grosso do Sul. Maize and soybean are at peak biomass development as indicated by the NDVI profile. Weather conditions were slightly above average, resulting in average NDVI but still slightly below that of same season in the previous year. Almost all cropland is cultivated and VCIx is 0.7, which confirms the fair crop condition.

Harvesting of wheat in Southern subtropical rangelands zone was concluded during the monitoring period and weather conditions no longer impact the output. NDVI profiles presented lower values and low VCIx values (less than 0.5) during the monitoring period indicating unfavorable conditions which may have negative impacts for the next season.

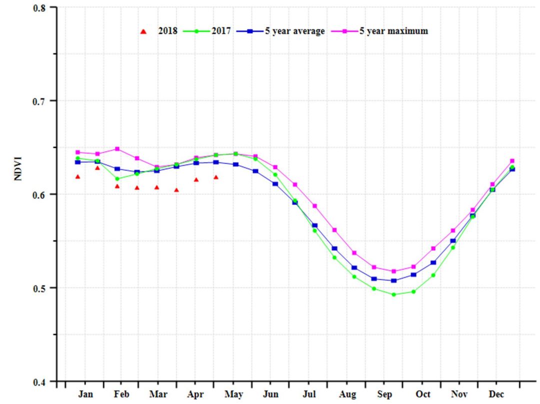
Rice in the Northeastern mixed forest and farmland zone is currently approaching the peak of the season. Favorable conditions with 10% above average rainfall, slightly below average temperature and RADPAR were observed during the monitoring period. However, the NDVI profile presents well below average NDVI mainly due to the late start of the season (see the delay of increasing NDVI). The delay was probably the result of abundant rainfall during the previous season, which hampered the sowing of rice.

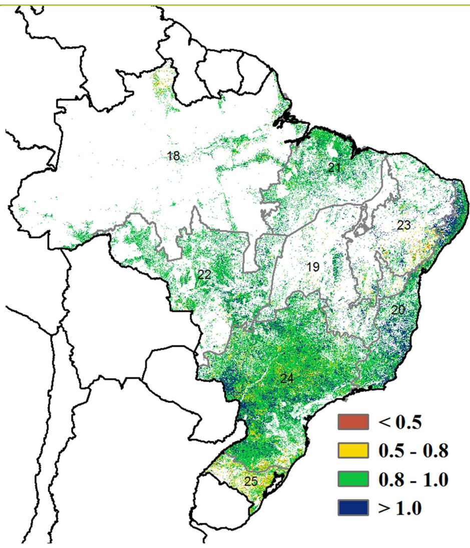
In the Nordeste, crops enjoyed favorable conditions with 9% above average rainfall. Rice recovered from the previous dry period and the NDVI profile was well above average. By the end of April, crops reached their development peak and caught up with the optimal condition during the last five years. Above average output of rice is expected.

Figure 3.13. Brazil's crop condition, January-April 2018



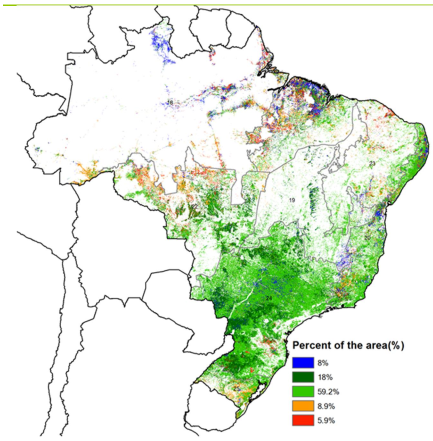
(a). Phenology of major crops

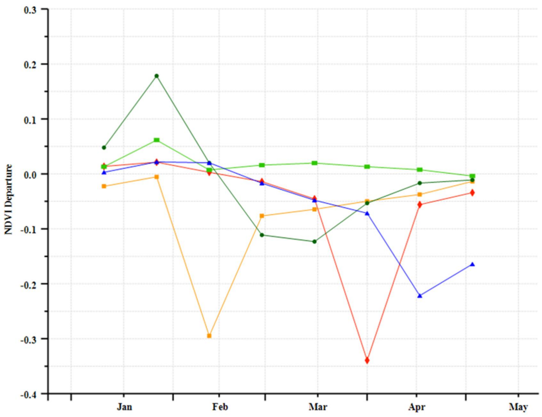




(b) Crop condition development graph based on NDVI

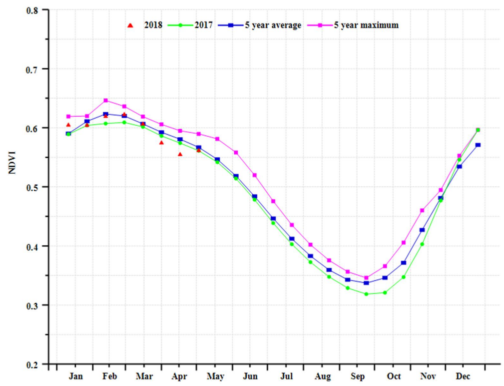
(c) Maximum VCI

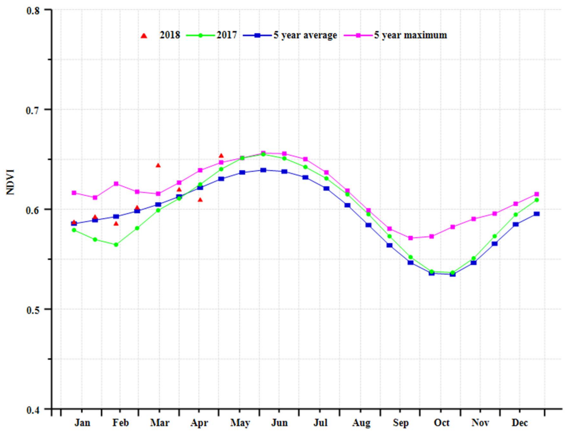




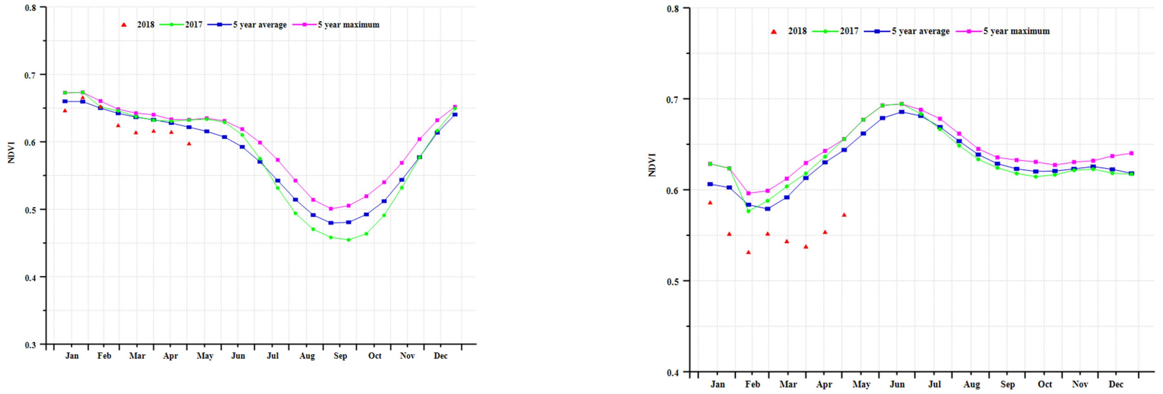
(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles

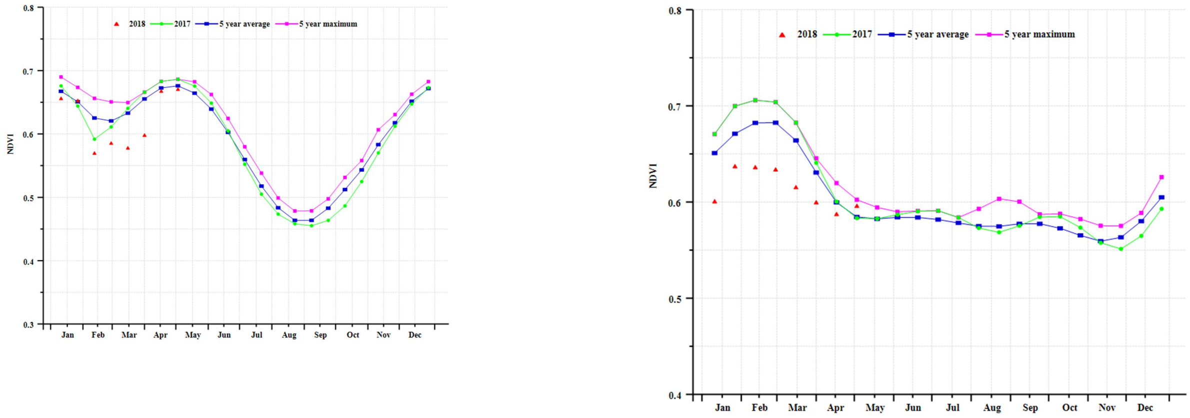




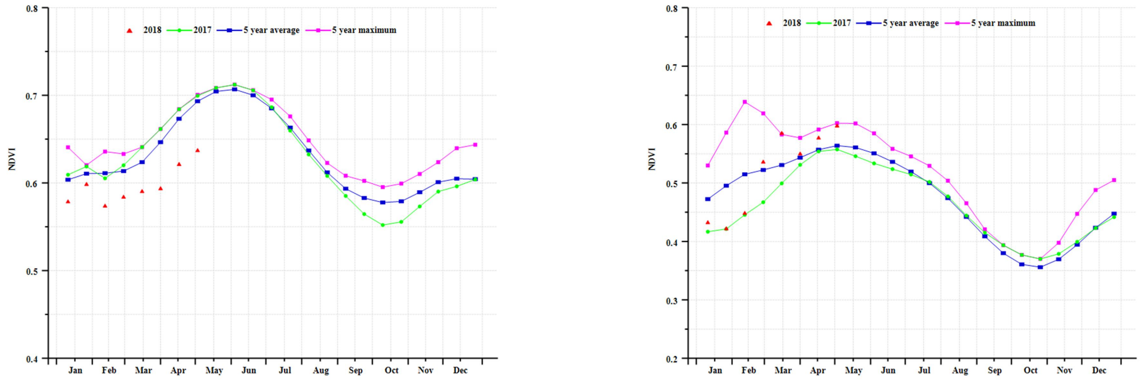
(e) Crop condition development graph based on NDVI ((Central Savanna) (left) and (East coast zone) (right))



(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 3.14. Brazil’s agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m2)	Departure from 15YA (%)
Amazonas	1200	3	26.9	-0.7	911	-3
Central Savanna	723	2	25.3	-1.0	1129	-1
East coast	561	17	25.4	-0.9	1095	-5
Northeastern mixed forest and farmland	1356	10	26.9	-1.0	927	-3
Mato Grosso	1091	5	26.5	-0.7	1025	0

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m2)	Departure from 15YA (%)
Nordeste	512	9	27.4	-0.2	1139	-6
Parana basin	646	-12	24.3	-0.5	1111	0
Southern subtropical rangelands	600	3	24.3	0.0	1145	1

Table 3.15. Brazil's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Amazonas	2281	1	99	0	0.63
Central Savanna	1797	4	100	0	0.54
East coast	1380	10	100	2	0.79
Northeastern mixed forest and farmland	2475	4	100	0	0.69
Mato Grosso	2351	3	100	0	0.70
Nordeste	1395	10	94	7	0.50
Parana basin	1719	-9	100	0	0.83
Southern subtropical rangelands	1570	-1	100	0	0.63

Table 3.16. 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	1	2	86607	3
Rice	11344	-4	2	11137	-2
Soybean	96726	0	0	97495	1

[CAN] Canada

The current reporting period covers winter wheat in Canada. Most agricultural areas were recorded snow, which limits the relevance of NDVI-based indicators.

Rainfall was 25% above average, which provided sufficient water for winter wheat. Both the temperature and radiation were below average (TEMP -0.9°C, RADPAR -3%), with a maximum VCI value of 0.62. The potential biomass was slightly below the recent five-year average (BIOMSS, -9%) due to low temperature.

Two of the three main production provinces recorded a shortfall of precipitation: Manitoba (with RAIN down 23%) and Saskatchewan (RAIN, -9%). The temperature of all the three provinces was markedly below average (Alberta -2.3°C, Manitoba -1.0°C, Saskatchewan -1.8°C). As a result, the tree provinces have below average biomass production potentials (Alberta -16%, Manitoba -17% and Saskatchewan -18%).

As a result, the overall condition of winter wheat in Canada is poor, and the production is unlikely to reach 2017 levels.

Regional analysis

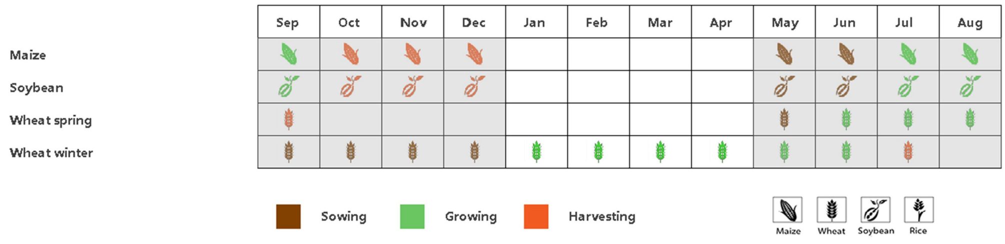
The Prairies (area identified as 30 in the maximum VCI map) and Saint Lawrence basin (26, covering Ontario and Quebec) are the major agricultural regions.

In the Prairies, the main food production area in Canada, rainfall was slightly below average (RAIN 104 mm, -6%), and colder than the last year (-2.0°C), while the radiation was equal. The potential biomass was below the five-year average (BIOMSS, -17%). Because of snow, the Cropped Arable Land Fraction (CALF) dropped dramatically (-87%), and the VCIx was 0.57. The NDVI values were also largely below the average from February to April. All these indicated that the production of winter wheat could be poor in the reporting period.

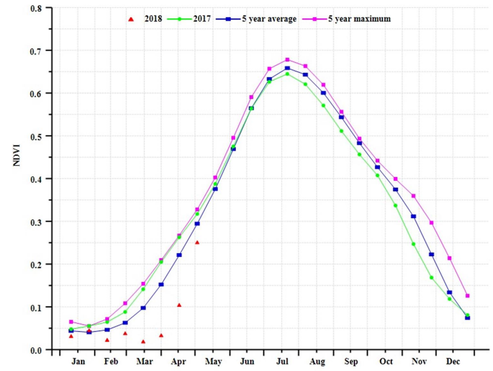
In the Saint Lawrence basin, rainfall was significantly above average (441 mm equivalent to +44%), which benefited winter wheat although water logging must have occurred locally; the temperature was slightly above average (TEMP, +0.6°C) and radiation was significantly below (RADPAR, -9%). The potential biomass was almost average (BIOMSS, -1%), and the Cropped Arable Land Fraction were largely below the average (CALF, -43%), while the VCIx was 0.74. Although, the NDVI profiles were similar to the Prairies, the agroclimatic indicators, especially the rainfall, indicate the winter wheat in this region could be favourable, if the conducive condition prevails in the next period.

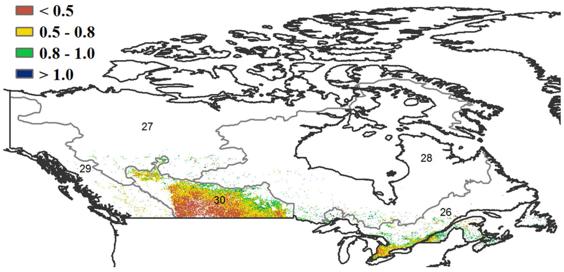
Overall, the crop condition of Canada is mixed: good in the Saint Lawrence basin and poor in the Prairies. As a result, the production of winter wheat could be affected. Current CropWatch estimates indicate a drop in wheat production (26,691 ktons, -13% below 2017).

Figure 3.14. Canada's crop condition, January-April 2018



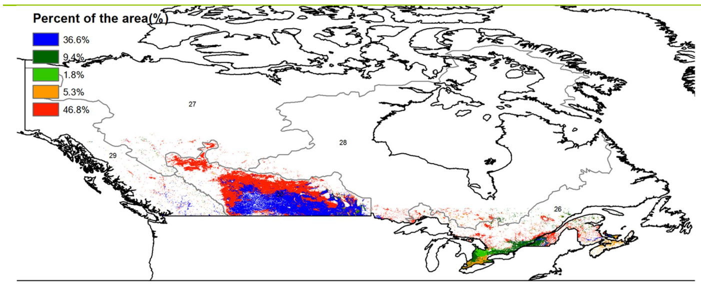
(a). Phenology of major crops

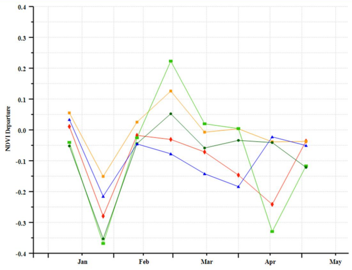




(b) Crop condition development graph based on NDVI

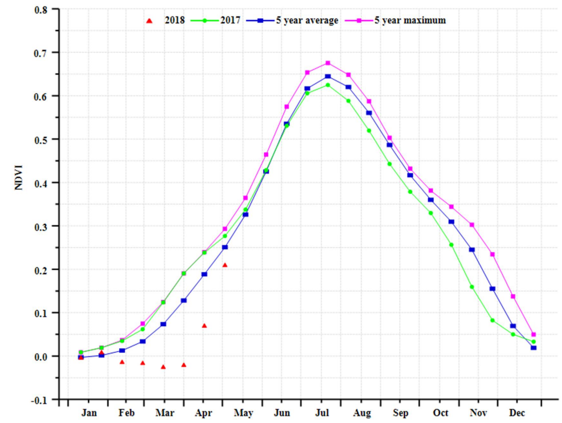
(c) Maximum VCI

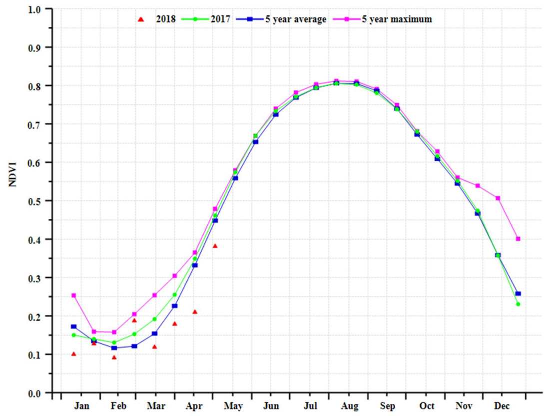




(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles





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

Table 3.17. Canada's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 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)	104	-6	-9.0	-2.0	643	0
Saint Lawrence basin (Canada)	432	44	-4.8	0.6	598	-9

Table 3.18. Canada agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 2018

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Prairies (Canada)	337	-17	0	-87	0.57
Saint Lawrence basin (Canada)	441	-1	0	-43	0.74

Table 3.19. CropWatch-estimated wheat production in Canada for 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Wheat	30679	0.0	-13.0	26691	-13.0

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[DEU] Germany

Overall, the crops in Germany showed above average condition during the reporting period from January to April. Currently, winter wheat and winter barley are in the vegetative stages, and maize is being planted. The CropWatch agroclimatic indicators show that for the country as a whole, total precipitation (as measured by the RAIN indicator) was 6% above average, temperature was just average, and radiation was above average (RADPAR, +1%). Above average precipitation occurred throughout the country from January to early-February and after early March. Suitable temperatures prevailed over the entire country from January to early-February and after early-April, while most of Germany were under the influence of a cold spell, with minimum temperatures below -10.0°C during the end of February and the begin of March, and also under the influence of another cold spell in the second half of March, with minimum temperatures below -8.0°C. The cold spell is referred to as "The beast from the east" in Chapter 3.1 and the disasters section in Chapter 5. Such conditions caused delays to the start of spring sowing and hampered the growth and development of winter crops, but did not cause substantial damage. Due to appropriate rainfall and overall suitable temperature, biomass (BIOMSS) is expected to increase by 6% nationwide compared to the five-year average.

As shown in the national crop condition development graph and the NDVI profiles, national NDVI values were above average in early January, then below the average and the values of 2017 from mid-January to early-April, and then again above average after mid-April. These observations are confirmed by the NDVI profiles. Summer crops also are about average in most of the country according to the NDVI profiles, a spatial pattern again reflected by VCIx in the different areas, with a VCIx of 0.90 for Germany overall. The outlook of winter crops is above average.

Generally, the values of agronomic indicators show favorable condition for most summer crops and the sowing of winter crops in Germany. CALF during the reporting period was 100%, the same as the recent five-year average. Due to favorable condition, the production of wheat is estimated at 4.9% above 2017 values.

Regional analysis

Based on cropping systems, climatic zones, and topographic conditions, six sub-national agro-ecological regions are adopted for Germany. They are include: the Wheat zone of Schleswig-Holstein and the Baltic coast, Mixed wheat and sugar beets zone of the north-west, Central wheat zone of Saxony and Thuringia, Sparse crop area of the east-German lake and Heathland area, Western sparse crop area of the Rhenish massif, and the Bavarian Plateau.

Schleswig-Holstein and the Baltic coast is the major winter wheat zone of Germany. The CropWatch agroclimatic indicator RAIN was well above average (+33%), temperature was slightly below average (TEMP -0.4°C) and radiation significantly below average (RADPAR -3%). With sufficient precipitation, biomass (BIOMSS) in this zone is expected to increase by 12% compared to the five-year average. As shown in the crop condition development graph based on NDVI, the NDVI values were above average in early January, then below the average and the values of 2017 from mid-January to early-April, and then again above average after mid-April. The area has a high CALF (99%) as well as a favorable VCIx (0.86), indicating high cropped area and favorable crop prospects.

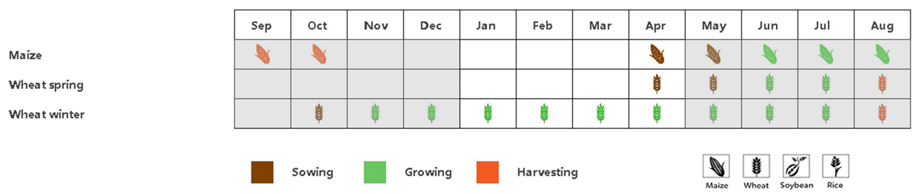
Wheat and sugar beet are major crops in the Mixed wheat and sugar beet zone of the north-west. The CropWatch agroclimatic indicators show that abundant RAIN (14% above average), temperature was slightly below average (TEMP, -0.3°C) and average radiation resulted in favorable crop condition for both crops. Biomass (BIOMSS) in this zone is expected to increase by 8% compared to the five-year average. As shown in the crop condition development graph based on NDVI, the NDVI values were above average in early January, then below the average and the values of 2017 from mid-January to early-April, and then again above average after mid-April. The area has a high CALF (100%) and crop condition for the region is good according to the high VCIx (0.91).

Central wheat zone of Saxony and Thuringia is another major winter wheat zone; it received about 11% above average rainfall and experienced average temperature condition. Due to favourable weather, the biomass potential (BIOMSS indicator) increased by 7% above average. As shown in the crop condition development graph based on NDVI, the values were above those of 2017 from early-January to early-March, then below the average and then again above average after mid-April. The VCIx of 0.89 for this region shows favorable crop prospects.

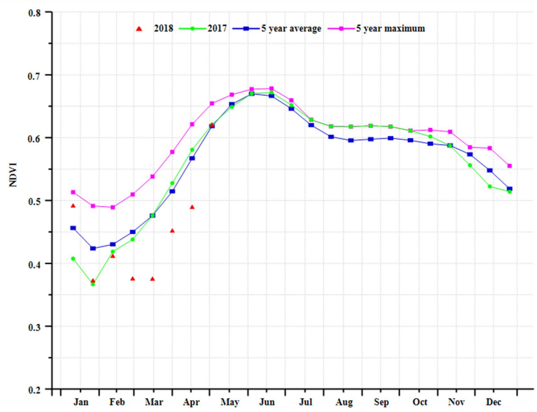
The sparse crop area of the east-German lake and Heathland district experienced average weather conditions but the western sparse crop area of the Rhenish massif was very wet (RAIN +14%) with slightly above average TEMP (+0.1°C) and radiation. BIOMSS was up by 4% and 9% respectively, while CALF was at 99% for both. As shown in the crop condition development graph based on NDVI, the NDVI values for those two regions were all above the values of 2017 from early-January to early-February, then below the average and then again above average after mid-April. Overall, favorable crop condition was recorded with high VCIx values of 0.86 for the eastern and 0.94 for the western areas, respectively.

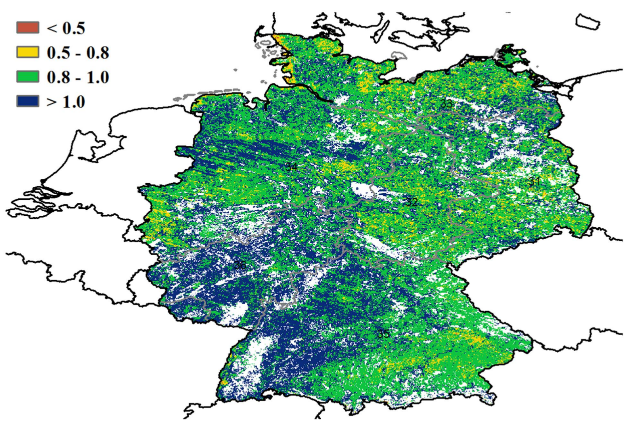
Rye and oats are major crops in the Bavarian Plateau. The CropWatch agroclimatic indicators show that normal weather was recorded for RAIN (-12%), TEMP (+0.5°C), and RADPAR (+2%). Compared to the five-year average, BIOMSS increased 1% and the Cropped Arable Land Fraction was at 99%. Due to the influence of cold spell in February and March and the rainfall deficit, the crop condition was below average from February to early-April. VCIx reached 0.90 over the whole region indicating favorable crop prospects at the end of the reporting period.

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

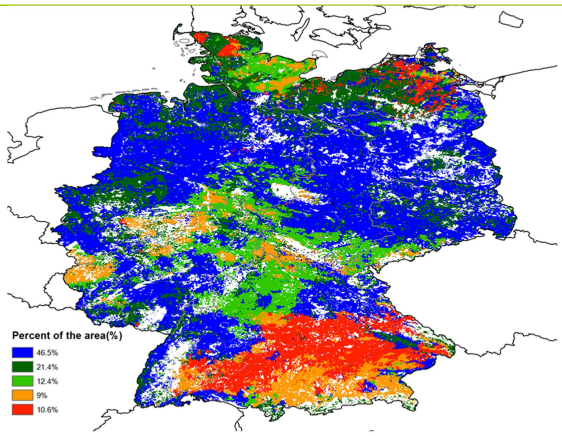


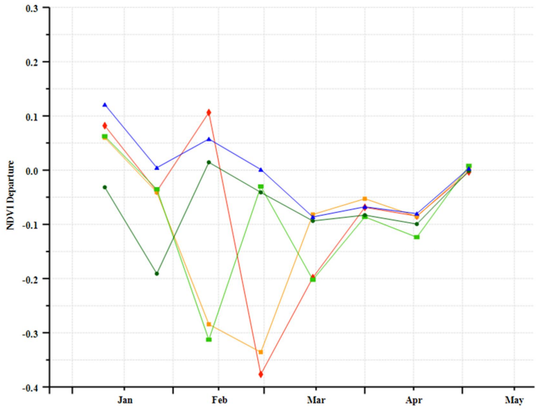
(a). Phenology of major crops





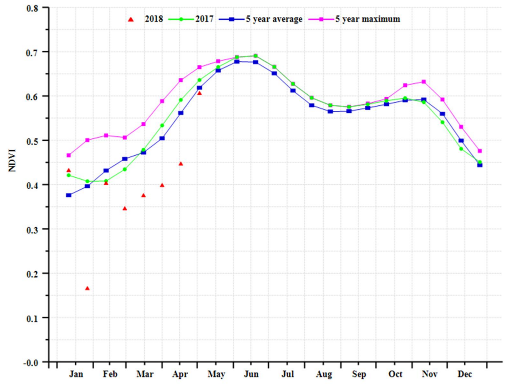
(b) Crop condition development graph based on NDVI (c) Maximum VCI

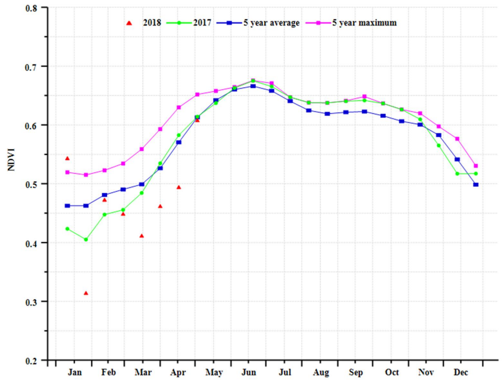




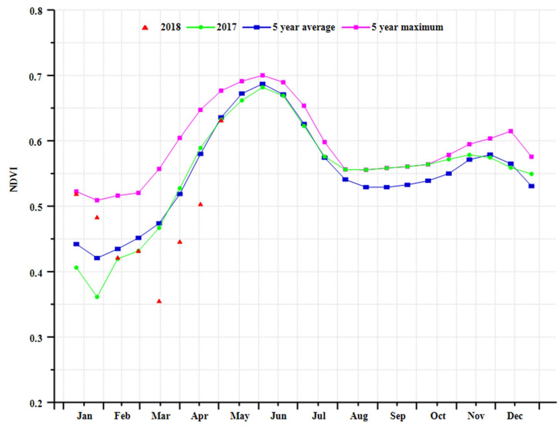
(d) Spatial NDVI patterns compared to 5YA

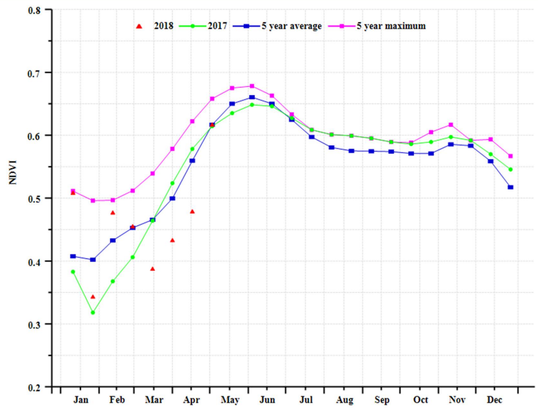
(e) NDVI profiles



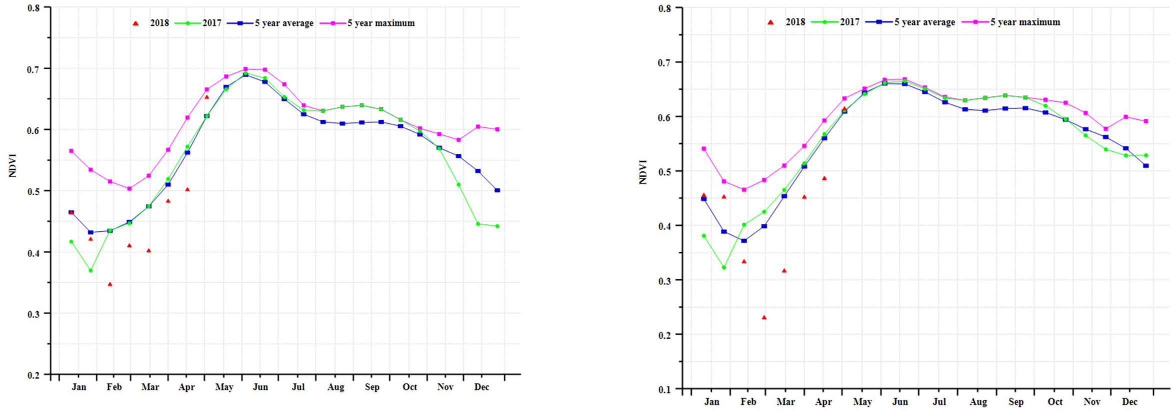


(f) Crop condition development graph based on NDVI (Wheat zone of Schleswig-Holstein and the Baltic coast (left) and Mixed wheat and sugar beets zone of the north-west(right))





(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 3.20. Germany's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 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	244	33	3.7	-0.4	461	-3
Mixed wheat and sugar beets zone of the north-west	252	14	4.7	-0.3	485	0
Central wheat zone of Saxony and Thuringia	204	11	4.3	0.0	520	3
Sparse crop area of the east-German lake and Heathland	175	0	4.0	0.1	513	3
Western sparse crop area of the Rhenish massif	246	14	4.7	0.1	526	0
Bavarian Plateau	195	-12	4.0	0.5	583	2

Table 3.21. Germany's agronomic indicators by sub-national regions, current season's value and departure from 5YA, January-April 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	913	12	99	0	0.86
Mixed wheat and sugarbeets zone of the north-west	992	8	100	0	0.91
Central wheat zone of Saxony and Thuringia	868	7	100	0	0.89
Sparse crop area of the east-German lake and Heathland	822	4	99	0	0.86
Western sparse crop area of the Rhenish massif	964	9	99	0	0.94
Bavarian Plateau	828	1	99	0	0.90

Table 3.22. CropWatch-estimated wheat production for Germany in 2018 (thousands tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Wheat	28130	5.10	-0.20	29496	4.90

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[EGY] Egypt

The reporting period covers the growing stage of winter wheat and the start of the sowing of both maize and rice. The recorded rainfall (RAIN) was 45mm, 20% less than the last 15 years average (15YA), the average temperature was 1.0°C above the 15YA. The radiation (RADPAR) was 1006MJ/m2, -6% below 15YA and the estimated biomass (BIOMSS) was 214gDM/m^2, 20% above 5YA.

The nation-wide crop development NDVI based graph shows that the condition of the crops was below the 5 years average. NDVI profile maps indicate that the condition of about 58% of cultivated areas were above average until February but ran below average till the end of April. Only 14% of the total cropped area conditions were about average throughout the whole reporting period.

The VCIx map indicates that the condition of the current crops, mainly the winter wheat, is fairly good. This agrees with the VCIx value (0.74) estimated for the whole country. There are no significant changes in both yield and cultivated area between 2017 and 2018 based on CropWatch estimates.

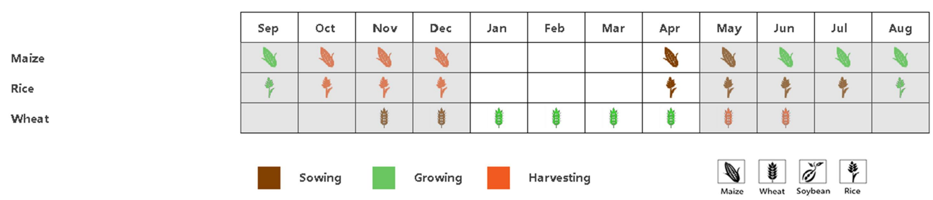
Regional analysis

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 Nile Delta and Mediterranean coastal strip, and the Nile Valley.

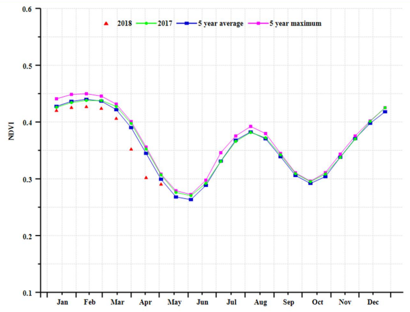
In the first the average rainfall was 34 mm (-34% below average), while in Nile Valley zone it reached 120 mm, an increase of 86% over average. Since virtually all Egyptian crop production is irrigated, rainfall makes little change in the outcome of the season, although additional water usually has a beneficial effect. RADPAR for both zones was about 6% below average and the BIOMSS index shows a decrease of -9% in Nile Delta and Mediterranean coastal strip zone, and 79% increase over Nile Valley zone compared to the 5YA.

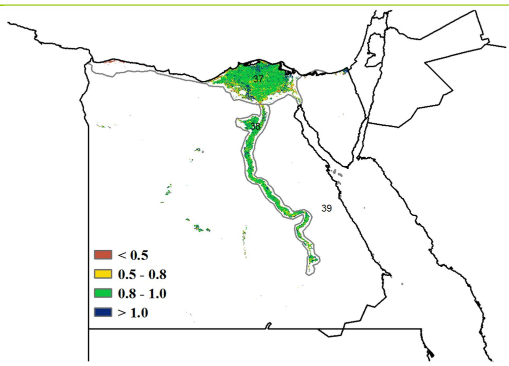
The NDVI-based Crop condition development graphs indicate below average conditions for both zones but, crop condition was lower in the Nile Delta and Mediterranean coastal strip zone than in Nile Valley zone, in agreement with the VCIx values (0.74 and 0.84, respectively).

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



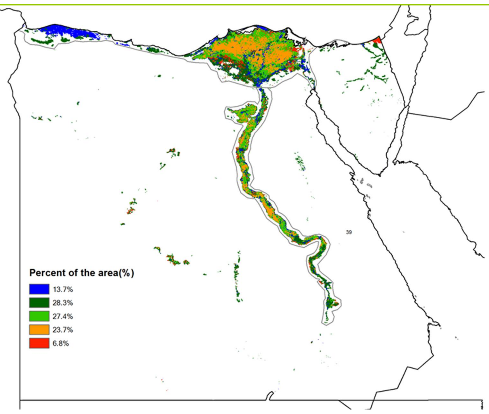
(a). Phenology of major crops

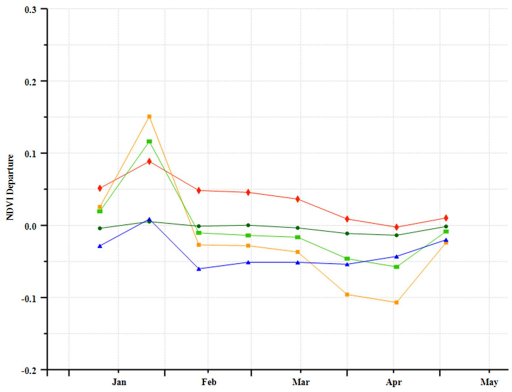




(b) Crop condition development graph based on NDVI

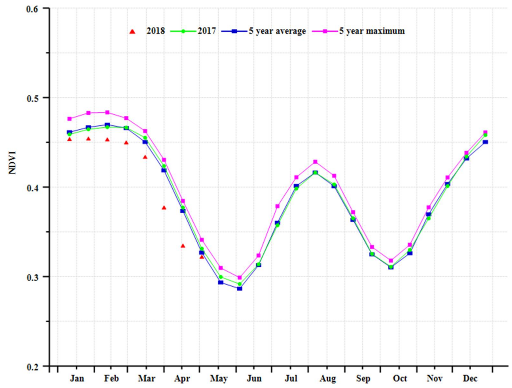
(c) Maximum VCI

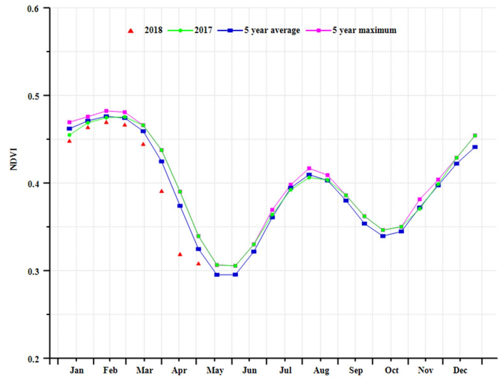




(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles





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

Table 3.23. Egypt's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 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	34	-34	17.5	1	988	-6
Nile Valley	120	86	18.6	1.2	1087	-7

Table 3.24. Egypt's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 2018

	BIOMSS		CALF		Maximum VCI
Region	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Nile Delta and Mediterranean coastal strip	203	-9	0.7	0	0.74
Nile Valley	309	79	0.8	1	0.84

Table 3.25. 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	0	0	6295	6.4
Rice	6545	0	0	6897	5.4
Wheat	10963	0	0	11730	7.0

[ETH] Ethiopia

Ethiopia has two major production seasons (Belg and Meher). The period covered (January- April) was the Belg season. The South-Eastern, Western and Central-northern parts of the country practices mostly maize, wheat, barley and beans production during the reporting period. Although only about 10% of maize is produced during Belg, the season plays an important role in terms of food security: this year's crops were generally good so far according to the NDVI-based season development graph.

CropWatch Agroclimatic indicators show that the reporting period recorded 188 mm total amount of rainfall which is an increase by 1% and 1.3°C decrease in temperature. RADPAR decreased by 2 percent below average, and the biomass production potential increased by 1 percent compared to the five-year average. The VCIx value of crop area showed that moderate crop health condition was recorded at national level with a value of VCIx 0.63, but in some part of the central and west of Oromia region VCIx exeeded1.00, which implies the area experienced few agricultural problems (disasters and diseases). The NDVI clusters and profiles provide additional spatial information: about 18.4% of the country (around central Oromia) enjoyed favourable crop condition, which is confirmed by high VCIx values. Other areas (Eastern Oromia, Amhara and Eastern Tigray) experienced less favourable vegetation condition (VCIx was close to or lower than 0.50).

Regional analysis

The reported period covers main rain-fed cereal producer areas found in the South eastern mixed-maize zone, Western mixed maize zone, and Central-northern maize-teff highlands zone.

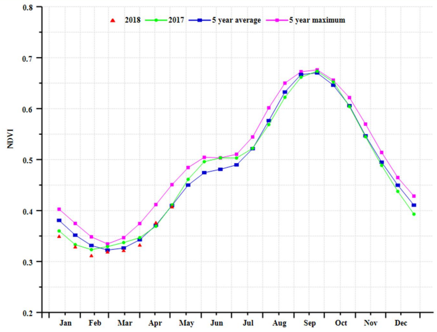
South-eastern mixed maize zone (47 in the VCIx map) is one of the major agricultural regions. Its rainfall was found to be significantly above the average (+74%) but the temperature in this zone was 0.8 degree below the average. The RADPAR was more significantly below average (-4%). The potential BIOMASS on the other hand was found to be 39% above average of five years, this is because of an increase in rainfall above the fifteen years average. The Cropped Arable Land Fraction reached 24% with VCIx of 0.60; NDVI started to increase in March and continued. Overall, the crop condition was favorable in the area.

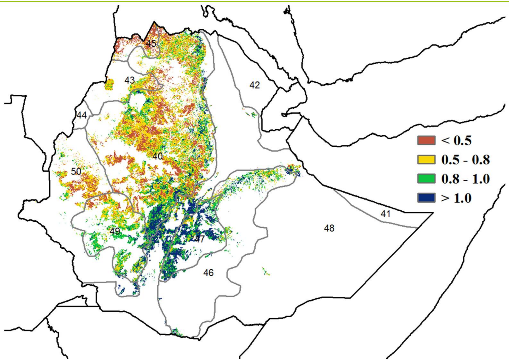
In the Western mixed maize zone, rainfall was below average (-7%), the temperature and radiation were also below average (TEMP, -1.5 and RADPAR, -1%). Both the potential biomass and Cropped Arable Land Fraction were below average (BIOMASS, -9%; CALF, -2%), whereas the VCIx was 0.49. Based on the NDVI profiles in the western mixed maize zone and Agroclimatic indicators, especially the rainfall decrease, NDVI profile showed average values. Conditions were generally unfavorable for maize during this period,

In Central-northern maize-teff highlands zone, the RAIN was reduced by -27%, which led to a drop in BIOMASS by -19 % below average. CALF and the RADPAR dropped as well, by -11% and -2% respectively. The NDVI profile was also below average. Overall the outlook in the Central-northern maize-teff highlands zone is poor due to shortage of water.

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

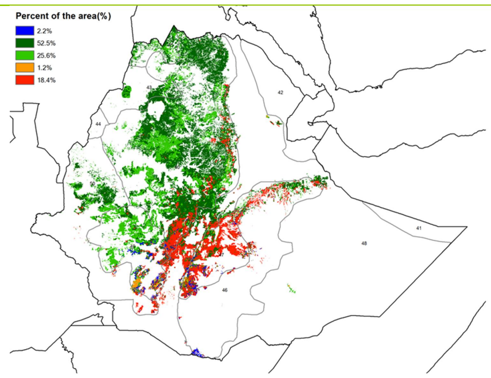
(a). Phenology of major crops

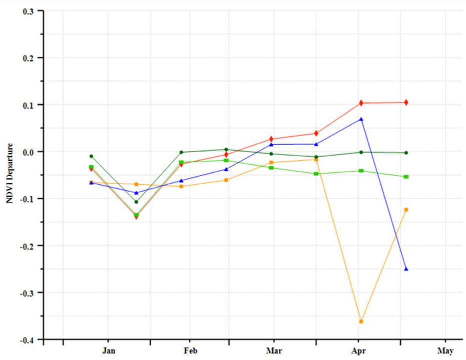




(b) Crop condition development graph based on NDVI

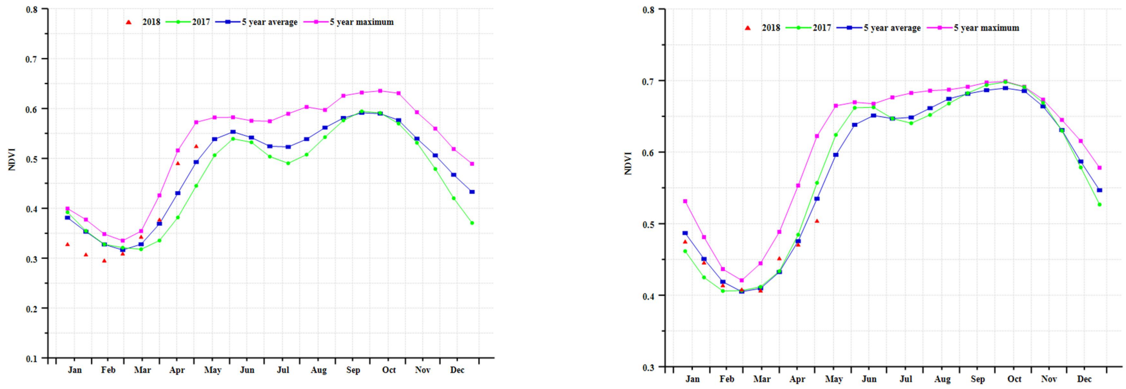
(c) Maximum VCI



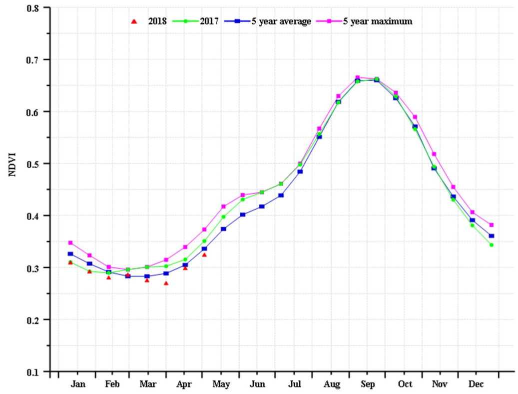


(d) Spatial NDVI patterns compared to 5YA

(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 3.26. Ethiopia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m2)	Departure from 15YA (%)
South-eastern mixed maize zone	374	74	21.5	-0.7	1242	-4
Western mixed maize zone	143	-7	23.7	-1.5	1207	-0.8
Central-northern maize teff highlands	96	-27	18.9	-1.2	1274	-2

Table 3.27. Ethiopia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 2018

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
South-eastern mixed maize zone	1018	39	81	24	0.60
Western mixed maize zone	528	-9	92	-2	0.49
Central-northern maize-teff highlands	434	-19	22	-11	0.57

Table 3.28. CropWatch-estimated Wheat production for Ethiopia in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Wheat	4180	9.8%	0.1%	459.5	9.9%

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

[FRA] France

The analysis period coincides with the late dormancy stages of wheat and other winter crops, and the planting of maize and summer crops that started in April. Compared to average, CropWatch agroclimatic indicators show that the conditions were unfavorable. This includes the following: a 30% drop in RAIN, about average temperature, and a marked drop (10%) in RADPAR nationwide. Crop condition was close average, which is confirmed by a slight decrease for the BIOMSS indicator (-1%).

As shown by the crop condition development graph, national NDVI values were mostly below those for 2017 and the recent five-year average. The spatial NDVI patterns compared to the five-year average and corresponding NDVI departure cluster profiles further indicate that NDVI is above average in 61% of arable land, with below average NDVI in the other regions. This spatial pattern is reflected by the maximum VCI (VCIx) in the different areas, with a value of 0.88 and a slight drop in CALF (0.5%) for France overall. Generally, due to the rainfall deficit, the agronomic indicators mentioned above show unfavorable condition for some crop areas of France. In the next few months, more rain is needed.

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: (50) Northern barley region; (51) Mixed maize/barley and rapeseed zone; (52) Maize, barley and livestock zone, (53) Rapeseed region; (54) Dry Massif Central zone; (55) Southwestern maize zone; (56) Eastern Alpes region, and (57), the Mediterranean zone.

In the Northern barley region, TEMP was 0.7°C and RADPAR 11% below average respectively, while RAIN was 29% above. As a result the BIOMSS indicator is 18% above the five-year average. High VCIx values are observed, reflecting overall favorable crop condition.

The most severe adverse weather conditions were observed in the Mixed maize/barley and rapeseed zone (RAIN -32%, RADPAR -14%). According to the NDVI profiles, crop condition has been continuously deteriorating since January. BIOMSS is 17% below its five-year average, but the VCIx value is high(0.94).

Generally, crop condition for the Maize, barley and livestock zone is close average, in spite of climate conditions being poor (RAIN -5%, TEMP -0.9°C, and RADPAR -12%). Almost all arable land in this region was cropped during the monitoring period, and the average VCIx is 0.92. The NDVI profile confirms the favorable conditions with close to average NDVI since April.

The Rapeseed region also had below average rainfall (RAIN, -13%). Temperature was average, but sunshine was low (RADPAR, -8%). According to the NDVI profile map and VCIx map, crop condition was good in the region. Overall, the situation is considered to be close to average.

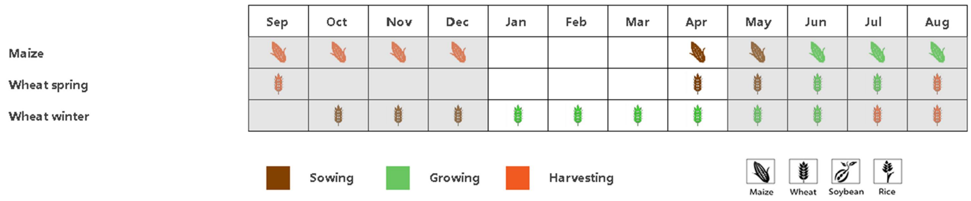
Mostly unfavorable climatic conditions dominated the Dry Massif Central zone over the reporting period. Rainfall was 31% below average (178 mm over four months). Temperature was normal, but radiation (RADPAR) was well below (-11%). The dry conditions have hampered crop growth, indicated also by a BIOMSS indicator 11% below average for the period.

The Southwest maize region had below average rainfall (RAIN, -13%) and radiation (RADPAR -12%), representing however average values for TEMP. BIOMSS for the region is close the five-year average, reflects the generally average crop condition.

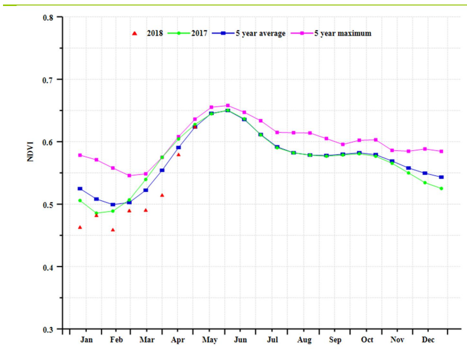
The crop condition for Eastern Alpes region is close to average. Rainfall fell 11% below average, temperature was average, but radiation was well below expectations (RADPAR -9%). Crop condition was close to average according to the NDVI development graph, an observation confirmed by the increase of BIOMSS (3%) and the small decrease in CALF (2%) compared to average. The VCIx map shows that the crop condition was close to average.

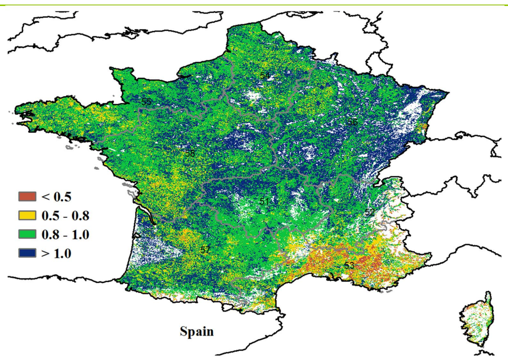
The Mediterranean zone recorded 238 mm of rainfall over four months (RAIN -3%). Temperature was average (TEMP-0.2°C) but RADPAR was 10% below. The increase in BIOMSS was 8% compared to the five-year average. Crop condition was favorable.

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

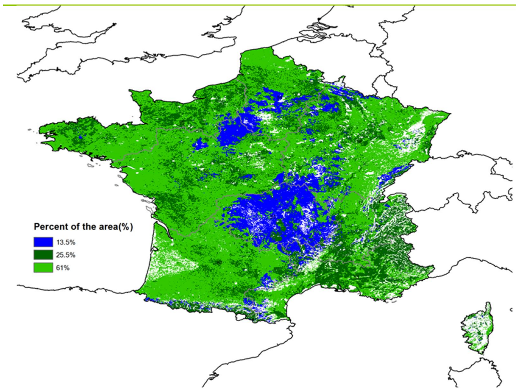


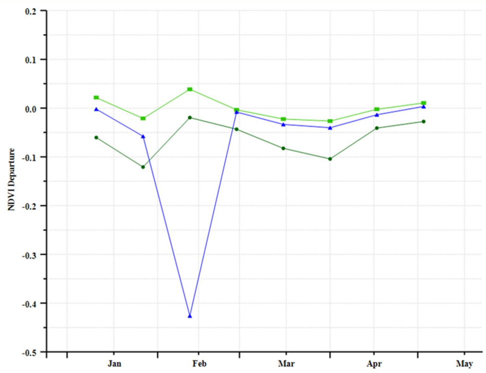
(a). Phenology of major crops



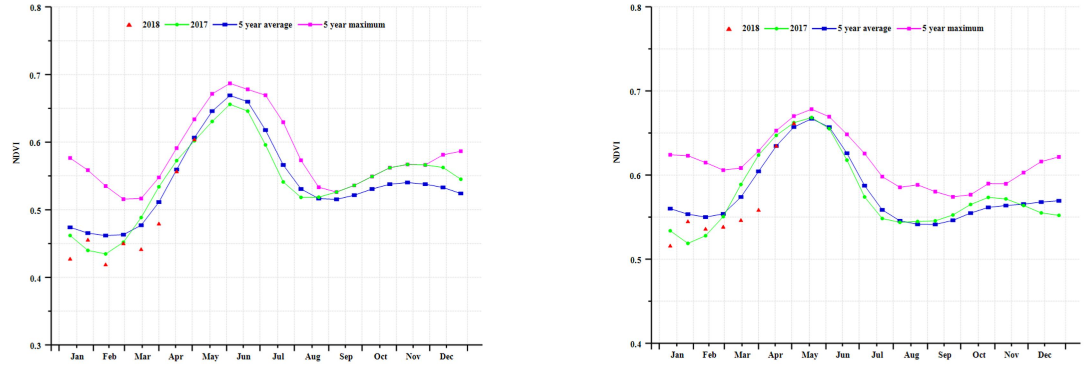


(b) Crop condition development graph based on NDVI (c) Maximum VCI

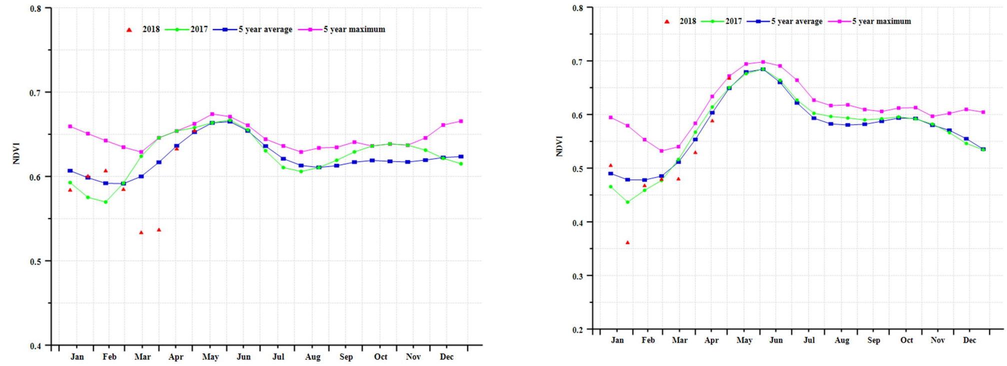




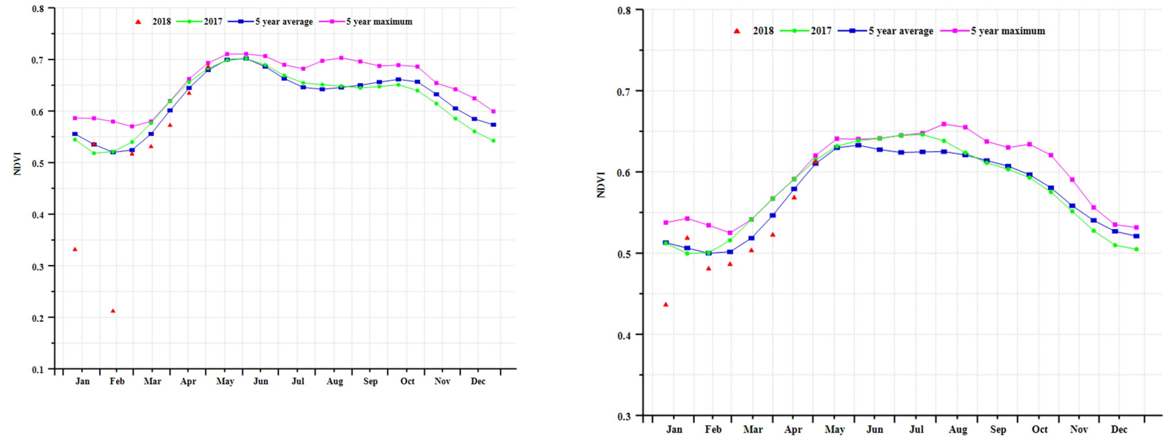
(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles



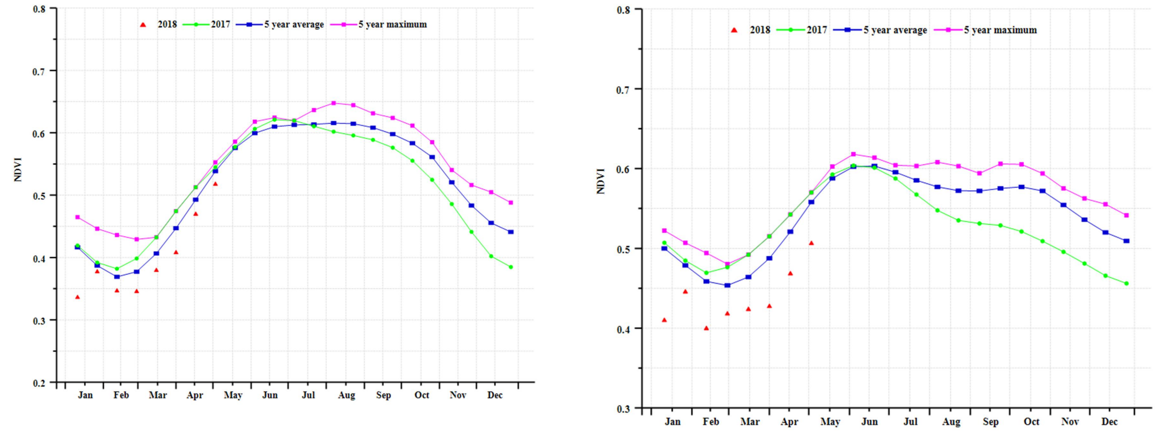
(f) Crop condition development graph based on NDVI (Northern barley region (left) and Mixed maize, Barley and Rapeseed zone (right))



(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 3.29. France's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 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)	256	29	6	-0.7	480	-11
Mixed maize/barley and rapeseed zone(France)	120	-32	7	-1.0	513	-14
Maize, barley and livestock zone(France)	192	-5	7	-0.9	497	-12
Rapeseed zone (France)	192	-13	6	-0.5	526	-8
Dry Massif Central zone(France)	178	-31	6	-0.5	556	-11
Southwest maize zone (France)	242	-14	8	-1.1	588	-12
Eastern Alpes region (France)	247	-11	4	-0.5	623	-9
Mediterranean zone (France)	238	-3	6	-0.2	678	-10

Table 3.30. France's agronomic indicators by sub-national regions, current season's value and departure from 5YA, January-April 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)	1029	18	100	0	0.93
Mixed maize/barley and rapeseed zone(France)	591	-17	100	0	0.94
Maize, barley and livestock zone(France)	859	2	100	0	0.92
Rapeseed zone (France)	846	-2	100	0	0.95
Dry Massif Central zone (France)	784	-11	100	0	0.94
Southwest maize zone (France)	937	-1	97	0	0.88
Eastern Alpes region (France)	806	3	84	-2	0.74
Mediterranean zone (France)	842	8	83	-5	0.60

Table 3.31. CropWatch-estimated wheat production for France in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Wheat	38051	4.3	-3.0	38484	1.1

[GBR] United Kingdom

Winter wheat and barley, spring barley and rapeseeds were in the field during the current reporting period. The CropWatch agroclimatic indicators show that for the country as a whole, temperature was below average (TEMP -1.7°C) and radiation dropped below average by 12%, while rainfall was up 32%.

Due to abundant rainfall and low temperature, the biomass accumulation potential BIOMSS was slightly below the recent five-year average. As shown by the NDVI profiles, the national NDVI values were lower than average from January to early April, but they picked up during late April due to abundant rainfall and favourable temperature. According to the crop condition map based on NDVI, close to 88% of the county indicated about average NDVI including Kant, Sussex, Wiltshire, Shropshire, Herefordshire, the east of Somerset and Suffolk, Gloucestershire, Oxfordshire, Northamptonshire, Bedfordshire. Only 8% of the region experienced below average crop condition from early March to early April in Middlesex, Berkshire, Derbyshire and eastern Banffshire, and Aberdeenshire. The VCIx was 0.77 and less than 4% of the arable land had below average NDVI. The area of cropped arable land fraction (CALF) is unchanged compared to its five-year average. CropWatch wheat production estimates are 1.5% above last years output due to a combination of increased yield (0.5%), and area (1.0%).

Regional analysis

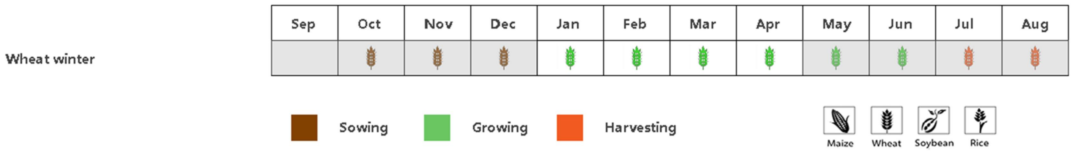
CropWatch has adopted three agro-ecological zones (AEZ) to provide a more detailed spatial analysis for the country; they include the Central sparse crop region (covering northern England, Wales, and Northern Ireland), the Northern barley region (Scotland and northern England), and the Southern mixed wheat and barley region (southern England). The Central sparse crop area and the Southern mixed wheat and barley region are characterized by unchanged fractions of cultivated arable land (CALF) compared to average. In the Northern barley region CALF decreased by 2%.

The central sparse crop region is one of the country's major agricultural regions in terms of crop production. NDVI values were lower than average and the five-year maximum according to the region’s crop condition development graph from January to April but NDVI was close to average in late April. Agroclimatic conditions include below average TEMP (-1.8°C) and RADPAR (-12%); in combination with above average rainfall (+38%), this resulted in below average BIOMASS (-8%). The VCIx was generally poor at 0.62.

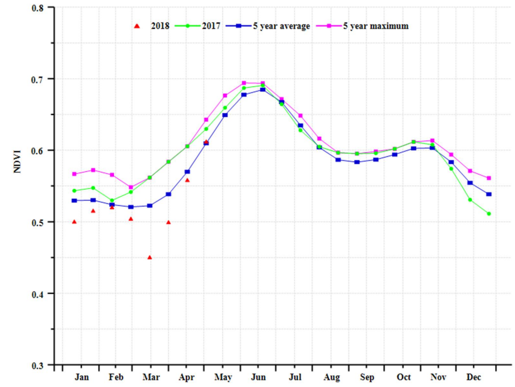
In the main barley region, the NDVI was below average according to the crop condition graphs. Compared to the fifteen-year average, RAIN was above average by 20%, while the temperature was below by 2.2°C and radiation by -8%. The biomass production potential was down 14% compared to its recent five-year average. The region had poor VCIx (0.59).

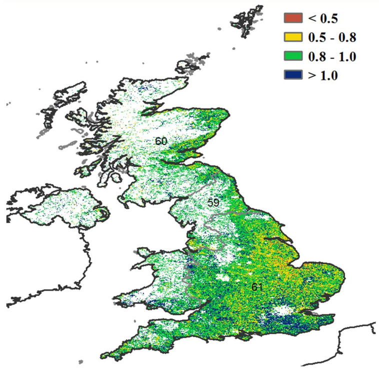
In the third region, the southern mixed wheat and barley region, NDVI was below average from early March to April, close to average on February and late April according to the crop condition graph for the zone. Agroclimatic conditions were: RAIN+40%, relatively close to average TEMP (-1.3°C) compared with other areas and rather low radiation (-15%). The regional VCIx (0.84) was well above average.

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

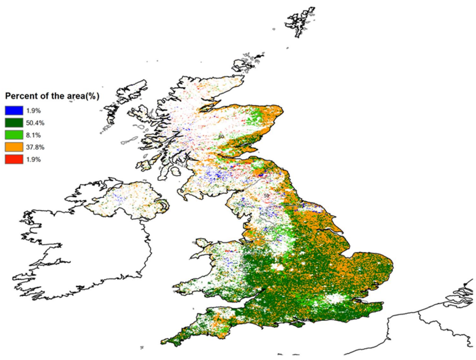


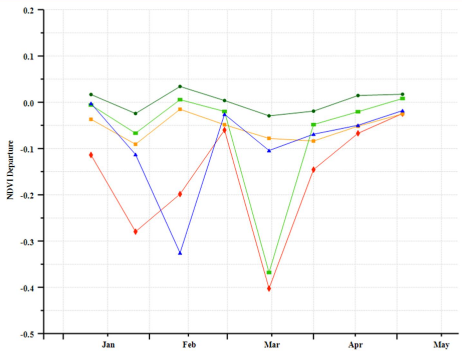
(a). Phenology of major crops



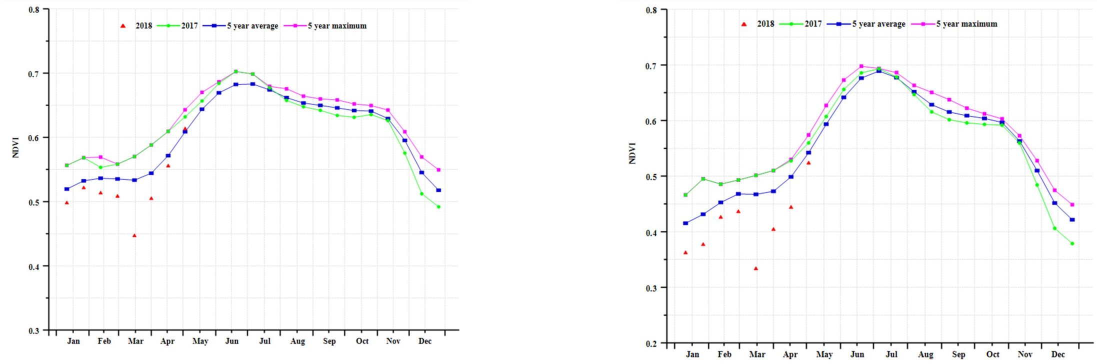


(b) Crop condition development graph based on NDVI (c) Maximum VCI

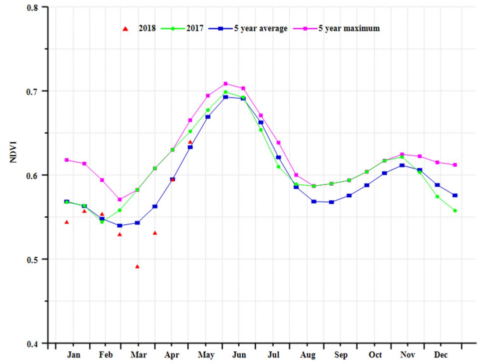




(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles



(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 3.32. United Kingdom's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 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)	429	20	3.1	-2.2	380	-7.6
Southern mixed wheat and Barley zone (UK)	310	40	5.7	-1.3	419	-15.1
Central sparse crop area (UK)	407	38	4.6	-1.8	408	-12.0

Table 3.33. United Kingdom's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 2018

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Northern Barley area (UK)	852	-14	1	-2	0.59
Southern mixed wheat and Barley zone (UK)	1045	12	1	0	0.84
Central sparse crop area (UK)	961	-8	1	0	0.62

Table 3.34. CropWatch-estimated wheat production for United Kingdom in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Wheat	14521	0.5%	1.0%	14734	1.5%

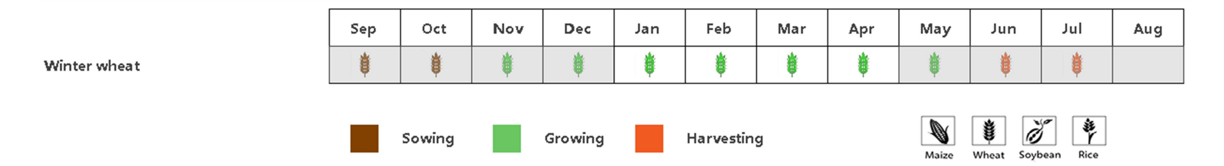
AFG AGO ARG AUS BGD BLR BRA CAN DEU EGY ETH FRA GBR **HUN** IDN IND IRN ITA KAZ KEN KHM LKA MAR MEX MMR MNG MOZ NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF ZMB

[HUN] Hungary

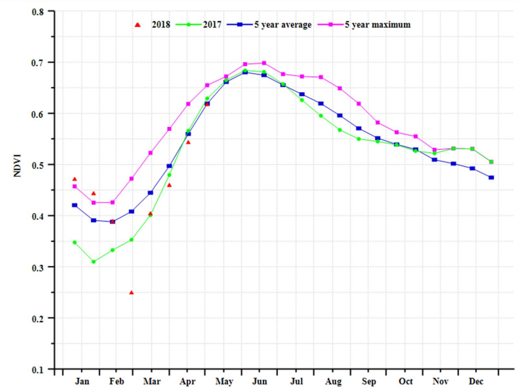
At the end of dormancy and early spring growth winter wheat showed generally favorable condition in Hungary. Agroclimatic indicators were above average for rainfall and the biomass production potential (RAIN +19% and BIOMSS +16%), about average for TEMP (+0.6°C) but low for radiation (-5.2%).

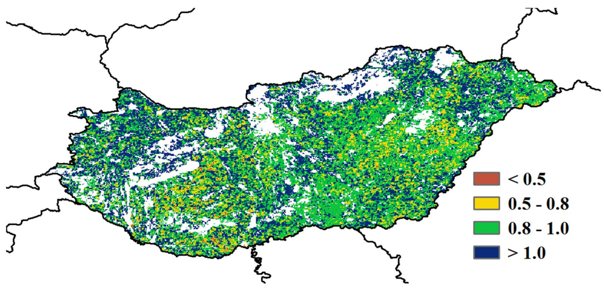
The National NDVI values were above average in January to February and increased again in March to late April after a sharp drop at the beginning of March. According to the NDVI cluster profiles and maps, crop condition was above average throughout the reporting period in 17.8% of arable land and about average in 37% of the total arable land. In general, the east of the country experienced better overwintering conditions than the western half, up to the counties of Nograd, Pest and Bacs-kiskun. The national average VCIx was 0.87, and the cropped arable land fraction (CALF) increased by 1% compared to its five-year average. CropWatch estimates wheat production to increase 2.8% over 2017 values (yield up 4.2%, area 1.4% down).

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



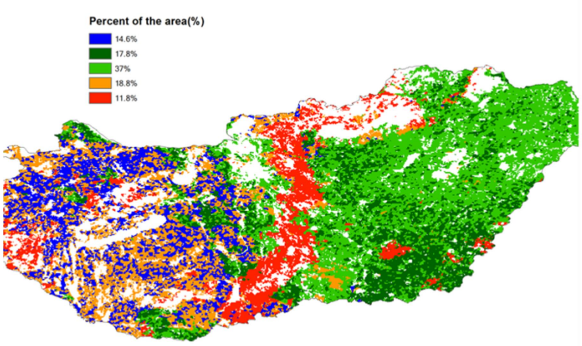
(a). Phenology of major crops

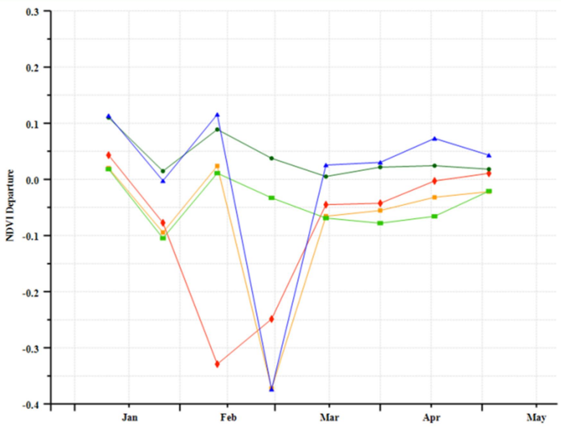




(b) Crop condition development graph based on NDVI

(c) Maximum VCI





(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles

Table 3.35. CropWatch-estimated wheat production for Hungary in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Wheat	5237	4.2%	-1.4%	5382	2.8%

[IDN] Indonesia

During this monitoring period, the harvest of rainy season maize was completed in Java and Sumatra, while the main rice harvest started in March. Crops condition was average from January to April, with the maximum VCI (VCIx) value on the national level reaching 0.83. The area of cropped arable land (CALF) in the country is comparable with the five-year average. All agroclimatic indicators were slightly below average (RAIN - 2%, TEMP -0.6°C and sunshine, expressed as RADPAR -2%. Due to persistent cloudiness, the NDVI values of most pixels are invalid. This leads to unrealistically low values in the national NDVI development graph compared to the recent five-year average in January and February. According to NDVI profiles, 48.2% of the arable land enjoyed average crop condition, including Java, which has the largest share of cropped areas in the country. 14.8% of the country (mostly in the equatorial areas of Kalimantan Barat and Kalimantan Tengah) had initially below average NDVI which however improved to near average values in February. In other area, NDVI fluctuated over a large range, possibly due to cloudiness. According to the biomass production potential BIOMSS, which is average, and other indicators, crop condition was slightly below but close to average in the whole country.

Regional analysis

For more spatial detail, CropWatch also prepares a regional analysis for four agro-ecological zones within the country, covering the main islands groups: Sumatra (64), Java (the main agricultural region in the country, 62), Kalimantan and Sulawesi (63) and West Papua (65). The numbers correspond to the labels in the VCIx and NDVI profile maps.

The agroclimatic conditions of Java follow the same patterns as the country as a whole: accumulated rainfall (RAIN,-1%) ,temperature (TEMP, -0.5℃) and radiation (RADPAR -2%) were below average, resulting in the biomass production potential decrease in this region (BIOMSS -11%). According to the NDVI development graph, crop condition was below 5-year average. Overall, the crop condition in Java was unfavorable.

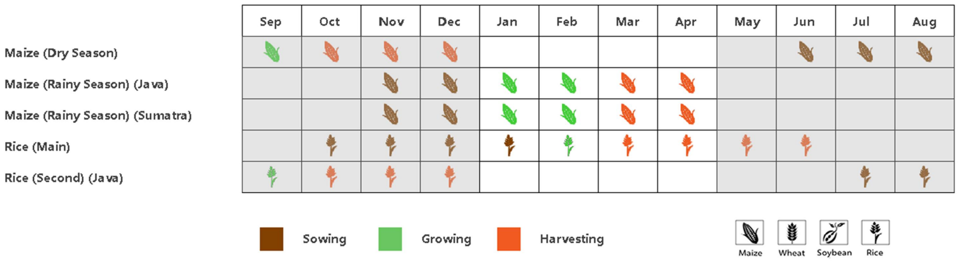
Crop condition was below average in Sumatra. The island experienced average conditions (RAIN +2%, TEMP -0.5℃ and RADPAR -2%) and the biomass production potential increased by 1% compared to the recent five-year average. According to the NDVI development graph, crop condition was slightly below average.

In Kalimantan and Sulawesi agroclimatic indicators were more markedly below average: TEMP -0.8°C, RAIN -8%, RADPAR -4%, and BIOMSS -3%, According to the NDVI development graph, crop condition was below average.

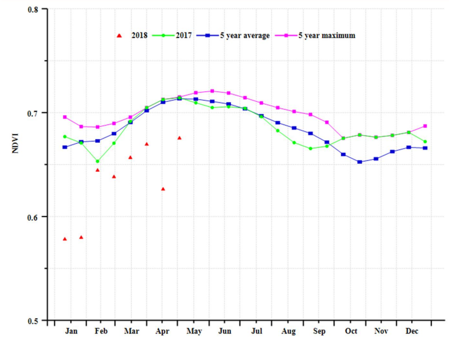
Finally, the situation in the West Papua was also close to average with TEMP (-0.6°C) and RADPAR (-1%) slightly down and RAIN up just +3%. The resulting BIOMSS was average but the NDVI development graph shows that crop condition was below average.

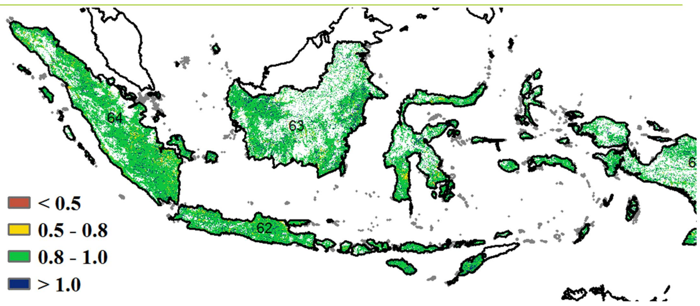
CropWatch anticipate that the yield of maize and rice in Indonesia in 2018 will decrease by 0.1% and 1.1%, respectively.

Figure 3.21. Indonesia’s crop condition, January-April 2018

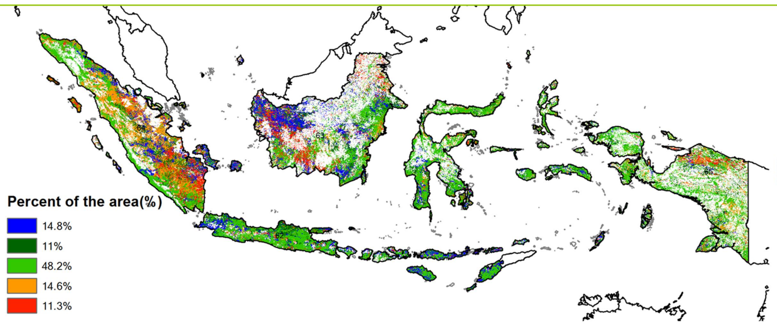


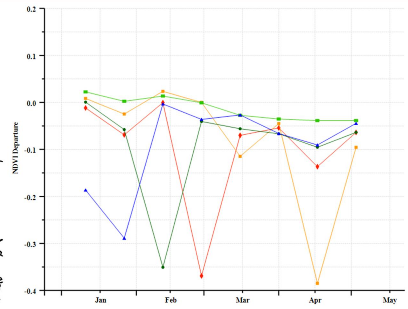
(a). Phenology of major crops



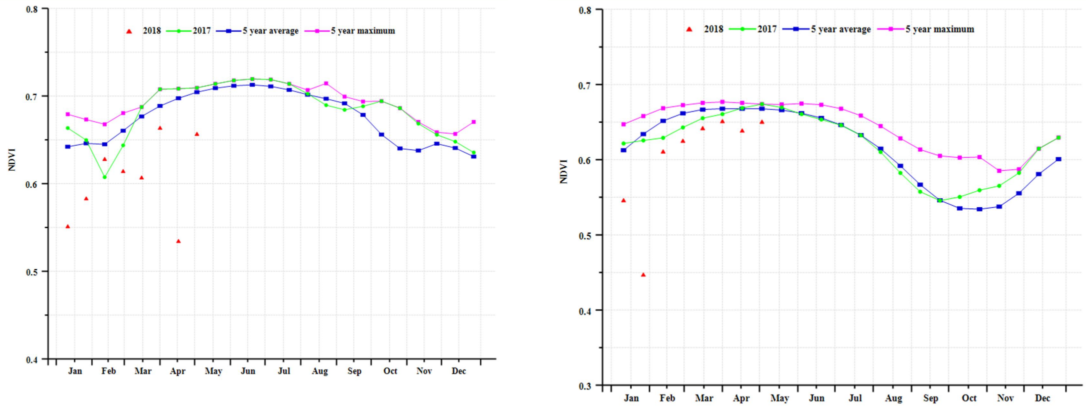


(b) Crop condition development graph based on NDVI (c) Maximum VCI

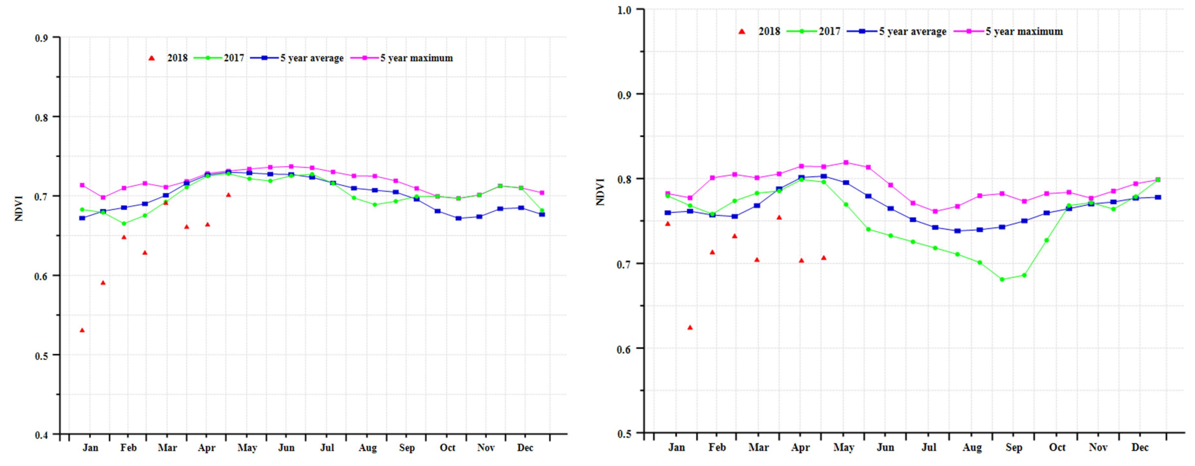




(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles



(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 3.36. Indonesia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure (%)	Current (°C)	Departure (%)	Current (MJ/m^2)	Departure (%)
Java	985	-18	25.5	-0.5	1033	-2
Kalimantan and Sulawesi	1141	2	25.9	-0.5	947	-2
Sumatra	1008	-8	25.4	-0.8	964	-4
West Papua	1383	3	25.2	-0.6	939	-1

Table 3.37. Indonesia's agronomic indicators by sub-national regions, current season's value and departure from 5YA, January-April 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure (%)	Current (%)	Departure (%)	Current
Java	1967	-11	99	-0.1	0.87
Kalimantan and Sulawesi	2318	1	100	0.0	0.80
Sumatra	2160	-3	100	0.0	0.86
West Papua	2358	0	100	0.0	0.73

Table 3.38. 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	-1.1%	0.0%	67665	-1.1%

[IND] India

The reporting period correspond mainly to growing of wheat and rice (Rabi/Winter) besides harvesting of maize and rice (Kharif) crops. The country received 86mm (-14%) rainfall, TEMP at 24.5°C was higher than average by 0.2°C and the RADPAR of 1124 MJ/m2 was -12% below average. The resulting BIOMSS of 295 gDM/m^2 was 4% down compared with average. The cropped agricultural area was 65% (+5%), VCIx at 0.79 with NDVI remaining low throughout the period indicate that conditions were not good for crops.

Rainfall distribution across the country had a large range: the Dtaes of Daman & Diu +189%, Gujarat +149%, Odisha +66%, Karnataka +39%, West Bengal and Goa both +37%, Andhra Pradesh +21% and Jharkhand +19% received higher than average rainfall. While Puducherry, Kerala, Tamilnadu, Chhattisgarh, Maharashtra and Tripura received near average precipitation, the remaining parts of the country recorded below average values ranging from -25 to -73% of average. The States with cooler and warmer TEMP were equally distributed. States in the north-east received lower than average RADPAR (-10% or below), while sunshine ranged from -9% to -2% of average i remaining areas. The biomass accumulation potential was below expectations in most of the northern and north-eastern States but above in the southern half of the country. NDVI was consistently lower than average in most parts, particularly in the northern belt. VCIx was low in central and southern states, while it was above 0.8 in the north.

Overall, the production prospects can be termed below average for winter wheat and rice crops in the country.

Regional analysis

India has varied topography, rainfall, temperature and soils giving rise to a variety of Agro-ecological conditions. The country has been divided into the following zones: the Deccan plateau, the Eastern coastal region, the Gangetic plains, the North eastern region, the Western coastal region, the North western dry region and the Western Himalayan region. CropWatch addresses six of the seven regions for crop assessment; results are reported below.

The Central Indian region known as Deccan Plateau received low rains of 49mm (-20%), 26.5°C TEMP (-0.6°C) and 1163 MJ/m² RADPAR (-6%). BIOMSS dropped 9% in the region which also recorded persistently low NDVI. Only 73% of agricultural areas were cropped and VCIx (0.73 on average) showed large areas between 0.5 and 0.8, indicating poor crop condition.

The only AEZ to receive higher than average rainfall (+41%), the Eastern coastal region had near average TEMP and RADPAR of 1210 MJ/m² but higher than average BIOMSS (had +29%). NDVI was average in January-February, dropped below average in March and regained in April. The region recorded 5% higher than average cropped area and a VCIx of 0.8 indicating fair crop condition.

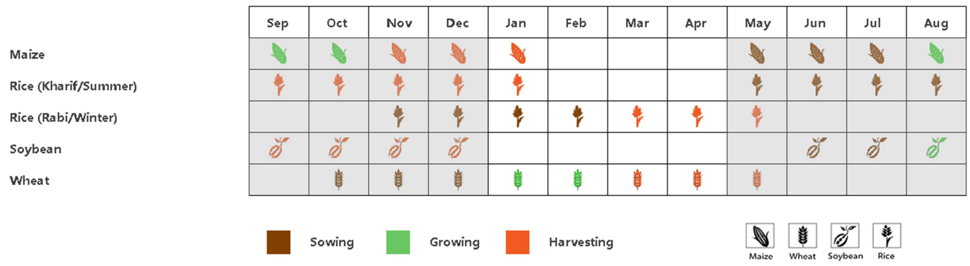
The Gangetic plain region was among the RAIN deficit regions (-11%) but TEMP (23.0°C) was nearly average and RADPAR was 8% lower than average, resulting in 16% below average BIOMSS. NDVI remaining below average throughout the reporting confirms low crop prospects with only 83% of agricultural area being cropped, with average VCIx at 0.87 VCIx and, generally, large spatial variability of indicators.

With highest the rainfall recorded for any AEZ (226mm, though still 37% below average), near normal TEMP and RADPAR at -12% Assam and the Northeastern region underwent an 11% drop below average of BIOMSS. NDVI followed a near average pattern with a dip in late February and April. Though 91% of arable land was cropped, crop condition was below average as reflected by VCIx (0.78).

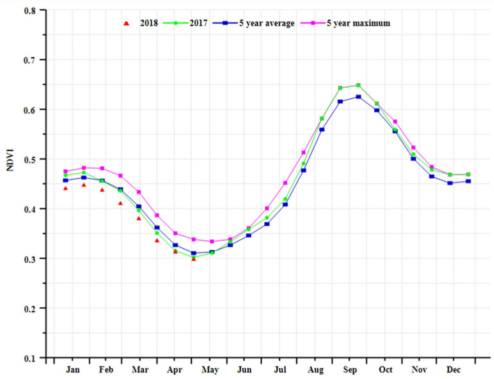
The Western coastal region received 18% higher than average rainfall, average TEMP and RADPAR of 1221 MJ/m² (-5%). This region had 14% higher than average BIOMSS. NDVI remained higher than average over the reporting period, but cropped area was only 51% and VCIx reached 0.84. Production may drop due to low hectarage in spite of fair yields

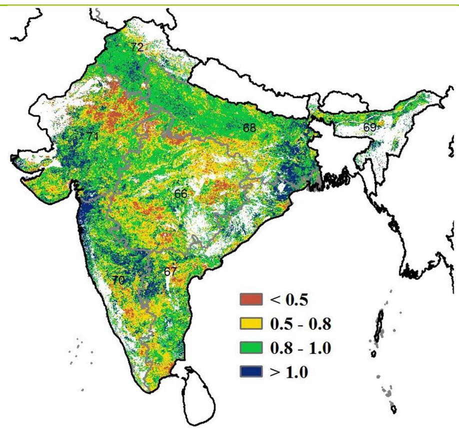
The North western region recorded seasonally low rainfall (only 20mm, -9%) and experienced near average TEMP and marginally low (-5%) RADPAR. Similarly BIOMSS was down (-9%) and only 45% of the area was cropped, With VCIx at 0.76 crop prospect are rather poor.

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



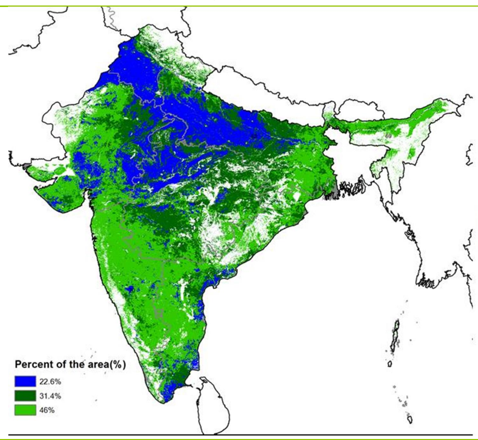
(a). Phenology of major crops

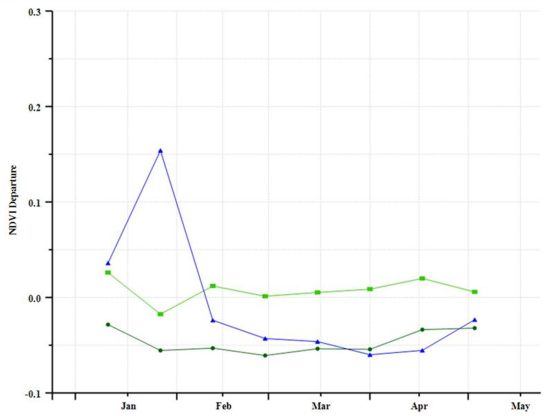




(b) Crop condition development graph based on NDVI

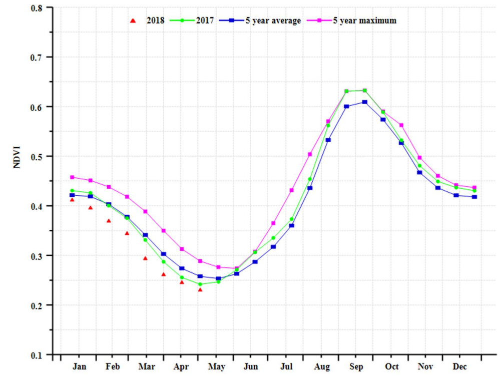
(c) Maximum VCI

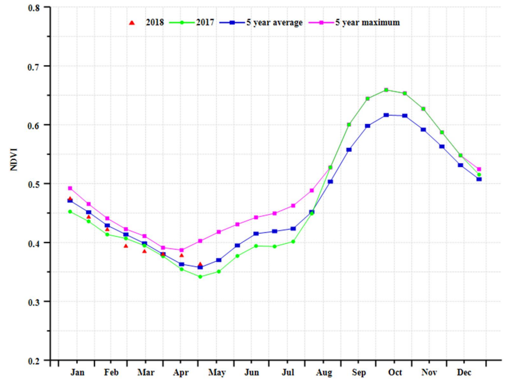




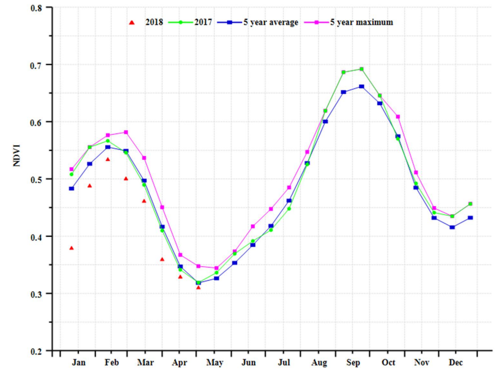
(d) Spatial NDVI patterns compared to 5YA

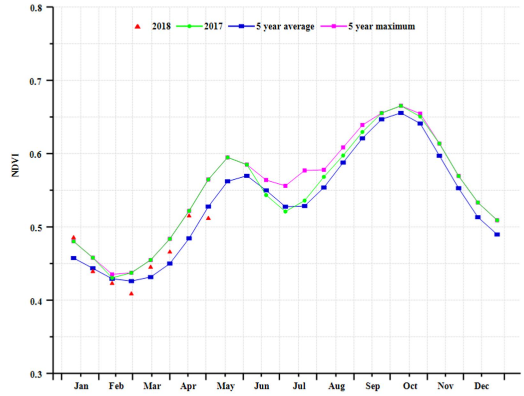
(e) NDVI profiles



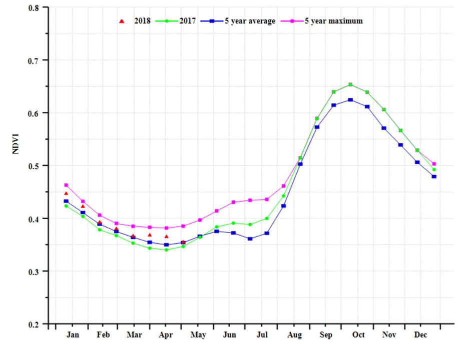


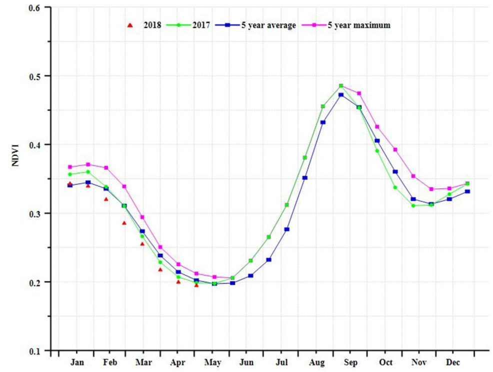
(f) Crop condition development graph based on NDVI (Deccan Plateau (left) and Eastern Coastal Region (right))



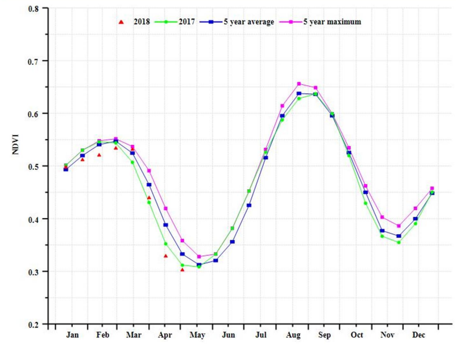


(g) Crop condition development graph based on NDVI (Gangatic Plains (left) and North Eastern Region (right))





(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 3.39. India's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 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)	49	-20	26.5	0.6	1163	-5
Eastern coastal region (India)	110	41	26.8	-0.5	1201	-3
Gangatic plain (India)	72	-12	23.0	-0.6	1077	-8
Assam and north-eastern regions (India)	226	-37	20.3	0.3	888	-12
Western coastal region (India)	93	18	26.3	-0.1	1221	-5
North-western dry region or Rajastan and Gujarat (India)	20	-7	25.4	0.8	1168	-5
Western Himalayan region (India)	127	-40	12.8	1.7	1036	-4

Table 3.40. India's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 2018

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Deccan Plateau (India)	229	-9	61	3	0.73
Eastern coastal region (India)	381	29	68	5	0.80
Gangatic plain (India)	289	-16	83	2	0.87
Assam and north-eastern regions (India)	800	-11	91	2	0.78
Western coastal region (India)	306	14	51	15	0.84
North-western dry region or Rajasthan and Gujarat (India)	98	-9	45	12	0.76
Western Himalayan region (India)	432	-23	92	0	0.83

Table 3.41. CropWatch-estimated rice and wheat production for India in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Rice	163146	-2.1	4.8	167323	2.6
Wheat	93496	-6.0	-0.3	87584	-6.3

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

[IRN] Iran

Crop condition from January to April 2018 was generally below average in Iran. Winter wheat is still growing and barley was harvested, while rice was planted from April. Accumulated rainfall (RAIN, -8%) and radiation (RADPAR, -9%) were below average over the last four months, while temperature (TEMP, +1.4°C) was above average. The unfavorable agroclimatic conditions resulted in a decrease in the BIOMSS index by 8% compared to the five-year average. The national average of maximum VCI index was 0.61, but the Cropped Arable Land Fraction (CALF) increased by 5% compared to the recent five-year average.

According to the national NDVI development graphs, crop conditions was above average throughout the monitoring period in about 10.3% of croplands, mainly in Ardabil, East and West Azerbaijan provinces, and some areas of Mazandaran and Golestan provinces. About 41% of arable land experienced unfavorable crop condition from late January to early February, and then recovered to close to or above average from March to April. Crop condition was below average during the monitoring period in most of the south and southwest regions, North Khorasan and Razavi Khorasan provinces in the northeast region.

Overall, crop condition was fair in Iran during the current winter season. The increase of both wheat area (+1.3%) and yield (+4.9%) resulted in more production by 6.2% compared to last year.

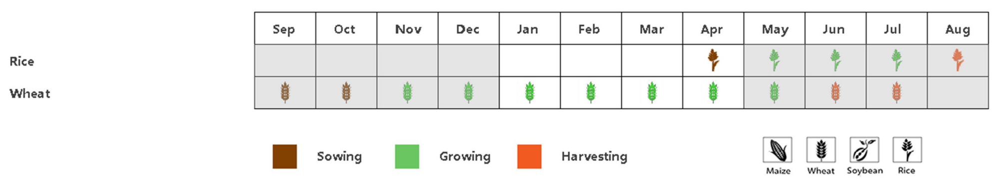
Regional analysis

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.

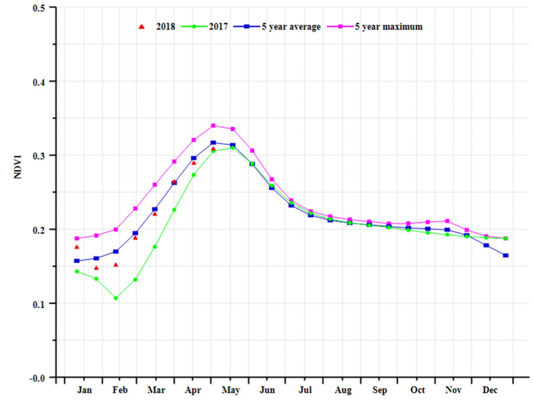
In the Semi-arid to sub-tropical hills of the west and north region, the accumulated rainfall (RAIN -7%) and radiation (RADPAR -10%) were below average, while temperature (TEMP +1.5°C) was above. The unfavorable weather conditions resulted in a decrease of BIOMSS by 8% compared to the recent five years average. The CALF increased by 8%. According to the NDVI profiles, the crop condition was close to or above average from the end of February. The outcome for winter crops of this season is estimated to be favorable.

Crop condition in the Arid Red Sea coastal low hills and plains region was far below average. The region received only 140 mm rainfall during this report period. The water shortage (RAIN,-18%) and low radiation (RADPAR, -5%) resulted in a significant drop of BIOMSS by 12%. The CALF decreased significantly by 27% compared to five-year average, and the national VCIx (0.35) was lower. Therefore, the outcome for winter crops of this region will be very poor.

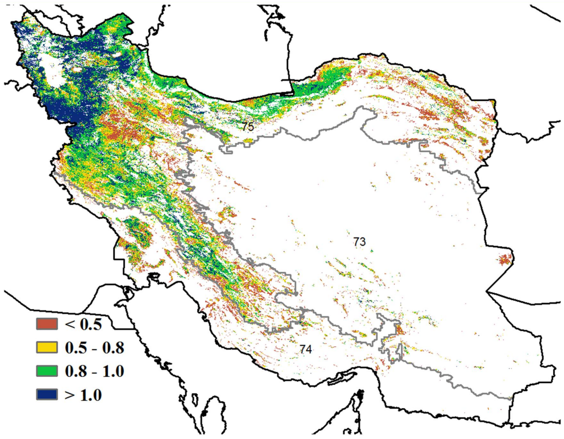
Figure 3.23. Iran's crop condition, January-April 2018



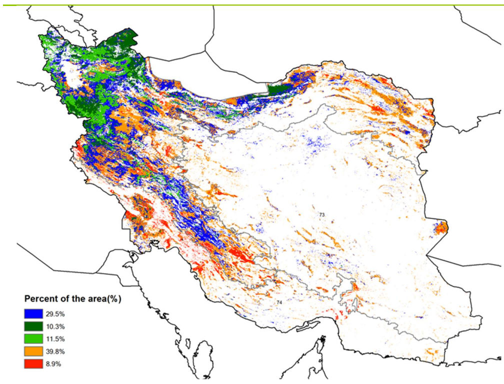
(a) Phenology of major crops



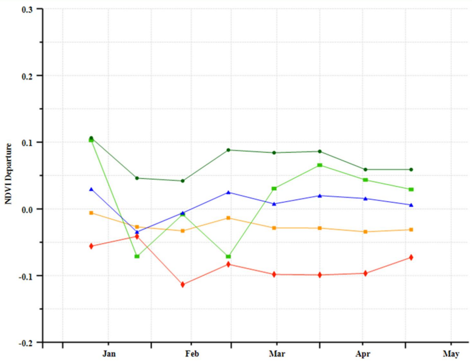
(b) Crop condition development graph based on NDVI



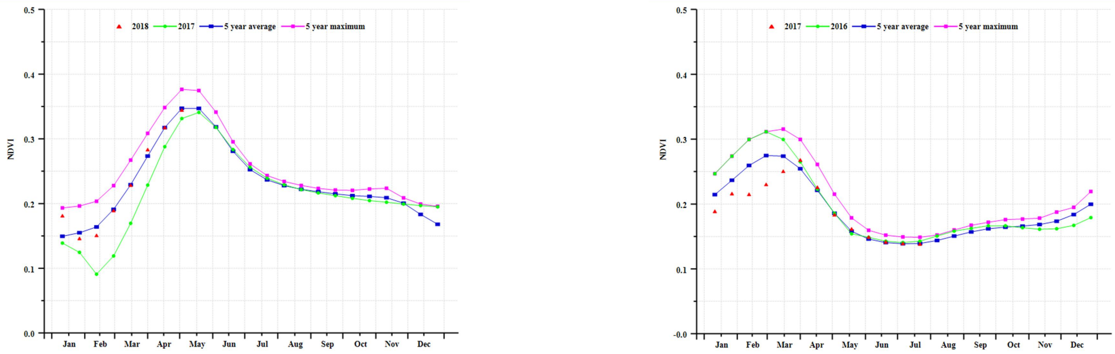
(c) Maximum VCI



(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 3.42. Iran's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 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	207	-7	6.8	1.5	870	-10
Arid Red Sea coastal low hills and plains	140	-18	17.2	1.0	1017	-5

Table 3.43. Iran's agronomic indicators by sub-national regions, current season's value and departure from 5YA, January-April 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	679	-8	25	8	0.68
Arid Red Sea coastal low hills and plains	510	-12	15	-27	0.35

Table 3.44. CropWatch-estimated wheat production for Iran in 2018 (thousands tons)

Crops	Production 2017	Yield change(%)	Area change (%)	Production 2018	Production change (%)
Wheat	12735	4.9	1.3	13529	6.2

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

[ITA] Italy

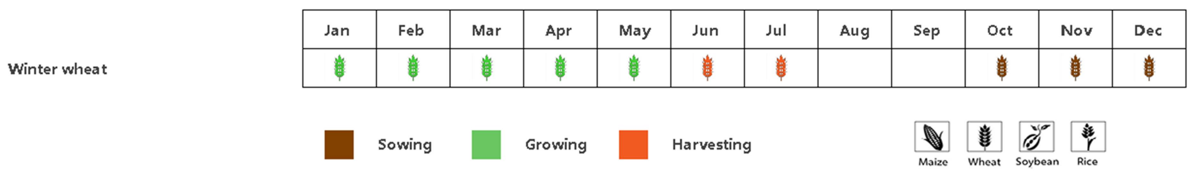
Winter wheat is sown between October and December to be harvested during the early summer months.

NDVI values close to 0.5 and generally below average and below 2017 experienced a sudden drop at the end of February. In the middle of March, values started to rise but were still lower than both 2017 and average at the end of the reporting period. Rainfall (186 mm) was well below average (-40%), the temperature was average; RADPAR (657 MJ/m²) was 8% below average as well. s a result, BIOMSS dropped 7% and VCIx was relatively low (0.73).

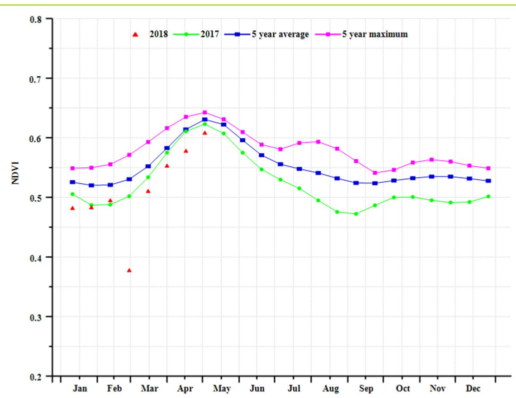
Italy can be divided into three regions based on the spatial variation patterns of NDVI: (1) the Po valley, (2) the Adriatic coast and adjacent southern Campania around Avellino province and (3) most of the Tyrrhenian coast, southern Italy and the islands (Sicily and Sardinia). Most of Tuscany appears as a patchwork of (1) and (3). (1) The northern Po basin had almost average NDVI throughout the reporting period (21,3% or arable land) while the southern part of the basin (about 20% of arable lands) had stable below average NDVI with the departure varying from about -0.10 to about -0.05 at the end of April. The area had mixed VCIx values and crop condition. (2) The Adriatic coast and the east of Cuneo province (Upper Po valley), representing together 28.9% of arable land experienced a drop in NDVI around the end of February. The low values persisted throughout the reporting period in the upper Po valley. VCIx was mostly average (0.5 to 0.8) along the coast but high in the south (1.0 and above), indicating favourable crops. (3) Southern Italy and the islands (29.7% or arable lands) had average NDVI with a short lived positive departure peak (+0.075) at the end of January. There are some patches of low VCIx in Sicily and some high values in Sardinia.

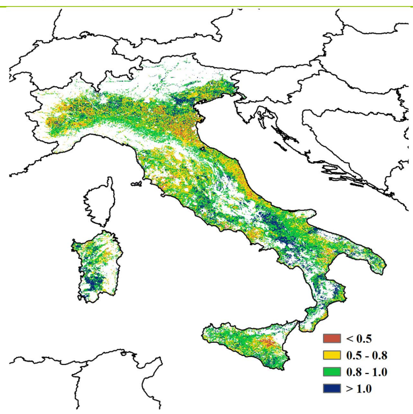
The current crop condition appears to be mostly average. However, if the water supply situation does not improve after April, CropWatch expects a decrease in winter wheat production of 5.3% compared with 2017 values.

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



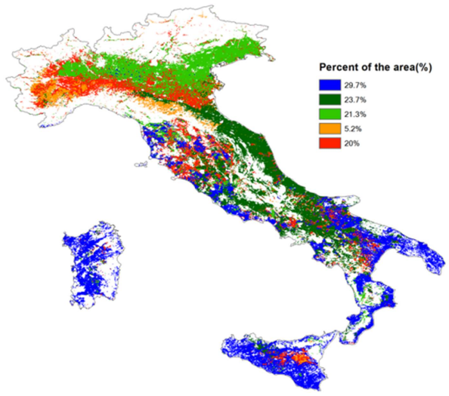
(a). Phenology of major crops

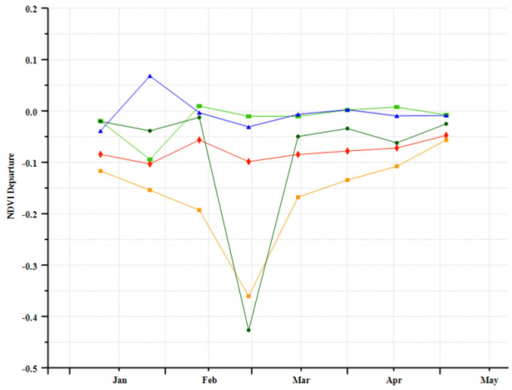




(b) Crop condition development graph based on NDVI

(c) Maximum VCI





(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles

Table 3.45. CropWatch-estimated Wheat production for Italy in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Wheat	7200	-0.90%	-4.40%	6820	-5.30%

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

[KAZ] Kazakhstan

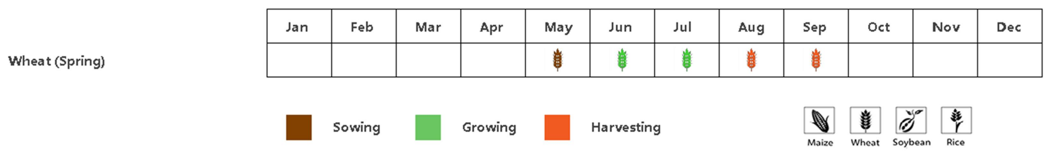
Winter wheat is cultivated during the reporting period in the south and south-east of Kazakhstan, while spring wheat is planted from May. The national average VCIx was 0.52 and the Cropped Arable Land Fraction decreased by 45% compared to the last five-years' average. Among the CropWatch agroclimatic indicators, RAIN was above average (+16%), while TEMP and RADPAR were below (-1.5°C and -8%). BIOMSS was close to the five-year average at the national scale. As shown by the NDVI development graph, conditions (including snow cover) were average from January to late February, but below average from the beginning of March to the end of April. The spatial NDVI pattern and profile show that the crop condition in 79.0% (8.9%+48.0%+22.1%) of the cropped areas was slightly above average only from February to late February in most of Kustanay, North Kazakhstan, Kokchetav, Tselinograd, Turgay, north part of Aktyubinsk provinces. Above average conditions occurred around late March in parts of East Kazakhstan, Semipalatinsk, Pavlodar, Karanganda, Taldy Kurgan, Almta Zhambyl and Kzylorda provinces. Generally, the agroclimatic indicators mentioned above show favorable condition for crop areas of Kazakhstan for the forthcoming summer crop.

Regional analysis

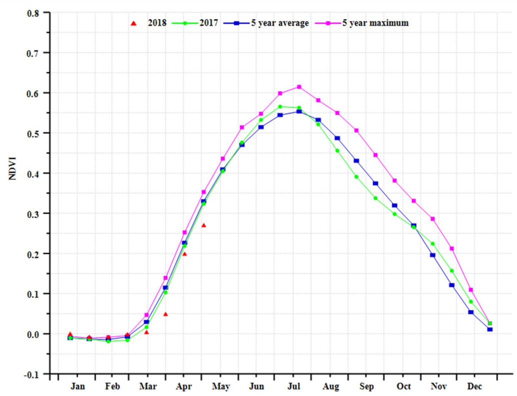
Kazakhstan has four agro-ecological regions: (1) Northern, (2) Eastern plateau and southeastern zone, (3) South and (4) Central non-agriculture regions. Only the Eastern plateau and southeastern region had crops during this monitoring period.

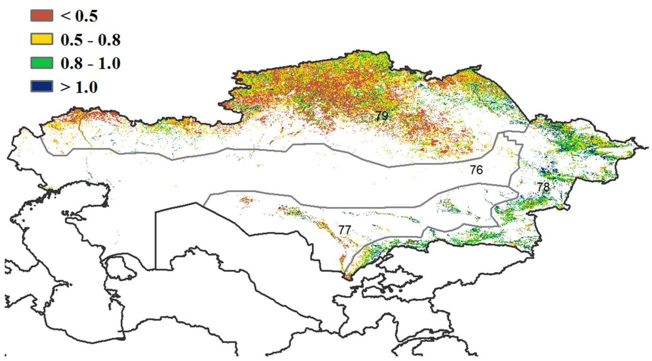
The Eastern plateau and southeastern region had close to average NDVI during the reporting period. RAIN was 12% above average, but TEMP and RADPAR were normal and below average, respectively (0°C and -12%). The agroclimatic variables resulted in an increase of the BIOMSS index by 4%. The maximum VCI index was 0.65, while the cropped area decreased by 17% compared to the five-year average.

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

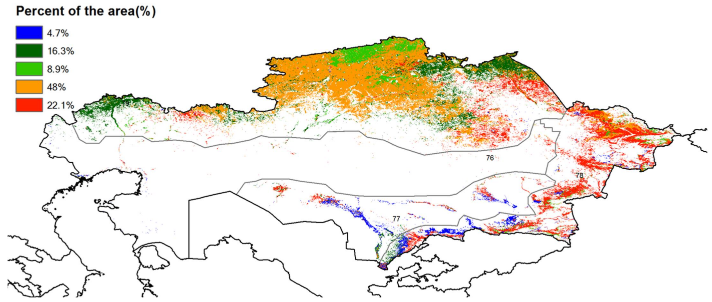


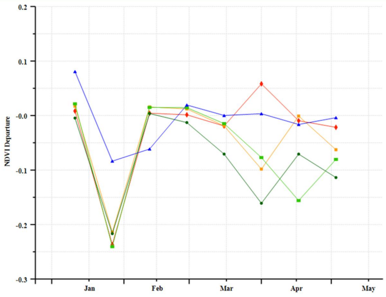
(a). Phenology of major crops



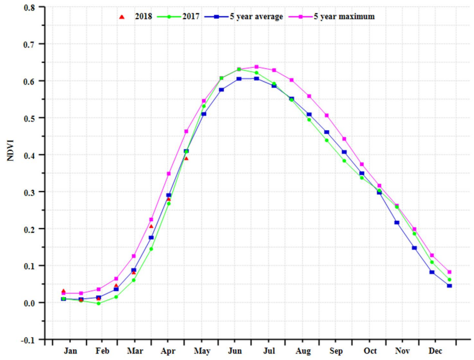


(b) Crop condition development graph based on NDVI (c) Maximum VCI





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



(f) Crop condition development graph based on NDVI Eastern plateau and southeastern region)

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

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Eastern plateau and southeastern region	164	12	-4.8	0.0	677	-11.8

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

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Eastern plateau and southeastern region	478	4	32	-17	0.65

Table 3.48. CropWatch-estimated Wheat production for Kazakhstan in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Wheat	16595	0	-12.9%	14451	-12.9%

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

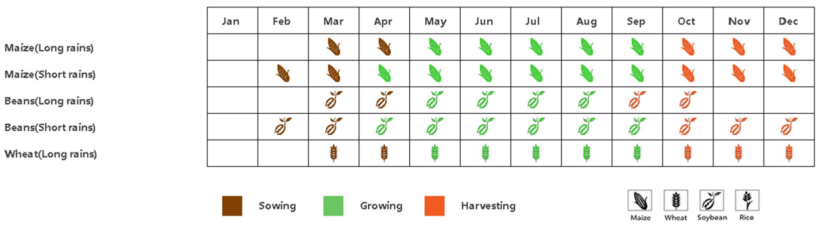
[KEN] Kenya

Farmers start to sow "short rain" crops in October and November, depending on the timing of the rains, to be harvested late January or February. "Long rains" start during the last third of the reporting period, to be harvested over the next reporting period, sometimes as late as early July or later, depending on location and, especially, elevation. Beans and short-cycled and drought staples (sorghum, millets) are usually planted early, including in the lowlands. Maize (the main cereal) is a typical long rains crop; it is cultivated in much of southern Kenya. Wheat (the second cereal crop in terms of production) is grown mostly in the high elevation areas of the south-west where seasons can be longer than six months.

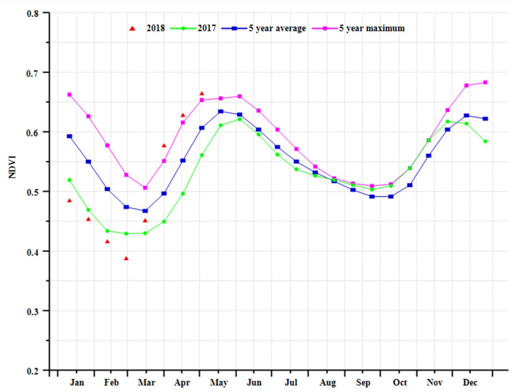
At 522 mm, the current nationwide rainfall exceeded the average by 70%, which is significant. The average temperature (22.3℃) was below average by 1.4 ℃ and so was RADPAR (1224 MJ/m², or -7%). Due to abundant precipitation, BIOMSS reached 1245 (g DM /m²), an increase of about 33% above the 5-years average. The current cropped arable land fraction is 0.99, 5% above the 5YA and VCIx is about 1.0, indicating the best crops of the recent years.

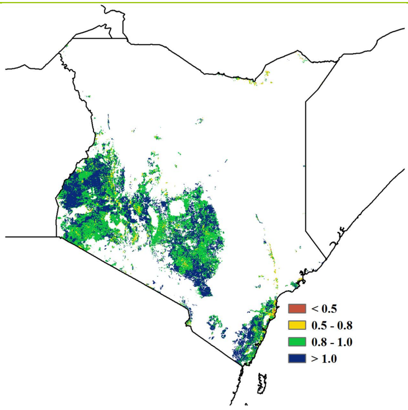
According to clusters and the map of NDVI profiles, crop condition was below average until mid-February, which indicates a poor short rain crops at the time of harvest. This is confirmed by the national graph of crop condition development which stayed below average and below 2017 values until February. Thereafter, NDVI jumped to high values with the start of the long rains, except in limited areas which make up just 11.5% of croplands. For the time being, NDVI profiles and VCIx agree: with few exceptions, rather good wheat and maize crops are expected from the major production areas. With yield up 27.5% and a 4.7% increase in cultivated area, CropWatch puts the long rains output 32.9% above the 2017 production.

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



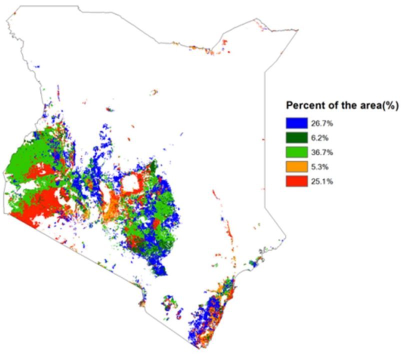
(a). Phenology of major crops

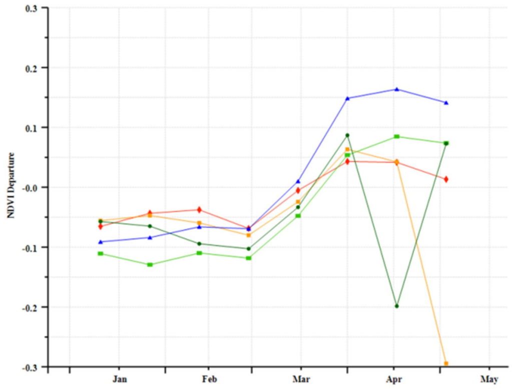




(b) Crop condition development graph based on NDVI

(c) Maximum VCI





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

Table 3.49. CropWatch-estimated maize production for Kenya in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Maize	3000	27.50%	4.20%	3986	32.90%

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

January to April covers the growing period of irrigated maize, and the planting time of rainy season rice. Crop condition is globally average. The fraction of cropped arable land was above the average of the previous five years (+15%). Compared to average, the CropWatch agroclimatic indicators show a sharp drop in radiation (RADPAR, -7%) and in air temperature (-1.4℃). Rainfall increased slightly (RAIN, +4%), causing a 6% increase in the biomass production potential (BIOMSS) and rather high VCIx country-wide (VCIx 0.92).

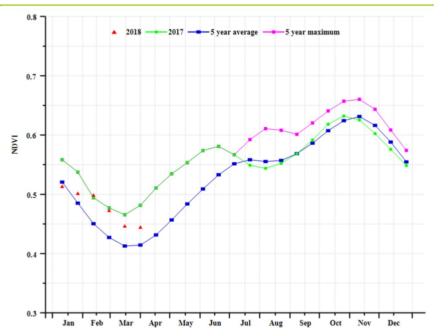
Most regions in the country experienced favourable VCIx values above 0.8, except a small region in the west of Tongle Sap. NDVI clusters show 80% of the crop area is slightly over average, only 20% of the area at the average condition. Altogether, the condition of crops in the country is better than average.

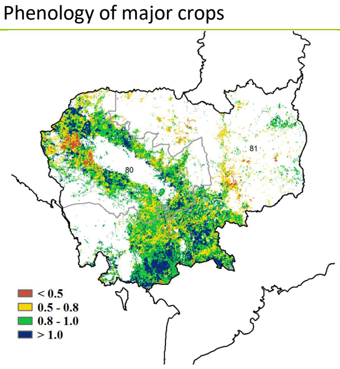
Based mostly on climate differences, two agro-ecological regions can be distinguished. Weather in the Tonle Sap lake area (especially rainfall and temperature) is mainly influenced by the lake itself. The second area, referred to as the "main crop area" covers areas outside the Tonle Sap basin along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

For the current reporting period, the two major crop areas share similar crop condition; both are above average according to the NDVI profile. The lake plain suffered a reduction of rainfall below average (-6%) compared with abundant water supply in the Main Crop Area (+16%). The marginal drought caused a 1% reduction in BIOMSS near Tongle Sap. However, maximum VCI is rather favourable in this region (0.89). Although both regions suffered from cloudy weather with cool temperature and reduced solar radiation, CALF increased markedly (+13% around Tonle Sap and +20% elsewhere. Overall, crop condition in Cambodia is at least fair.

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

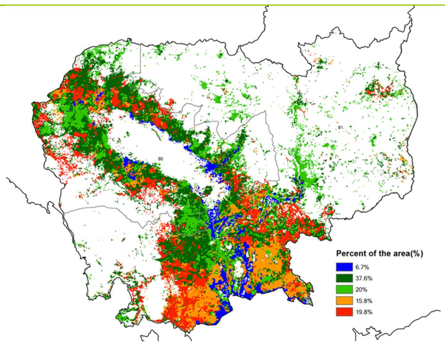
(a). Phenology of major crops



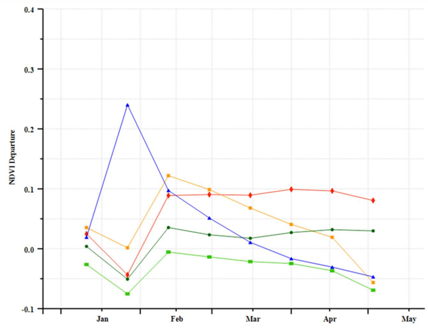


(b) Crop condition development graph based on NDVI

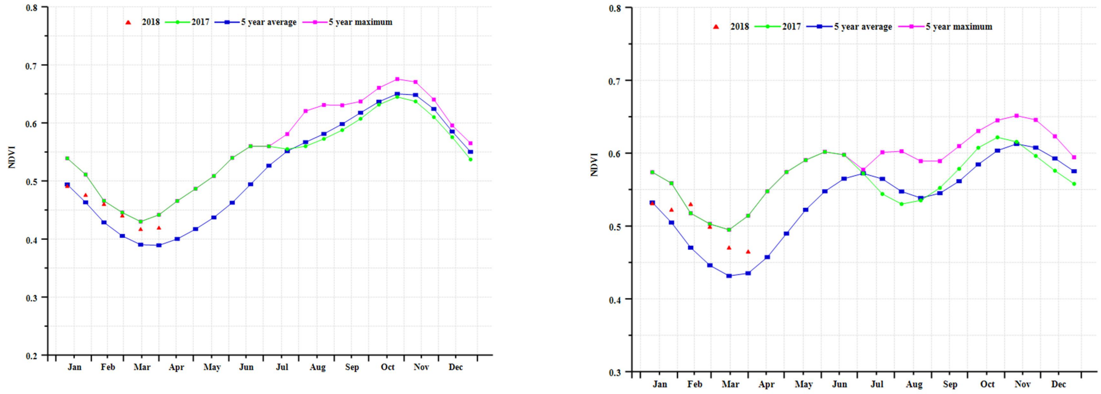
(c) Maximum VCI



(d) Spatial NDVI patterns compared to 5YA



(e) NDVI profiles



(f) Crop condition development graph based on NDVI (Lake area of Tongle Sap (left) and Main cropping area (right))

Table 3.50. Cambodia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Main cropping area (Cambodia)	203	17	27.6	-1.6	1074	-8
Lake plains (Cambodia)	152	-6	27.4	-1.3	1117	-6

Table 3.51. Cambodia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 2018

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Main cropping area (Cambodia)	745	16	81	20	0.97
Lake plains (Cambodia)	584	-1	92	13	0.89

Table 3.52. CropWatch-estimated rice production for Cambodia in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Rice	8792	5%	2.9%	8596	-2.2%

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

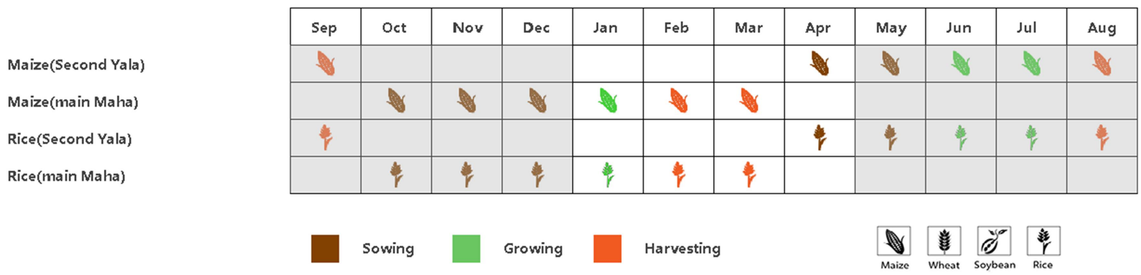
[LKA] Sri Lanka

The reporting period covers the entire growing and harvesting season of Maha rice and maize, as well as the early sowing season of Yala crops (rice and maize). CropWatch assesses the overall crop condition to be below both the average of the previous five years and 2017.

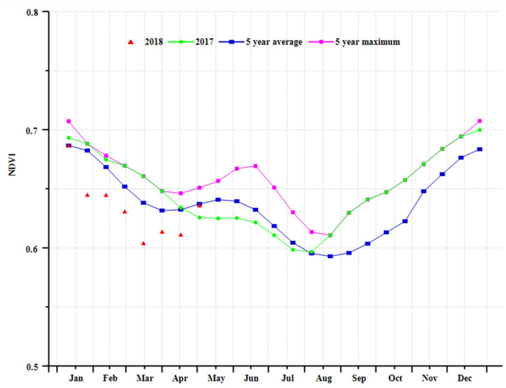
Compared to average, rainfall increased 26%, while temperature and radiation were slightly below (0.6℃ and 2%, respectively). The fraction of cropped arable land (CALF) remained stable compared with the five-year average. Excess precipitation may have had a negative influence on crop condition and led to a decrease in BIOMASS compared with the five-year average. The crop condition development graph based on NDVI describes an unfavourable situation. Crop condition dropped below average after January and remained so up to mid-April. The condition recovered to normal compared to average in late April.

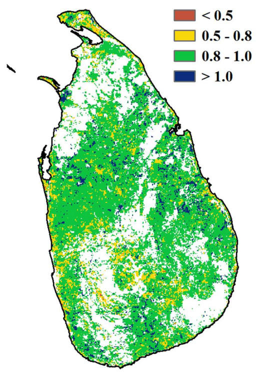
There were, however, some spatial differences according to NDVI profile clusters and map. In southern Sri Lanka, crop condition fluctuated around the average while all other regions experienced departures from average to some extent. The North-western Province suffered bad conditions from February to mid-April except for its eastern part. In the east of the country, the North-Central province and the Eastern Province crops did unsatisfactorily in late January and mid-April. The maximum VCI (VCIx) map displays patterns of spatial distribution that are similar to the NDVI clusters, with low and high values occurring throughout the country. The average VCIx value for Sri Lanka, however, is rather high at 0.86. CropWatch therefore puts the productions of rice during 2018 slightly above the output of 2017.

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



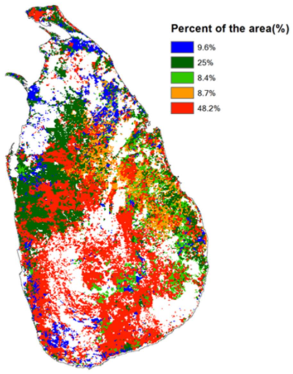
(a). Phenology of major crops

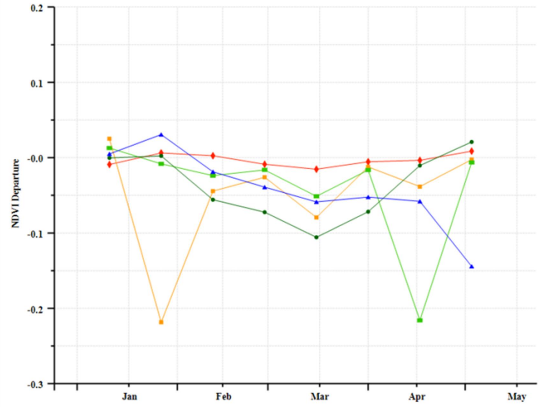




(b) Crop condition development graph based on NDVI

(c) Maximum VCI





(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles

Table 3.53. 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	0.1%	2501	0.1%

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

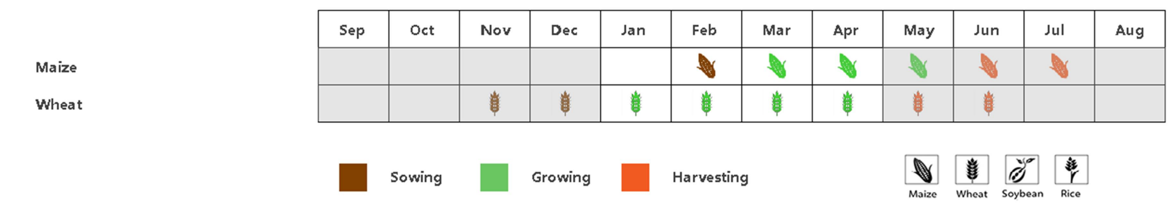
[MAR] Morocco

Morocco produces mostly rainfed winter cereals (wheat and barley) as well as summer crops such as maize, potatoes and sunflower where sufficient irrigation water is available.

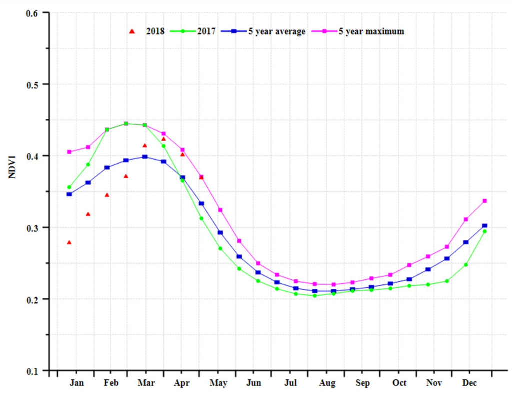
Nationwide RAIN was about average (164 mm, -2%) but both TEMP and RADPAR were below (-0.9°C and -11%, respectively). BIOMASS increased by 3 percent compared to the 5YA. Crop condition development graphs based on NDVI show below average values during winter but picked up at the time of harvest, when they were close to the 5-year maximum. The VCIx of 0.76 showed fair crop condition. In addition, the cropped arable land fraction increased by 15 percent compared to its five-year average.

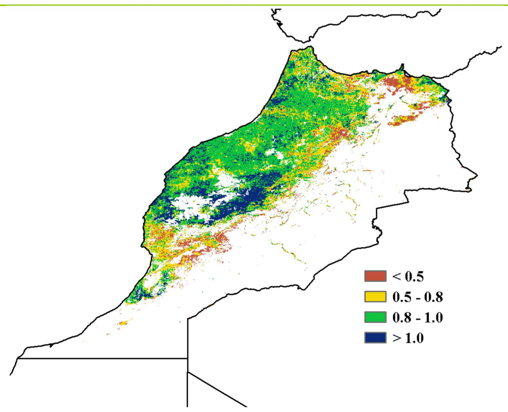
NDVI clusters and profiles provide additional spatial information about the condition of crops. NDVI varied smoothly during the reporting period and remained close to average, with the exception of a sharp and short-lived drop at the beginning of March around the provinces of Chefchaouen, Sidi Kacen, Taza and Taounate in the north of the country (2.9% of cropped areas). The lowest values were very close to average (around -0.05 in NDVI units) and occurred in some high elevation areas of the provinces of Boulmane, Kenifra, Errachidia and Ourazazate, representing 18.8% of arable land. At the end of the reporting period, the most favourable conditions compared with average were those prevailing in a large area (19.5% of arable lands) centered around the mountains of Beni Mellal and Azilal. Altogether, the available data indicate at least average output expectations for winter crops.

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



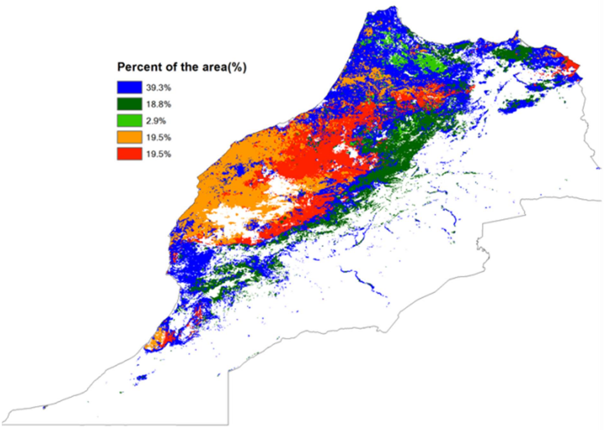
(a). Phenology of major crops

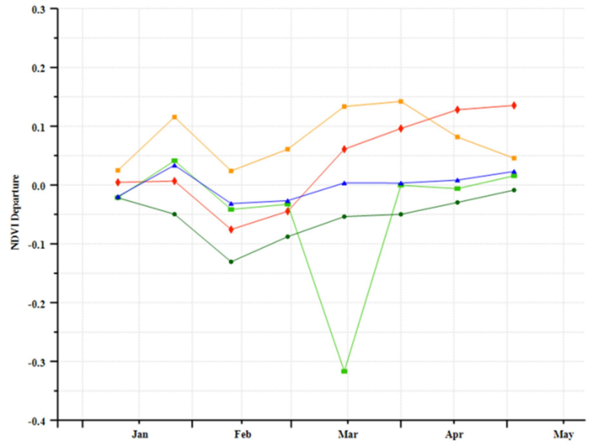




(b) Crop condition development graph based on NDVI

(c) Maximum VCI





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

Table 3.54. CropWatch-estimated wheat production for Morocco in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Wheat	7100	-0.6%	-3.5%	6814	-4.0%

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

[MEX] Mexico

Winter wheat in Mexico was still growing from January to March; the harvest started in April. During the same period, the maize harvest was ongoing in northwestern Mexico. As shown by the crop condition development graph based on NDVI, at the national scale the condition of crops was mostly below the five years' average. It improved during late April and reached a level comparable to last year's, while remaining below average.,

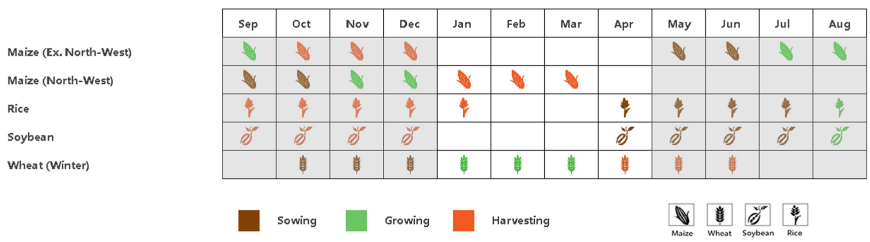
The CropWatch agroclimatic indicators show that rainfall increased by 31% compared to average whereas RADPAR decreased by 4%. Temperature was average. All the above agroclimatic condition resulted in a relatively high BIOMSS, with the value surpassing average by 9%. As indicated by the agronomic indicators, CALF in the whole country was 2% below average. Moreover, VCIx was relatively low, with a value of 0.72. According to the VCIx pattern map, low values (less than 0.5) occur in most areas of the country except the south-east. The spatial NDVI pattern and corresponding NDVI profiles show that about 66.4% of the cropped areas experienced below-average crop condition, which is consistent with the VCIx pattern. Considering the crop situation and the agroclimatic and agronomic condition, CropWatch estimates that the maize production of this season was 23439 thousands tons, down1.8% compared to 2017.

Regional analysis

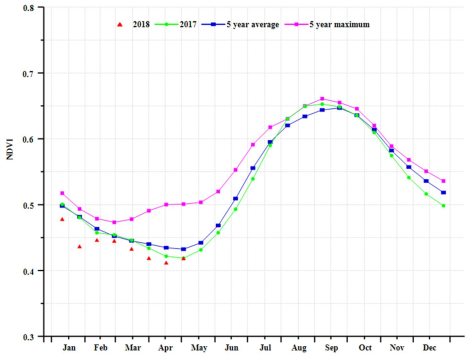
According to the crop condition development graphs based on NDVI, the Mexican AEZs display conditions similar to those prevailing at the national level. This applies to the Arid and semi-arid regions, the Humid tropics with summer rainfall, the Sub-humid temperate region with summer rains and the Sub-humid hot tropics with summer rains.

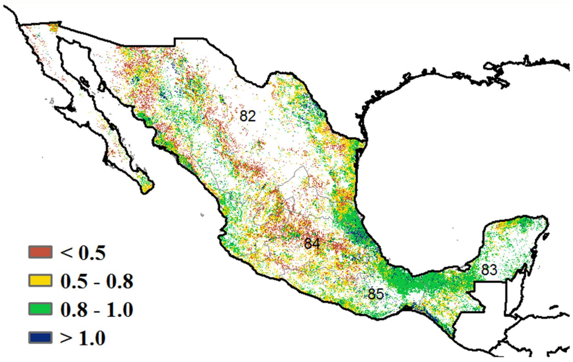
The agroclimatic indicators show that rainfall was significantly above average in almost all the regions (+20% to +75%), except in the Arid and semi-arid regions (-7%). In contrast, RADPAR was below average in all the regions (-4% to -2%). Temperature was close to average, with the departures ranging between -0.4°C and +0.3°C. As for the agronomic indicators, BIOMSS increased respectively by 34%, 19% and 22% in the Humid tropics with summer rainfall, Sub-humid temperate region with summer rains and the Sub-humid hot tropics with summer rains; it decreased by 14% in the Arid and semi-arid regions. CALF was 10% and 3% below average in the Sub-humid temperate region with summer rains and the Sub-humid hot tropics with summer rains whereas it was 3% above average in the Arid and semi-arid regions. CALF was average in Humid tropics with summer rainfall. Among all the regions VCIx varied between 0.63 and 0.86.

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



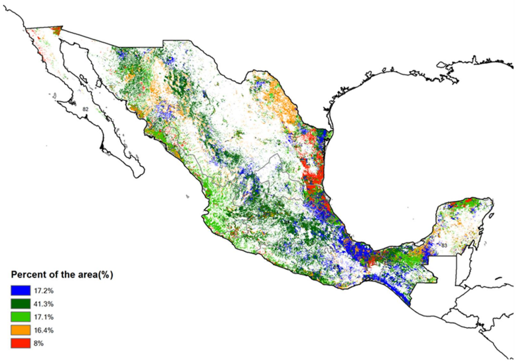
(a). Phenology of major crops

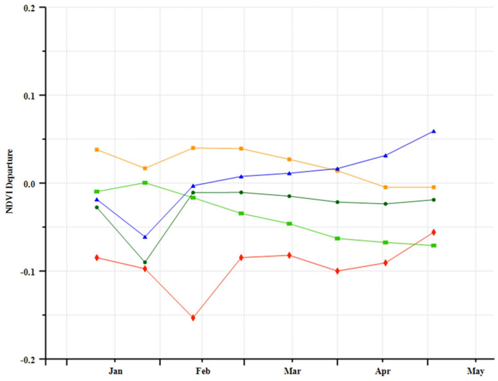




(b) Crop condition development graph based on NDVI

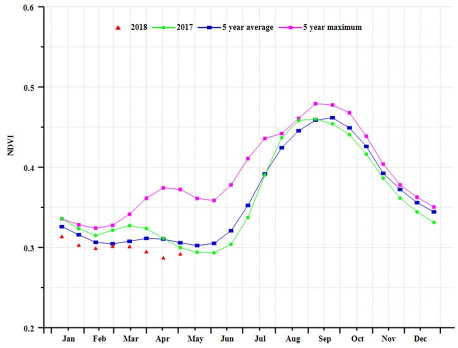
(c) Maximum VCI

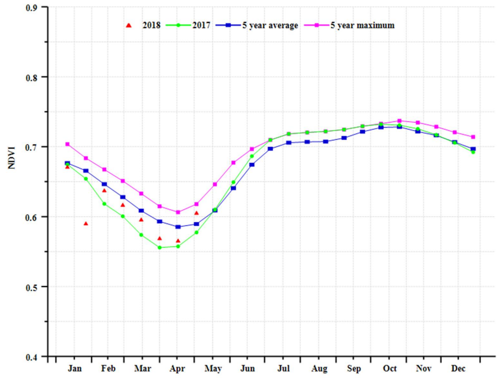




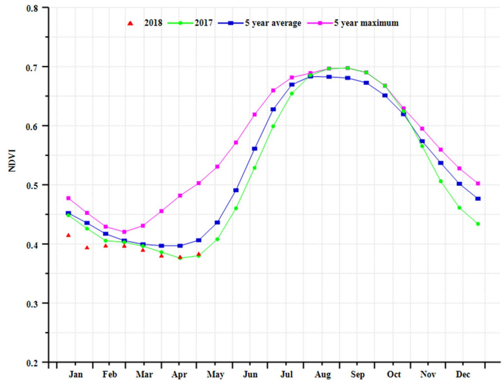
(d) Spatial NDVI patterns compared to 5YA

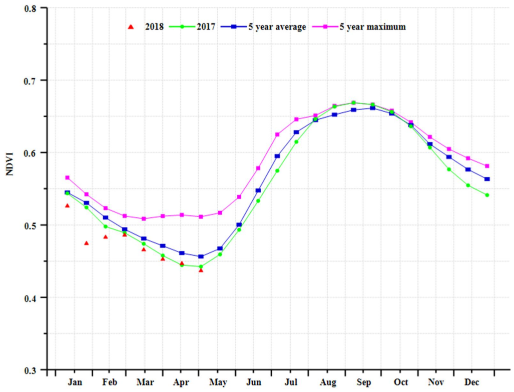
(e) NDVI profiles





(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 3.55. Mexico’s agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Arid and semi-arid regions	63	-7	16.5	0.3	1146	-4
Humid tropics with summer rainfall	264	75	25.0	-0.4	1078	-2
Sub-humid temperate region with summer rains	91	20	18.8	-0.1	1211	-4
Sub-humid hot tropics with summer rains	97	21	21.2	-0.3	1156	-4

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

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Arid and semi-arid regions	224	-14	0	3	0.66
Humid tropics with summer rainfall	741	34	1	0	0.86
Sub-humid temperate region with summer rains	359	19	0	-10	0.63
Sub-humid hot tropics with summer rains	360	22	1	-3	0.78

Table 3.57. CropWatch-estimated maize production for Mexico in 2018 (thousands tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Maize	23858	-4.1%	2.4%	23439	-1.8%

[MMR] Myanmar

Myanmar is a major agricultural country that cultivates several main crops every year. Maize is distributed mainly in the Hills region, while wheat and rice are planted across the country. The reporting period covers the entire harvesting season of maize, as well as the growing season and early harvesting season of the second rice and wheat. The main rice was harvested before this monitoring period and will be planted in the next monitoring period. CropWatch assesses crop condition throughout the country as generally above the average of the previous five years throughout the period, sometimes reaching the maximum of last five years in January and February.

As shown by the CropWatch agroclimatic indices, compared to average, both rainfall and RADPAR decreased by 9%, with TEMP close to average. The fraction of cropped arable land (CALF) showed an increase of 12%. Poor climatic condition and improved CALF led to no change in BIOMASS compared with five-year average. The crop condition development graph based on NDVI shows a favorable situation. Crop condition, which had been satisfactory already in January and remained so in February, slightly declined to average in March and April. Similar fluctuations of crop condition can also be seen for the agro-ecological regions described in the regional analysis below.

In terms of spatial distributions, cropland across the country displayed mostly good condition except for several southern provinces. The central areas of Myanmar, including Mandalay, Magwe, southern Bago and some scattered parts of Shan, enjoyed above average condition throughout the reporting period except for a transitory below average spell in late January. The southern provinces such as Ayeyarwady, Yangon and the north of Bago displayed the same condition as others while suffering from poor crop condition after mid-February. The VCIx map displays a similar pattern of spatial distribution with high values all over the country, accompanied by low values in scattered distributed regions.

Regional analysis

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

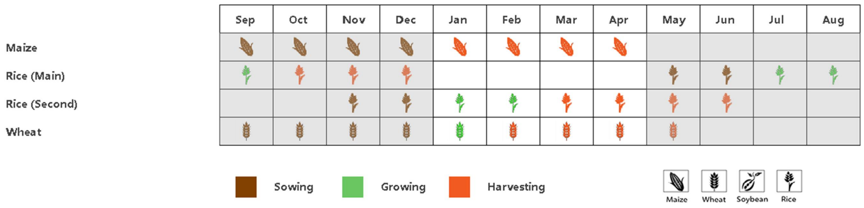
The Coastal region shows the least favorable agroclimatic and crop conditions for the country, but the crop condition was still above average through the whole period except for late April. The unfavorable agroclimatic indices of this sub-national region may substantially impact the growing of second rice. Rainfall was somewhat below average (RAIN -7%) and radiation was poor (RADPAR -6%).

The Central plain is the main crop region of the country, and the area shows the most favorable values among the three sub-national regions discussed here. The crop condition was above average all the time and even reached the maximum level in first two month. Abundant precipitation compared with average provided good conditions for the growth of the second rice and wheat.

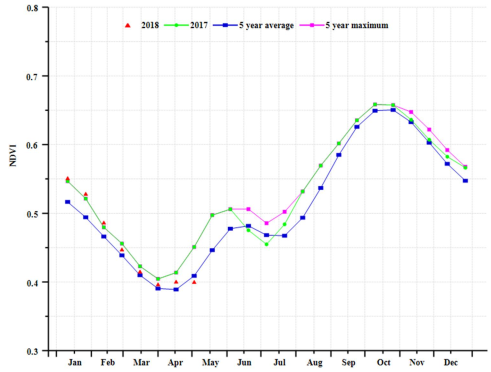
The Hill region cultivates maize as its main crop; it was harvested during the monitoring period. Agroclimatic indicators were close to the national values but for rainfall dropped 21% below average. According to the NDVI development graphs, crop condition was above average before mid-April. The maize output of this sub-national region is deemed to average.

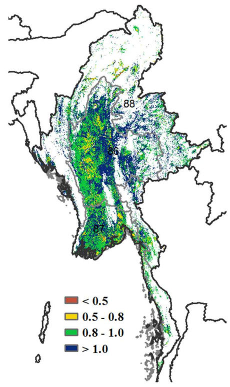
CropWatch puts the production of maize and second rice during 2018 slightly above those of 2017.

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

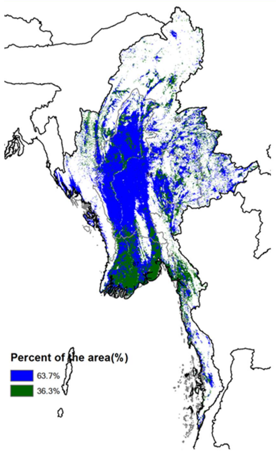


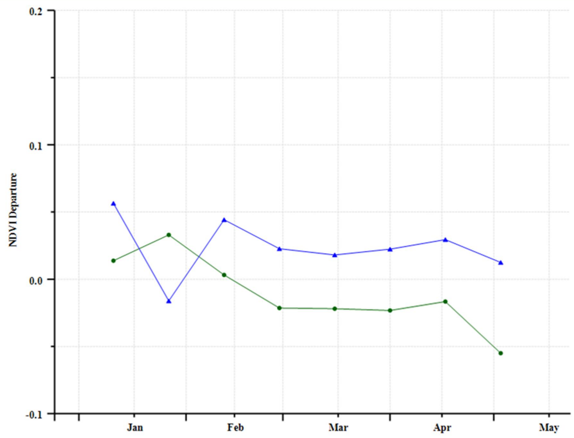
(a). Phenology of major crops



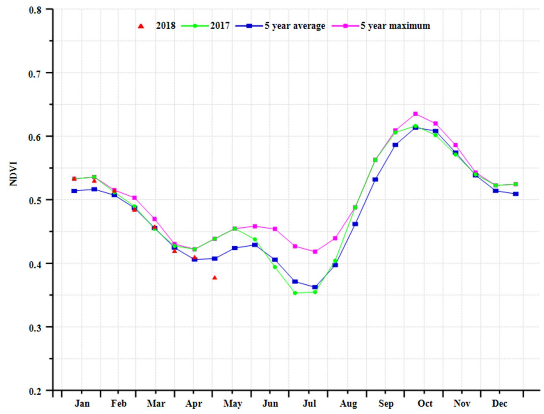


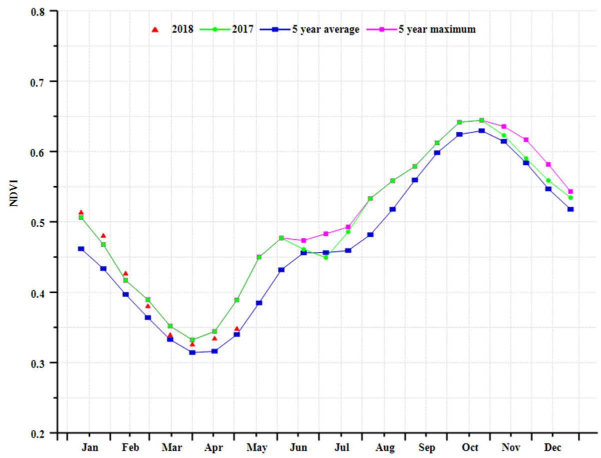
(b) Crop condition development graph based on NDVI (c) Maximum VCI



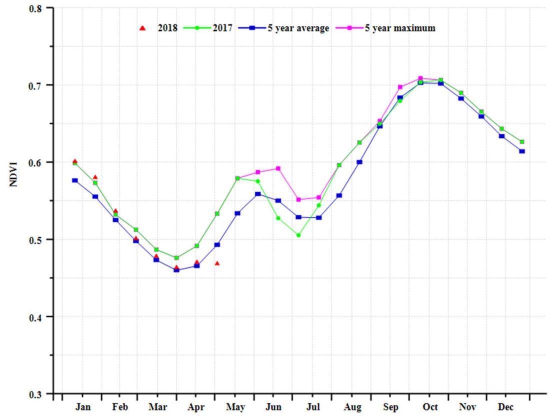


(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles





(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 3.58. Myanmar's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 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	81	-7	28.4	-0.1	1175	-6
Central plain	70	18	25.0	-0.5	1093	-10
Hill region	95	-21	21.4	-0.3	1031	-10

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

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Coastal region	302	-2	88	2	0.95
Central plain	313	25	80	25	0.99
Hill region	401	-11	93	2	0.96

Table 3.60. CropWatch-estimated rice production for Myanmar in 2018 (thousand tons)

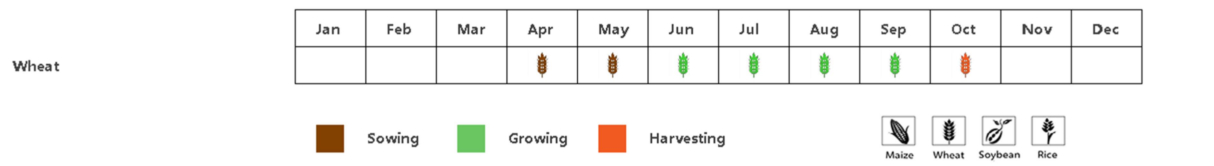
Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Rice	25407	1.2	0.3	25790	1.5

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

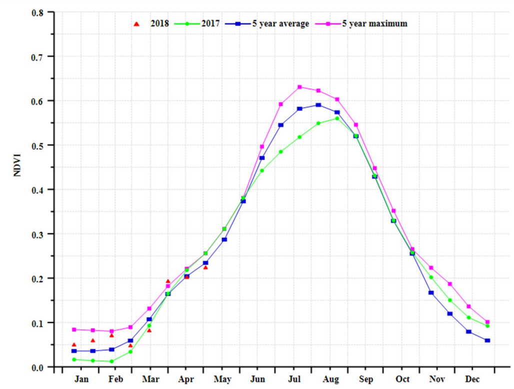
[MNG] Mongolia

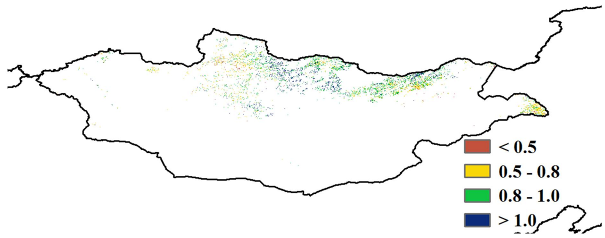
No crops were in the field during most of this monitoring period due to low temperature, but the sowing of summer wheat has started from late April. Among the CropWatch agroclimatic indicators, RAIN and TEMP were above average (+31% and +1.5°C), while RADPAR was down 3%. The combination of factors resulted in high BIOMSS (+27%) compared to average. Overall, the agroclimatic variables indicate favorable soil moisture conditions for crops and rangelands of the forth coming season.

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



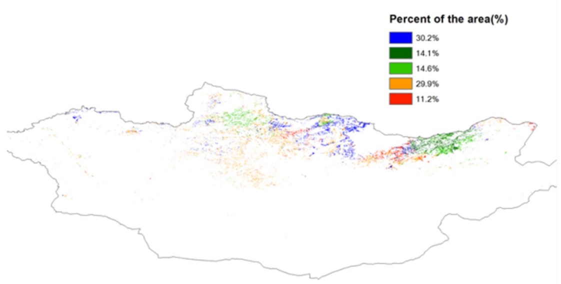
(a). Phenology of major crops

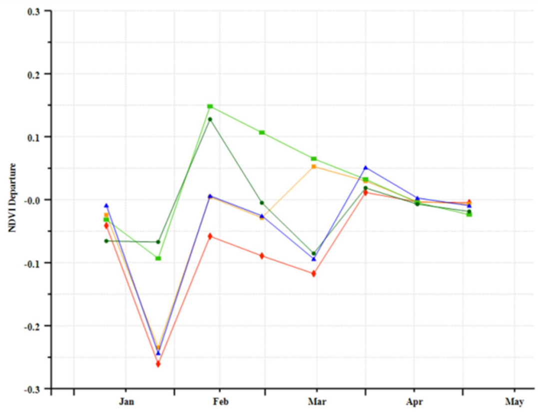




(b) Crop condition development graph based on NDVI

(c) Maximum VCI





(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles

Table 3.61. CropWatch-estimated wheat production for Mongolia in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Wheat	231	0.0	0.7	233	0.7

[MOZ] Mozambique

Overview

Mozambique is a mainly agricultural country, with more than 70% of its population living in the rural area spracticing agriculture. According to last agriculture census (2009-2010), there are 3.9 million small-scale farmers in Mozambique who represent 98.6% of the total production of the country. A considerable portion (28%) of these households is female-headed, going up to 40-45 % in Gaza and Inhambane province. These households grow about 5 million hectares of (largely annual)crops, of which 45% is in Nampula and Zambézia. Both Nampula and Zambézia are considered two of the higher food and cash crops productions provinces.

According to data from Ministry of Agriculture and Food Security of Mozambique, Maize, Rice, Sorghum, Cassava,Cotton, and Sugarcane are the main crops grown on several farms. Most farms grow corn (76.86%), 28.74% grow small peanuts, 24.31% cultivate sorghum,16.27%grow rice.

The agriculture predominant are subsistence and mainly characterized by low yields due to the lack of inputs (quality seeds, fertilizer, pesticides, and irrigation system). The lack of timely and frequently agroclimatic information and analysis also affect the farmers and delay actions. The main season start in October to March. With the large majority of agricultural production being rain-fed. Weather variability is a major factor in determining crop performance. Data available show that the north side of the country tends to have higher rainfall of 150 to 300 mm per month between December and March while the southern part has 50 to 150 mm per month.

National Analysis

The monitoring period covers the sowing and growing season of maize and rice for the north region and growing and starts harvesting season for the central and south region. At the start of the season in late 2017 farmers faced problems with water scarcity in some areas of the south and central parts of the country, especially in the provinces of Gaza, Inhambane, Maputo (north), Tete (south) and parts of Manica and Sofala. Some early crops were lost and had to be replanted. Compared with their averages, the agroclimatic indicators showed a slight increase in rainfall (+1%) and a decrease of both temperature (-0.9ºC) and sunshine(RAPDAR, -2%). BIOMASS rose 2% over the 5YA.

For the current season, Mozambique has experienced below average rainfall in the southern (Maputo, Gaza, Inhambane) and some central parts (Tete and Sofala) provinces, while above average rainfall has been received over the northern (Nampula, Cabo Delgado, and Niassa)provinces. Highlights can be addressed to Tete province where a reduction on rain and temperature (RAIN -24% and TEMP-0.7ºC) and biomass (-17%)were significant when compared to the average of previous fifteen and five years respectively. Nampula and Zambézia, the major producer provinces of the country were below average rainfall. The other provinces, including, Gaza and Inhambane received favorable rainfall with 12% and 35% above average respectively.

Most parts of the regions received good rains briefly in late January and February. comparing with last 15 years average, From October to early December, the rain was below average and coincides with growth stage. These February rains provided some moisture which contributed slightly to pasture re-growth were still insufficient toeliminate the prevailing rainfall deficits. Dry conditions in the south and some center parts affected maize and rice production. The infestation of Fall Army worm (FAW)in Inhambane, Sofala and Tete provinces, as reported by Ministry of Agriculture and Food Security will further impact the outputs.

The spatial NDVI departure pattern sassociated with the NDVI profiles indicate a variety of behaviors before February, with parts of the provinces of Cabo Delgado, Nampula, Tete and Inhambane above average and other areas below (only 5.6% of arable land in February). From February, NDVI patterns were remarkably close to average.

The national crop condition development graph based on NDVI show that crop condition was unfavorable from the beginning of the monitoring period. After mid-March, crops recovered and caught up with the five-year average. CALF, the cropped arable land fraction did not register any changes and in most of the areas, favorable vegetation condition prevails with VCIx values situated between 0.8 and 1.0.

In general, crop condition in Mozambique was slightly below average compared to the same period in the previous years and 5 YA. Compared to the output of 2017, the maize production is expected to increase by 2%.

Provincial analysis

According to the Ministry of Agriculture and Food Security of Mozambique, the country has two major production provinces: Zambézia and Nampula classified according to the historical productivity.

Zambézia

According to the crop phenology during the monitoring period, the growing season of maize and rice was ongoing, while their harvesting started in April and will extend to May. Considered to be the one of major production zone in Mozambique, during the period under analysis,the Zambézia Province registered a decrease in rainfall and temperature in 16%and 0.8ºC respectively when compared to the average of previous 15 years while the radiation was about the average of fifteen years. The reduction in rainfall and temperature led to a reduction in biomass (BIOMASS -6%). In contrast, the agro-climatic conditions did not have any impact on the cropped arable land fraction (CALF) which was about the average of previous 5 years. For this region, better maximum vegetation condition index (VCI=0.94) was verified.

The crop condition development graph based on NDVI for this region shows that from early February to mid-March, the crop condition was below the average of previous 5 years as well as the same monitoring period of the year 2017. Afterward, crops situated about the average from mid-March to the end of the monitoring period. In addition, The NDVI clusters show that excepting scatter the area coastal zone, the crop condition was above the average during the entire monitoring period in all province.

In general, the crop condition in Zambézia region was average during the January-April 2018 monitoring period.

Nampula

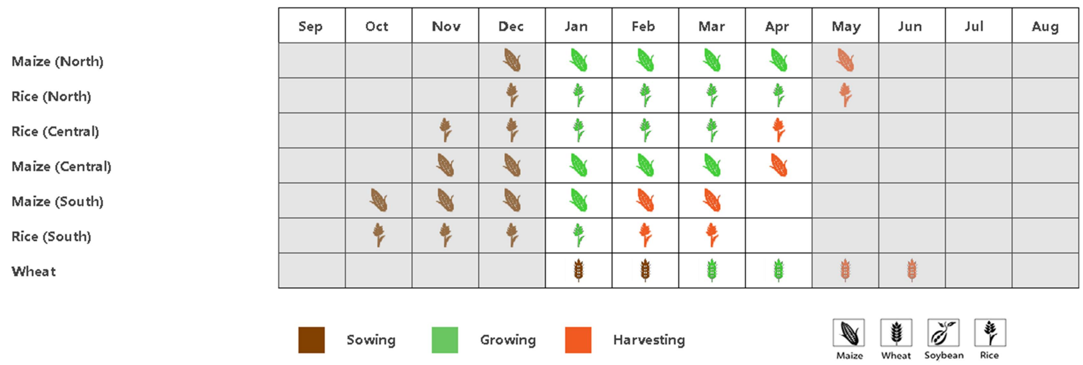
Nampula province is divided into three agronomic zones: interior, intermediate and coastal zones (south and north).The coastal zone is potential for rice production and the interior zone is potential for maize production and in the intermediate zone, maize can be produced. The productivity of these two crops is very low due to the weak management. In general, the sowing period started from last week of November to the first week of January for maize and from December to January for rice.Maize and rice are cultivated by small farms, where their fields are less than 2 (two) hectares.

Analyzing the agroclimatic indicators, in general, Nampula province registered a decrease in rain and temperature(RAIN-7% and TEMP -0.7ºC) compared with last 15 YA, but the radiation was about the average. The reduction of this factors affected the biomass, which reduced by4% compared to the last 5YA. According to the average rainfall profile,the rain season started from November and end by April. In the current crop season, rain in Nampula province was below the average of the last 15 years,but above average from first October to end of December, mid-January, and April.

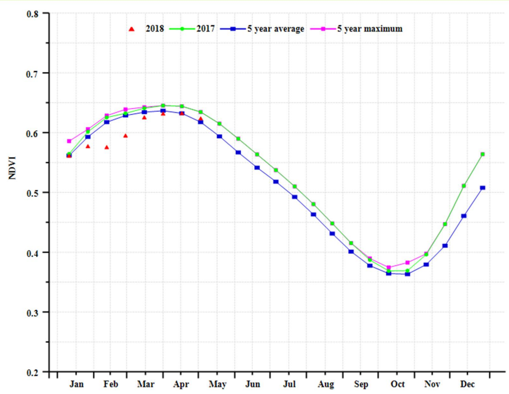
According to the NDVI profiles of Nampula province, the NDVI was below of average of the last 5 years but catch up with the last cropping season from March. The peak of the growing season was at the same level of the five-year average and previous monitoring period. The Maximum VCI (0.93) indicates good crop condition. The cropped arable land fraction (CALF) increased in 3% compared with last 5 YA, and this will cover the decrease of biomass. Most parts of Nampula recorded high VCIx values, but in the western part of the province(Malema, Ribaue, and Murrupula) shows slightly lower values.

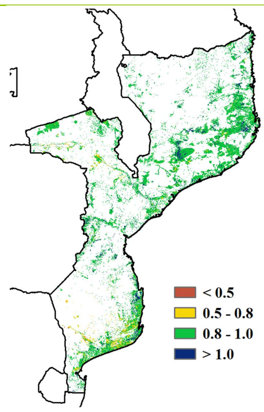
In general, the province was below average weather conditions for crop growth during the current season, but the production will be compensated by the increase of crop arable land fraction.

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



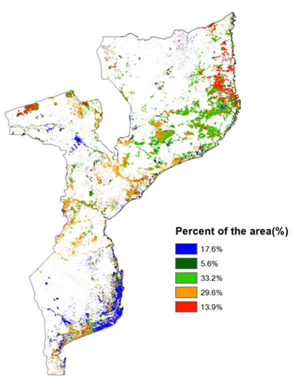
(a). Phenology of major crops

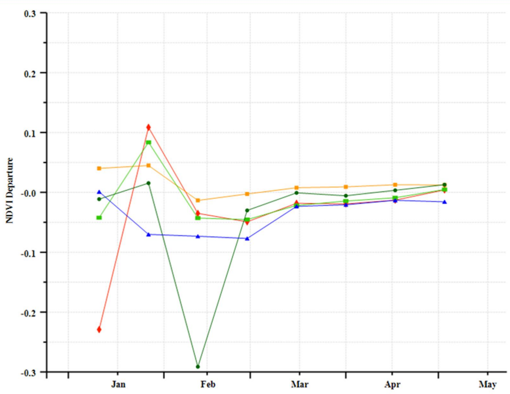




(b) Crop condition development graph based on NDVI

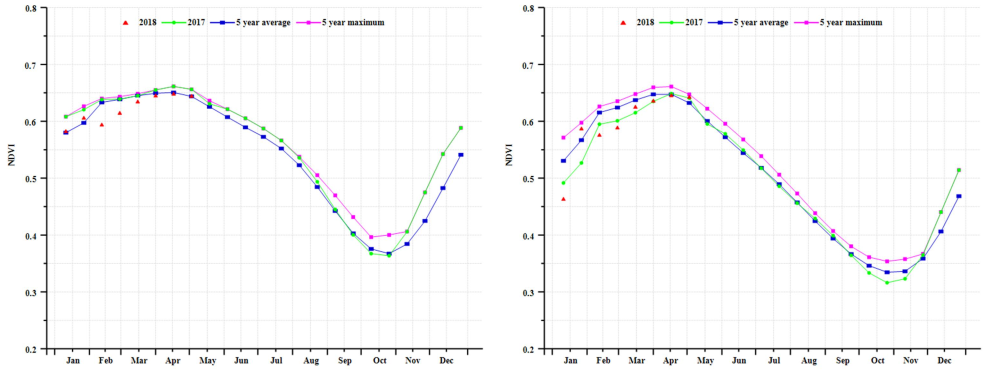
(c) Maximum VCI



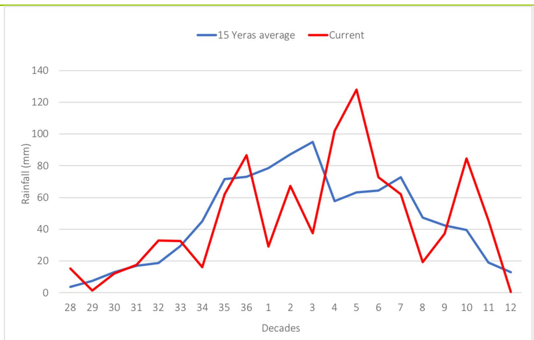


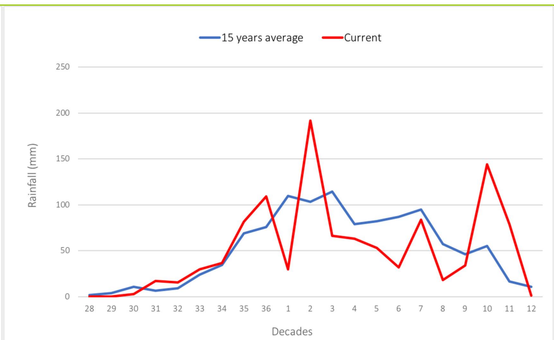
(d) Spatial NDVI patterns compared to 5YA

(e) NDVI profiles



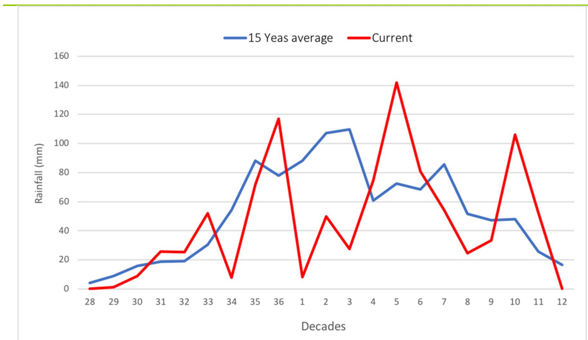
(f) Crop condition development graph based on NDVI (left: Zambézia, right: Nampula)





(g) Mozambique decade rainfall profile

(h) Nampula decade rainfall profile



(i) Zambezia decade rainfall profile

Table 3.62. Mozambique agroclimatic indicators by major production zones, current seasonvalues, and departure from 15YA, January 2018-April 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Maputo	356	0	25.7	-1.2	1095	-2
Gaza	382	12	26.2	-1.3	1140	-2
Inhambane	533	35	26.9	-0.9	1143	-3
Sofala	818	37	27.4	-1.2	1115	-3
Manica	848	45	25.6	-1.2	1135	-4
Tete	436	-24	25.2	-0.7	1166	2
Zambézia	654	-16	26.6	-0.8	1118	0
Nampula	796	-7	26.8	-0.7	1108	0
Cabo Delegado	870	5	26.3	-0.7	1071	-2
Niassa	719	-13	24.4	-0.7	1047	-4

Table 3.63. Mozambique agronomic indicators by major production zones, current seasonvalues, and departure from 5YA, January 2018-April 2018

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	1081	13	97	5	0.85
Inhambane	1144	7	96	1	0.89
Sofala	1488	6	99	3	0.94
Manica	1402	1	100	1	0.94
Tete	1223	-17	99	1	0.90
Zambézia	1640	-6	100	1	0.94
Nampula	1755	-4	99	3	0.93
Cabo Delegado	1972	3	99	3	0.95
Niassa	1878	-2	100	2	0.94

Table 3.64. CropWatch-estimated Maize production for Mozambique in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Maize	2040	0.0	2.3	2085	2.2

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

[NGA] Nigeria

The January-April period covers the sowing season of maize (south/main) as well as the rainfed Rice. During this period, the agroclimatic indicators show that while the temperature and radiation registered a decrease (TEMP -1ºC and RAPDAR -11%), a significant increase in the percentage of Rainfall (RAIN +25%) was verified. The increase in the percentage of rainfall led to an increase in biomass (BIOMASS +21%), as shown in agronomic indicators. However, the Cropped Arable Land Fraction (CALF) at the same period decreased in 15% due to normal phenology (no crops in the field).

The crop condition development graph show conditions close to both average and 2017. The scenario changed from early March to the end of the monitoring period, when the crop condition was below the average of the previous five years as well as below the five years maximum. While the southern region of the country registered good maximum vegetation condition index (VCIx), the northern region - which is currently in its dry season - showed low VCIx (0.5 or below). During this period the maximum VCI was 0.59. For the entire county, the NDVI clusters show that the crop condition was unfavorable during the entire monitoring period. An increase of 1% in maize production over 2017 is nevertheless expected.

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, Derived savanna, Humid forest zone, and Guinean savanna.

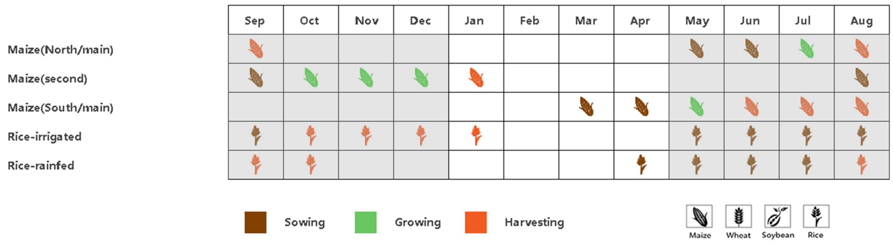
A decrease in both agroclimatic (RAIN -7%, TEMP -0.7ºC and RAPDAR -6%) and agronomic (BIOMASS -12%, CALF -13%) indicators was observed in the Sudano Sahelian region. However, since the cropping season in northern Nigeria lasts from June to September, the current values are irrelevant as far as crop production is concerned. They may, however directly and indirectly impact rangelands.

In the Derived Savana region an increase in rainfall (RAIN +24%) was accompanied by a decrease in temperature and radiation (TEMP -1.1ºC and RAPDAR -14%). The increase in rainfall led to a 25% increase in BIOMASS. The CALF registered a reduction of 15% and the maximum VCI for this region was 0.63. During this period, the crop condition development was above the average of previous 5 years from mid-February to mid-March, dropping to below the average at the end of April.

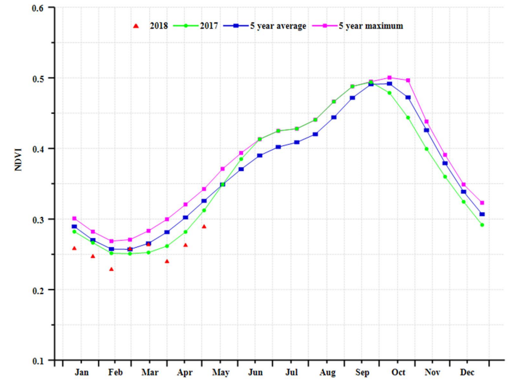
The crop condition development for the Humid forest zone region was below the average most of the time during the monitoring period, being above the average of previous 5 years in early of February. The agroclimatic indicators for this region, show an increase in rainfall (RAIN +24%) and a decrease in temperature and radiation (TEMP -1.2ºC and RAPDAR -18%). An increase in biomass production potential (BIOMASS +18%) and a decrease in cropped arable land fraction (CALF -1%) were verified. In this region, the maximum VCI was 0.8.

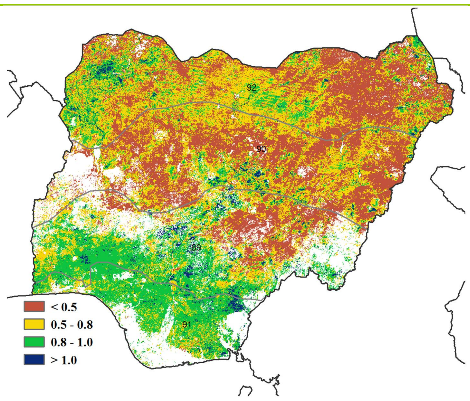
The crop condition development was below the average of the past five years in the Guinean savanna region which recorded a large increase in rainfall (RAIN +33%) and drop in both temperature (TEMP -0.9ºC) and RADPAR (-9%). Compared with the recent 5YA the biomass production potential increased by 23% while CALF decreased by 53%. For this region, the maximum VCI registered was 0.50 on average.

Figure 3.34. Nigeria's crop condition, January-April 2018

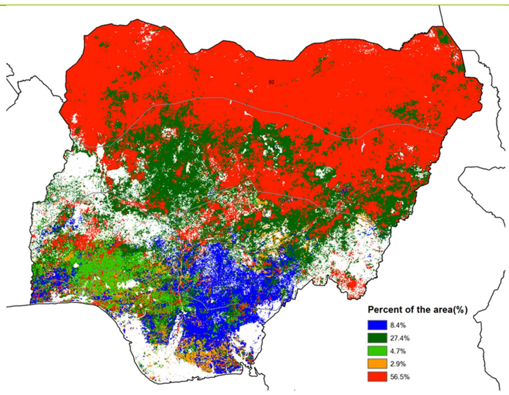


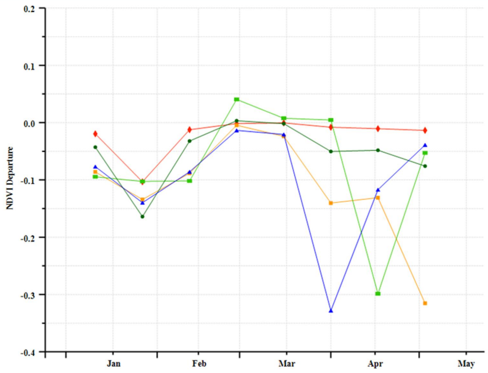
(a) Phenology of major crops



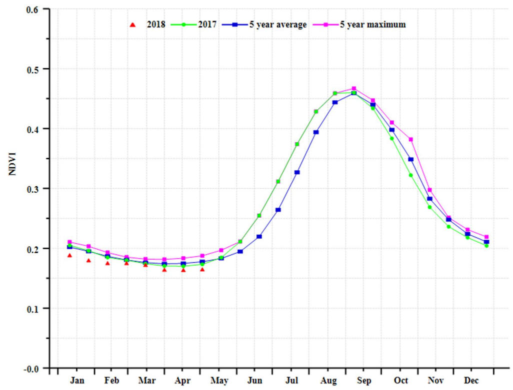


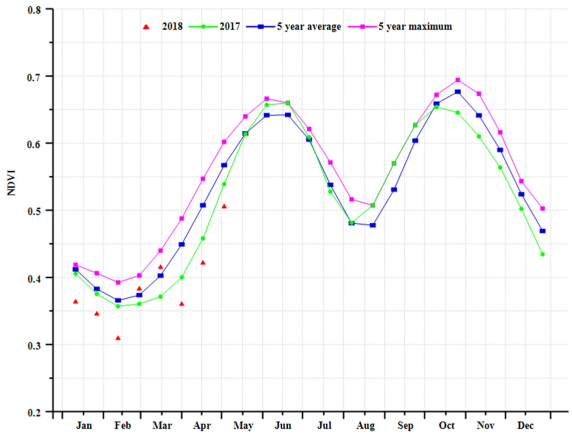
(b) Crop condition development graph based on NDVI (c) Maximum VCI



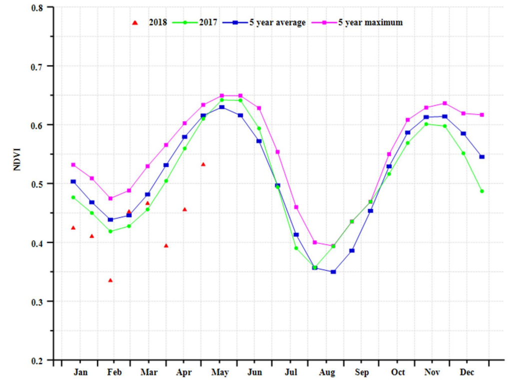


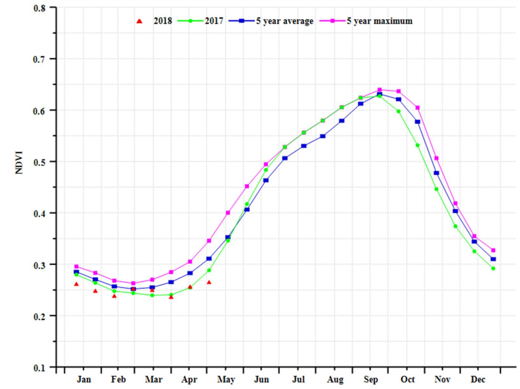
(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles





(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 3.65. Nigeria's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 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	13	-7	29.1	-0.7	1313	-6
Derived Savana	214	24	28.4	-1.1	1091	-14
Humid Forest Zone	476	24	28.1	-1.2	892	-18
Guinean Savanna	95	33	28.4	-0.9	1251	-9

Table 3.66. Nigeria's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 2018

Region	BIOMASS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Sudano Sahelian	51	-12	0.01	-13	0.58
Derived Savana	751	25	0.66	-15	0.63
Humid Forest Zone	1342	18	0.97	-1	0.80
Guinean Savanna	327	23	0.06	-53	0.50

Table 3.67. CropWatch-estimated maize production for Nigeria in 2018 (thousands tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Maize	11165	1.3%	-0.3%	11276	1.0%

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[PAK] Pakistan

The reporting period covers most of the winter wheat cycle from vegetative growth to harvest. It also touches the field preparation and sowing of maize. A national average of 143 mm of rainfall (which is 15% lower than average) fell on mostly irrigated winter crops. TEMP at 16.9 °C was +0.9°C higher than average and RADPAR was near average. BIOMSS accumulation was expected to be 384gDM/m2, -10% lower than average. NDVI was lower than average throughout the reporting period in most parts of the country. With only 49% of agriculture area being occupied by crops, coupled with a low VCIx of 0.67, prospects for winter wheat are not good.

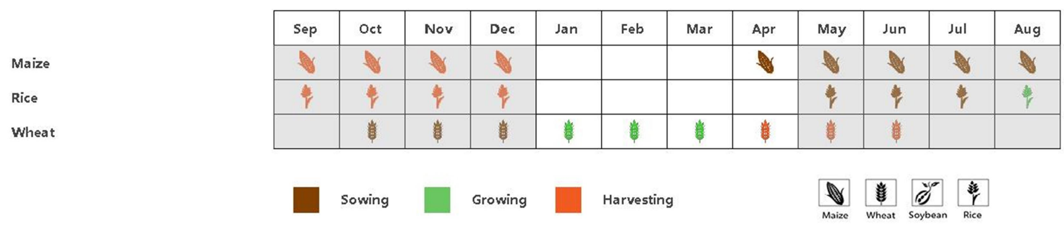
Regional analysis

To account for the country's large diversity of topography, soil and weather, CropWatch partitions Pakistan into four agro-ecological regions. They are referred to as Balochistan, the Lower Indus river basin, the Northern highlands and Northern Punjab. Balochistan, with only 2 million ha cultivated land is not included in the CropWatch analysis.

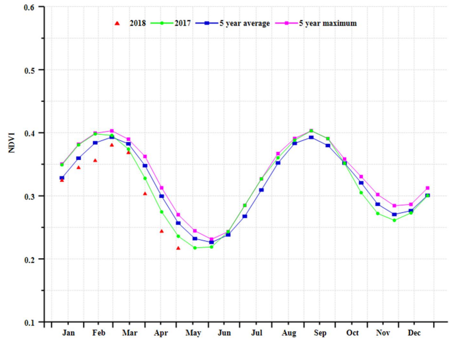
The lowest rainfall (52 mm of RAIN, 14% below average) fell over the Lower Indus river basin while Northern Punjab recorded more than twice as much rainfall, which represented nevertheless a deficit of 28% compared with average. The Northern Highlands received the highest rainfall among all the regions (248 mm) which was -15% below average. The Northern highlands were warmer than average (+1.2ºC) while other regions had near average TEMP. All the regions received near average RADPAR and except for the Northern highlands other regions had a reduced biomass production potential (-18%). Actually cropped arable land ranged between 42% (Northern highlands) and 86% remaining within -7% of average. All the three regions had persistently lower than average NDVI, with patches of low as well as high VCIx for an average around 0.80.

All the agroclimatic and agronomic indicators show lower than average values for winter wheat. However, since most of the crop is irrigated, CropWatch project a minor reduction in production (a 1.4% drop below 2017).

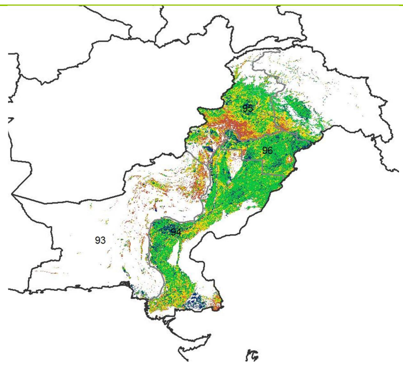
Figure 3.35. Pakistan's crop condition, January-April 2018



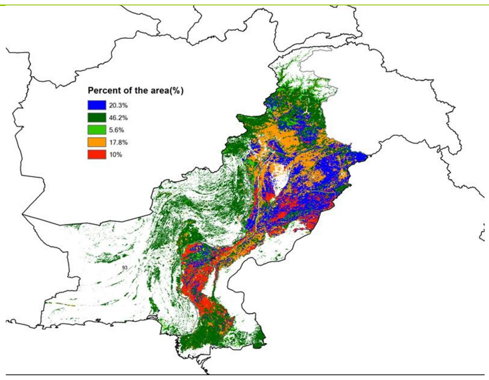
(a). Phenology of major crops



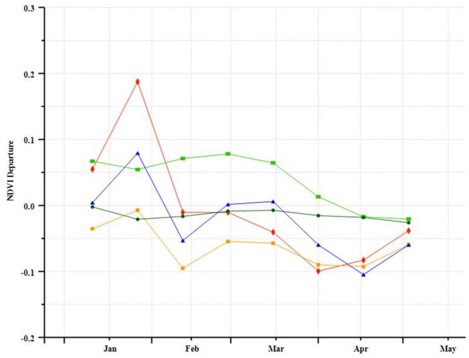
(b) Crop condition development graph based on NDVI



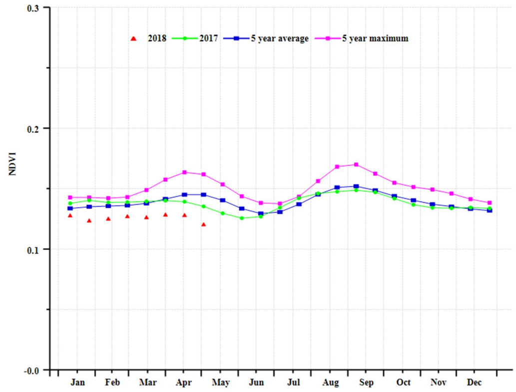
(c) Maximum VCI

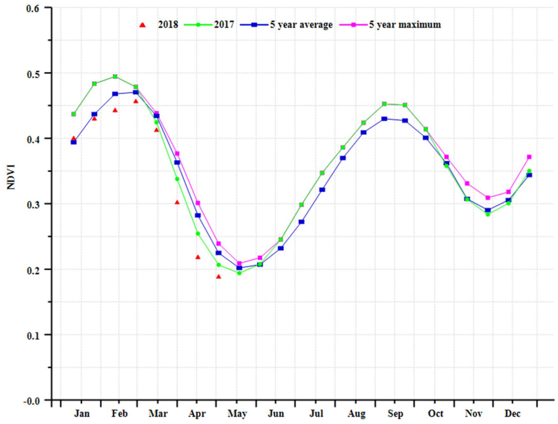


(d) Spatial NDVI patterns compared to 5YA

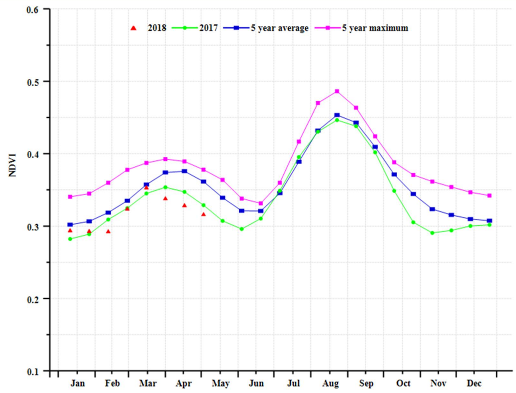


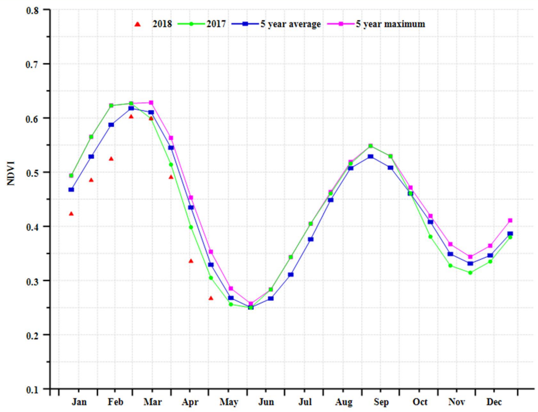
(e) NDVI profiles





(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 3.68. Pakistan's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Balochistan	89	-9	16.8	0.9	1112	-4
Lower Indus river basin in south Punjab and Sind	52	-14	23.0	0.7	1075	-6
Northern highlands	248	-15	12.0	1.2	957	-3
Northern Punjab	117	-28	19.6	0.4	960	-5

Table 3.69. Pakistan's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 2018

Region	BIOMSS		CALF		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current (%)	Departure from 5YA (%)	Current
Balochistan	313	-13	1	22	0.20
Lower Indus river basin in south Punjab and Sind	197	-18	63	1	0.81
Northern highlands	791	0	42	-7	0.67
Northern Punjab	507	-18	86	-2	0.87

Table 3.70. CropWatch-estimated wheat production for Pakistan in 2018 (thousand tons)

Crops	Production 2017	Yield variation (%)	Area variation (%)	Production 2018	Production variation (%)
Wheat	24283.0	-0.8%	-0.5%	23946	-1.4%

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[PHL] The Philippines

In the Philippines, the monitoring period covers the harvesting stage of secondary rice and maize, as well as the sowing stage of main rice and maize crops. According to the NDVI profiles for the country, crop condition was close to the five-year average from February to April, but below average in January and the final months of 2017. Nationwide, precipitation (RAIN) presents a positive departure of 38% over average, accompanied by below average radiation (-2%) and temperature (-0.5°C), which resulted in an increase of BIOMSS 18% over average.

Based on the VCIx indicator, favorable crop condition prevailed as the value mostly exceeded 0.80. The cropped arable land fraction (CALF) nation-wide was almost 100%. Considering the spatial patterns of NDVI profiles, 86% of the cropped area experienced average conditions, but other areas display different profiles including (1) a marked drop in January in 9.6% of the areas and in February in 4.4% of the areas, (2) a recovery to average condition in March and April.

The behavior of NDVI can be explained at least partially by several typhoons of minor magnitude that affected the Philippines, starting with Bolaven in January. Storms brought some heavy and short duration rain, causing flash floods in the Visayas, including Samar. Altogether, however, the outputs for maize and rice in the country are expected to be above average.

Regional analysis

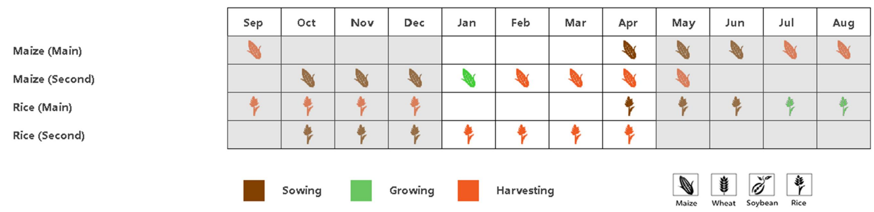
Based on cropping systems, climatic zones, and topographic conditions, three main agro-ecological regions can be distinguished for the Philippines. They are the Lowlands region, the Hills region, and the Forest region.

The Lowlands region experienced excessive rainfall (RAIN +50%), low radiation (RADPAR -3%) and mildly below average temperature (TEMP -0.5°C). BIOMSS was 25% above the average. Regional CALF is 100%, and the VCIx was good at 0.89. Altogether, the outputs for main maize and rice are expected to be above average.

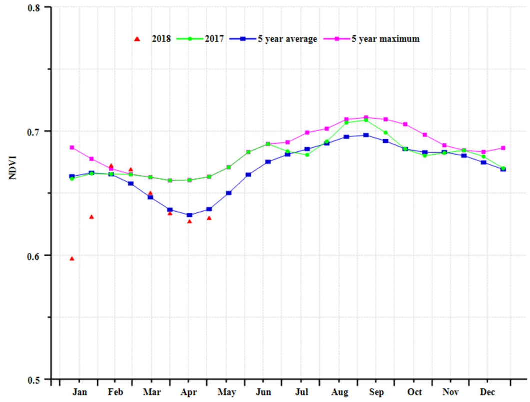
The Forest region also experienced excessive rainfall (RAIN +32%), mildly below average radiation (RADPAR -1%) and temperature (TEMP -0.5°C). BIOMSS was 15% above compared to the average for the period and region. Regional CALF is 100%, and the VCIx was good at 0.85. Altogether, the outputs for main maize and rice are expected to be above average as well.

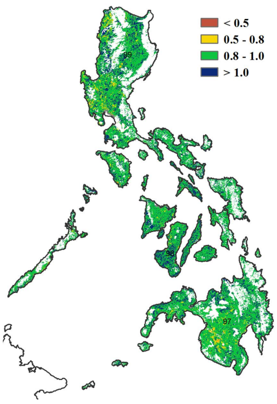
The hills region recorded the highest rainfall departure (RAIN, +77%) but nevertheless average radiation and temperature. BIOMSS is 15% above the five-year average. A high CALF (100%) and good VCIx (0.94) should result in above average main maize and rice seasons.

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



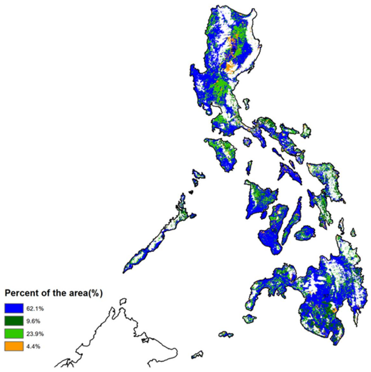
(a). Phenology of major crops

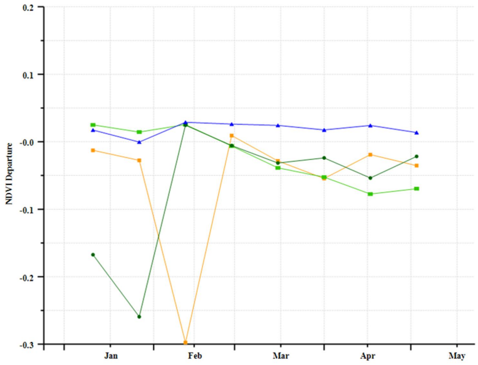




(b) Crop condition development graph based on NDVI

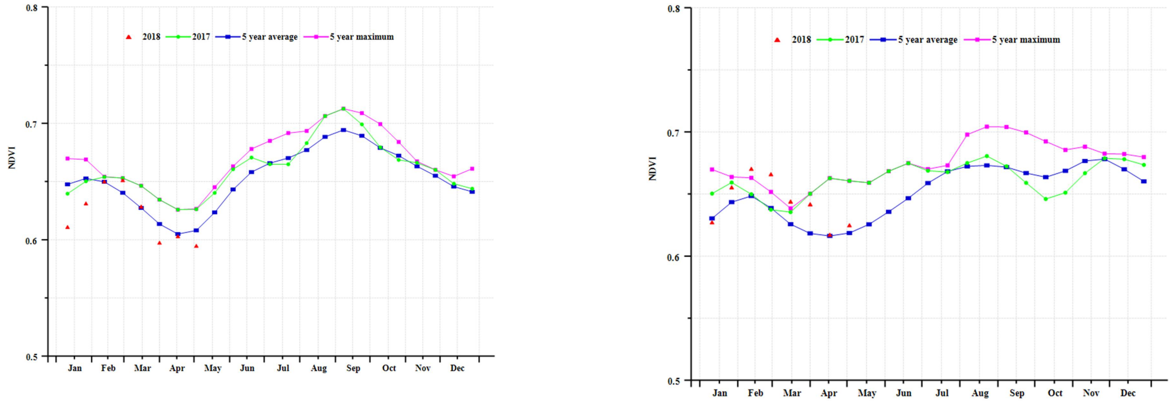
(c) Maximum VCI



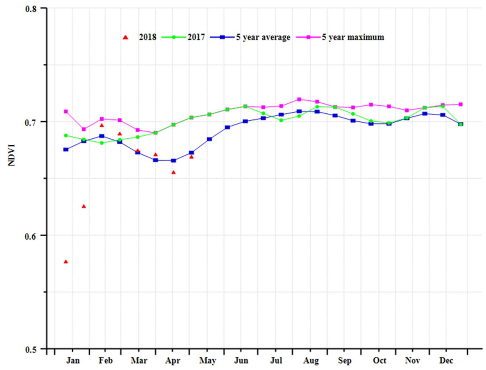


(d) Spatial NDVI patterns compared to 5YA

(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 3.71. Philippines's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Lowlands region	424	50	25.2	-0.5	1034	-3
Hills region	721	77	26.4	-0.2	1106	0
Forest region	1131	32	25.9	-0.5	1049	-1

Table 3.72. Philippines's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Lowlands region	973	25	100	0	0.89
Hills region	1277	15	100	0	0.94
Forest region	1815	15	100	0	0.85

Table 3.73. 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	2.2%	0.0%	7791	2.2%
Rice	20188	3.8%	0.0%	20950	3.8%

[POL] Poland

The monitoring period covers the cultivation of winter wheat. Relative to average values, rainfall was below (-19%), temperature was close and RADPAR was above by +3%. Resulting from the dry conditions, the potential biomass (BIOMSS) decreased 11%. As shown in the crop condition development graph, national NDVI was below the average of last 5 years from January to April resulting from several frosts episodes. Only about 69.3% of the areas had above average condition in early February, while all the agricultural areas were below the average most of the time. Crop condition generally improved in April and resulted in a favorable VCIx of 0.9. The Cropped Arable Land Fraction (CALF) was slightly below the average. The production of wheat is estimated at 11.9% above 2017 values.

Regional analysis

For the purpose of crop monitoring, Poland can be divided into four agro-ecological zones (AEZ) referred to as Central rye and potatoes area, Northern oats and potatoes areas, Northern-central wheat and sugarbeet area, and the Southern wheat and sugarbeet area.

In the Central rye and potatoes area, the condition of crops was below the average of the last 5 years due to low rain (RAIN -19%) which led to a decrease of the biomass production potential (BIOMSS -13%) below the average of the last five-years. RADPAR was slightly above average (+4%). The area has a high CALF (98%) and a favorable VCIx (0.92).

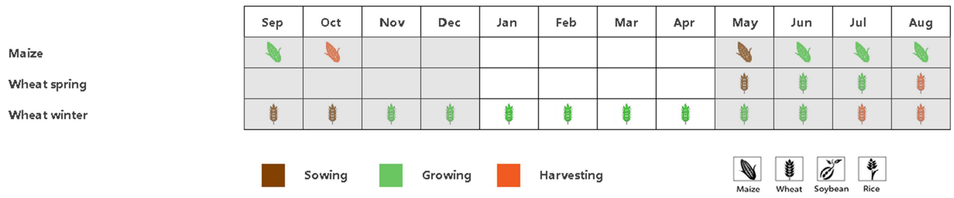
Contrary to the previous AEZ, the Northern oats and potatoes area had close to average RAIN (-1%), TEMP (-0.2ºC) and RADPAR (+1%). The area had a high CALF (94%) as well as a favorable VCIx (0.85).

RAIN was 7% below average with average temperature in the Northern-central wheat and sugarbeet area, where BIOMSS decreased 4% compared to the last five years. Similar to the other areas, the area has a high CALF (96%) and VCIx (0.91).

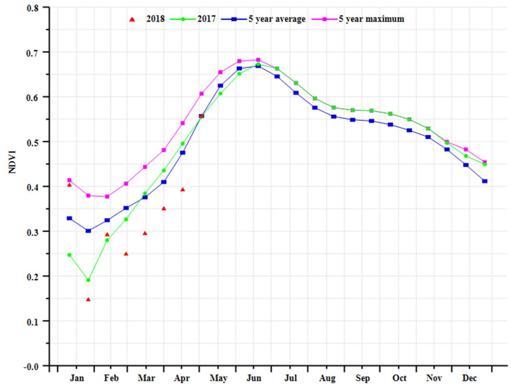
The Southern wheat and sugarbeet area recorded a slight but positive temperature departure (TEMP +0.4°C) as well as the largest rainfall deficit (-29%), which led to decreased biomass (BIOMSS -16%) compared to the five-year average. The area has a high CALF (99%) as well as a favorable VCIx (0.94).

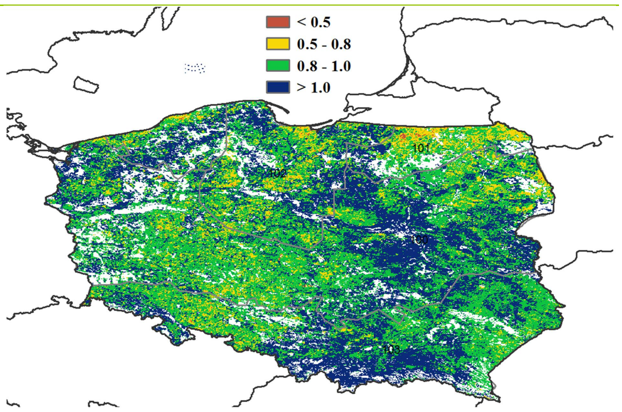
Overall, drier than usual weather conditions mostly prevailed in central and south of Poland, leading the decreased biomass in the central rye and potatoes area and Southern wheat and sugarbeet area.

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

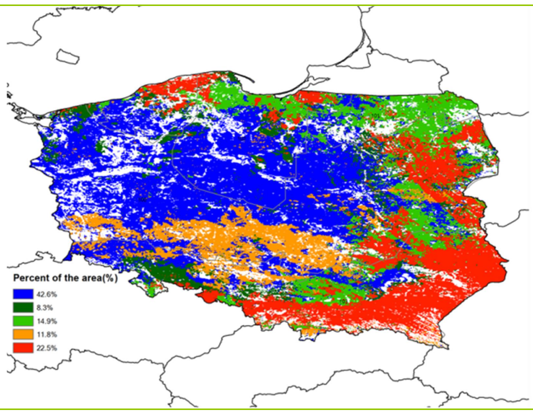


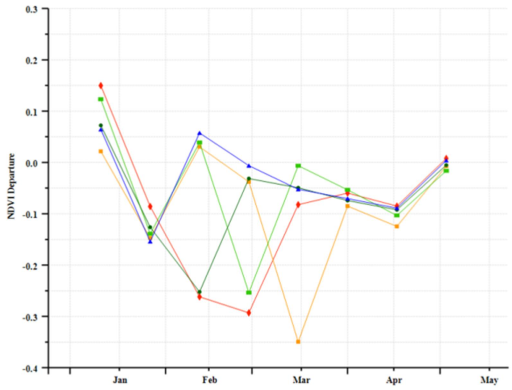
(a). Phenology of major crops



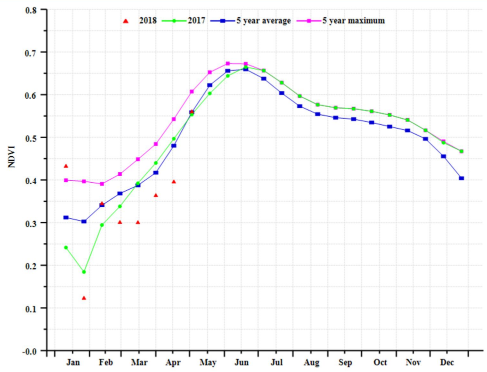


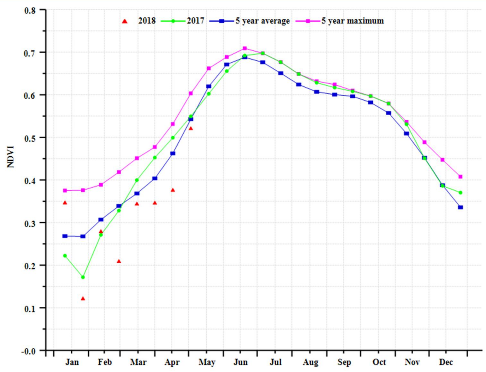
(b) Crop condition development graph based on NDVI (c) Maximum VCI



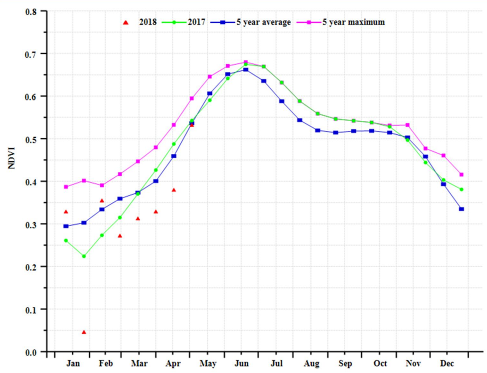


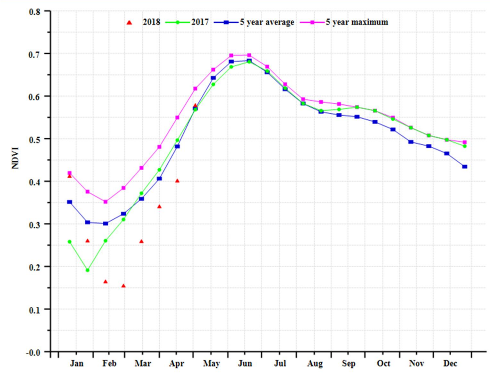
(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles





(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 3.74. Poland's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 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	136	-19	2.6	0.1	510	4
Northern oats and potatoes areas	171	-1	1.5	-0.2	472	1
Northern-central wheat and sugarbeet area	150	-7	2.0	-0.3	487	1
Southern wheat and sugarbeet area	139	-29	2.7	0.4	545	4

Table 3.75. Poland's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 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	663	-13	98	-1	0.92
Northern oats and potatoes areas	751	0	94	-4	0.85
Northern-central wheat and sugarbeet area	717	-4	96	-2	0.91
Southern wheat and sugarbeet area	676	-16	99	0	0.94

Table 3.76. CropWatch-estimated Wheat production for Poland in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Wheat	10931	11.00	0.80	12236	11.90

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

[ROU] Romania

Winter wheat began vegetative growth after being sown from October. The overall condition of the crop was good (VCIx = 0.94). Rainfall was slightly higher than average (+9%) and so was temperature (+1.2°C). Sunshine radiation as assessed by RADPAR was 3% below the reference. Both biomass and CALF show better condition than average (BIOMSS +9%, CALF +9%), and indicate a favourable beginning of the 2018 winter wheat season. The winter wheat production of Romania in 2017 is 7670 kton and the field variation is 8.4% together with the area variation is -1.7%. Accordingly, Cropwatch predict the winter wheat production of Romania in 2018 is 8172 kton, increasing by 6.5%.

Regional analysis

More detail is provided below for three main agro-ecological zones (AEZ) of the country. They include the Central mixed farming and pasture Carpathian hills; the Eastern and southern maize, wheat and sugar beet plains; the Western and central maize, wheat and sugar beet plateau.

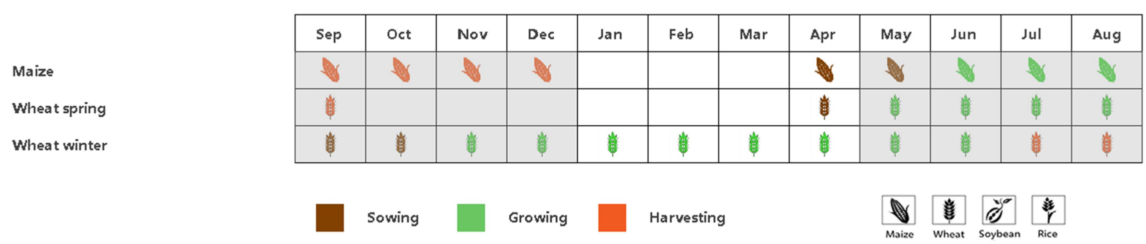
According to NDVI development profile, crop condition differed in the three regions. In the Central mixed farming and pasture Carpathian hills and the Western and central maize, wheat and sugar beet plateau, crop condition was below average over most of the reporting period while better condition prevailed for winter crops in the Eastern and southern maize, wheat and sugar beet plains, where crop condition was better than average and even exceeded the 5-year maximum in January. As for cultivated area, an increase of CALF occurred in all three regions compared with average.

All AEZs regions suffered from low solar radiation (RADPAR -7%) which, however, should not have affected wheat much as the crop is dormant and partially snow-covered.

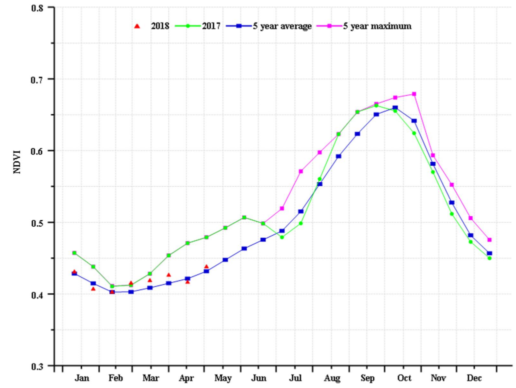
Temperature and rainfall were above average in all three regions. During previous reporting period (July to October 2017) CropWatch found a deficit of rainfall in Romania. The current increase of precipitation will improve the growing conditions for winter wheat. This is confirmed by the increase of the BIOMSS indicator.

VCIx values were in excess of 0.90 in all AEZs. VCIx was lower than 0.8 near the central region but exceeds 1.0 in most parts of the northwest and southwest regions.

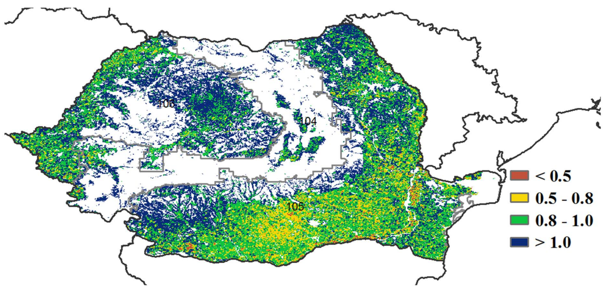
Figure 3.38. Romania's crop condition, January-April 2018



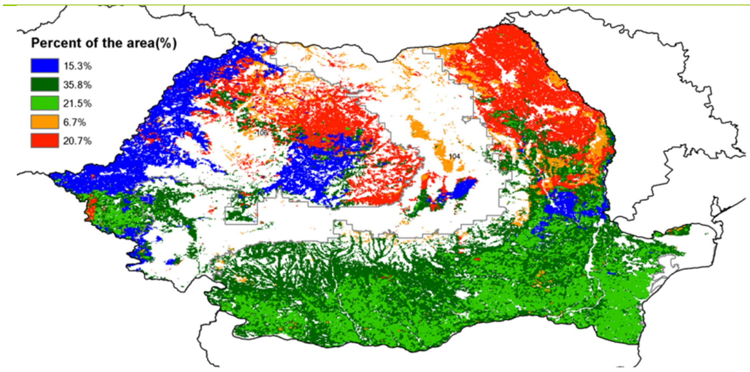
(a). Phenology of major crops



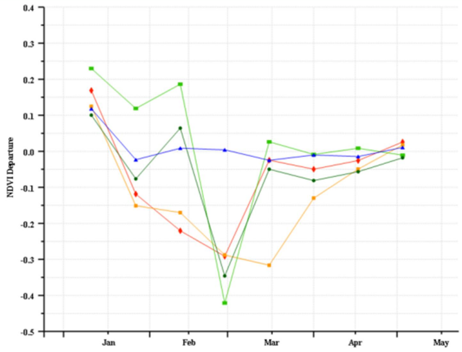
(b) Crop condition development graph based on NDVI



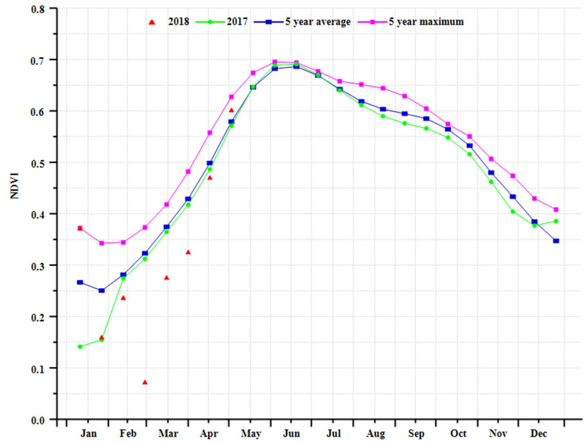
(c) Maximum VCI

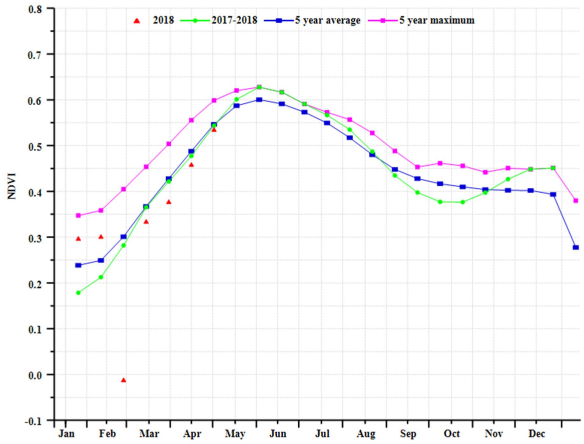


(d) Spatial NDVI patterns compared to 5YA

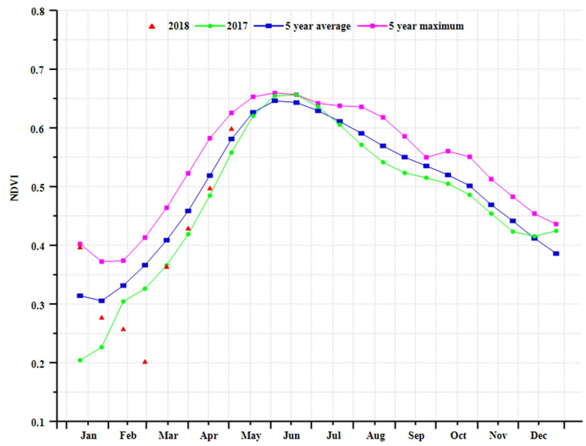


(e) NDVI profiles





(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 3.77. Romania's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 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	239	-1	1.9	1.2	620	-2
Eastern and southern maize, wheat and sugar beet plains	234	20	4.5	0.5	630	-3
Western and central maize, wheat and sugar beet plateau	214	-1	4.4	1.4	594	-3

Table 3.78. Romania's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 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	764	9	98	-36	1.19
Eastern and southern maize, wheat and sugar beet plains	900	19	94	35	1.11
Western and central maize, wheat and sugar beet plateau	823	6	99	78	1.25

Table 3.79. CropWatch-estimated Wheat production for Romania in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Wheat	7670	8.40	-1.70	8172	6.50

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

[RUS] Russia

During the monitoring period, winter wheat was in late dormancy or early spring growth stages and maize was planted from April. The fraction of cropped arable land (CALF) was low (- 57%) due to the serious snow cover but it will recover with spring. Overall Russia experienced relatively unfavorable climate conditions in these four months because of unusually low temperature (-0.9ºC), even if the rainfall was up 9%; the BIOMSS indicator dropped 9% compared with the last five-year average.

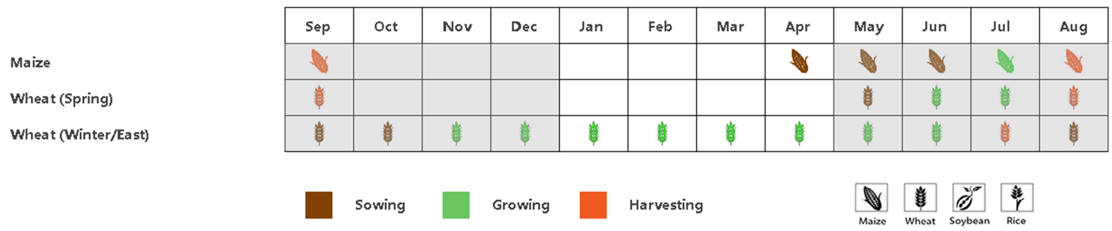
As shown in the NDVI-based crop condition development graph, values were lower than the average of the last five years. In about 58.5% of the croplands in Russia, mainly in the center (Volga, South Urals and South Siberia), the NDVI was significantly lower than average in January and February. As stressed below in the regional analysis, cold was a major issue in several areas. Compared with the previous season, winter wheat yields are expected to decrease (VCIx=0.67).

Regional analysis

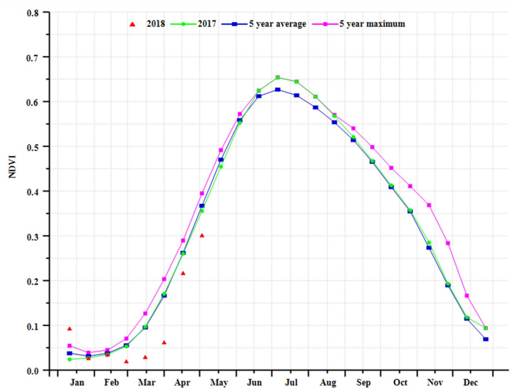
A more detailed analysis is provided for seven agro-ecological zones (AEZ), namely the Kaliningrad oblast (94), the Caucasus (95), the Volga Basin (97), the Central Economic Region (100), the Southern Urals (99), the Southern Siberian area (98), and the Northwest region including Novgorod (101). The numbers correspond to the labels on the VCIx map.

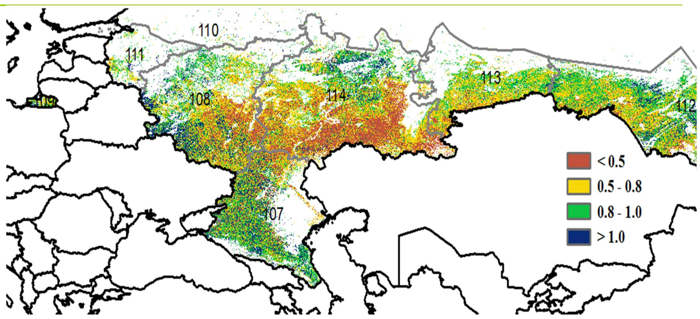
In the Caucasus, Central Economic Region (CER), Kaliningrad oblast, Northwest region including Novgorod and Volga Basin regions, rainfall was abundant and the departure from average exceeded 10%. In the Central Economic Region (CER), Northwest region including Novgorod, Southern Siberian area, Southern Urals and Volga Basin, the temperature was low, especially in Southern Siberian area, Southern Urals and Volga Basin (TEMP -11.8°C, -9.4°C, -7.1°C below average, respectively). NDVI also dropped in these areas as shown in Crop condition development graph.

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



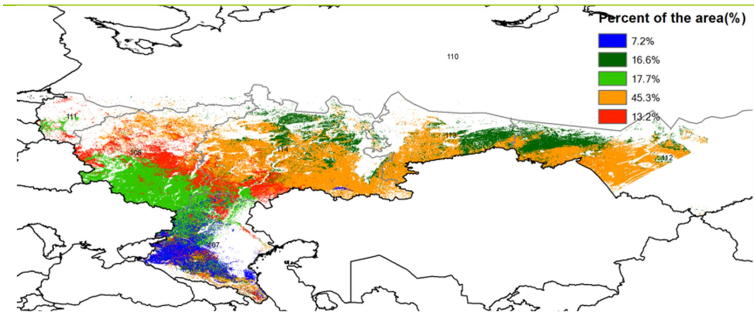
(a). Phenology of major crops



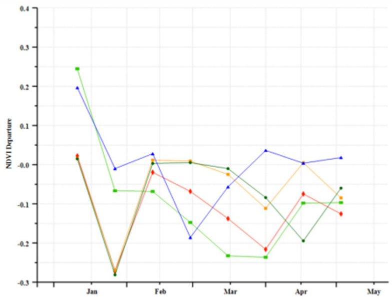


(b) Crop condition development graph based on NDVI

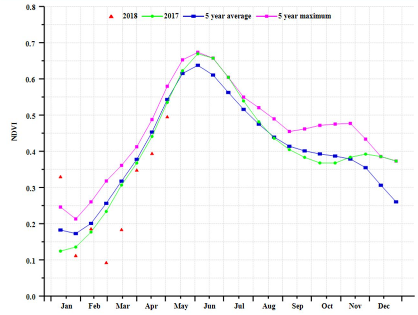
(c) Maximum VCI

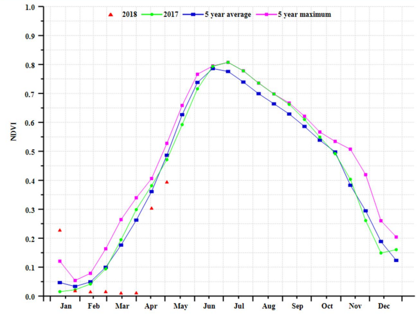


(d) Spatial NDVI patterns compared to 5YA

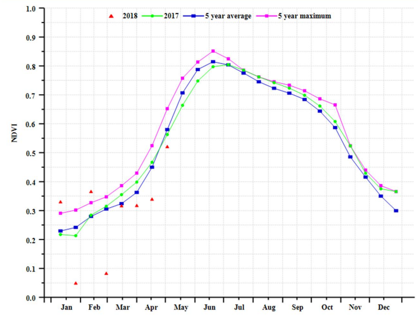


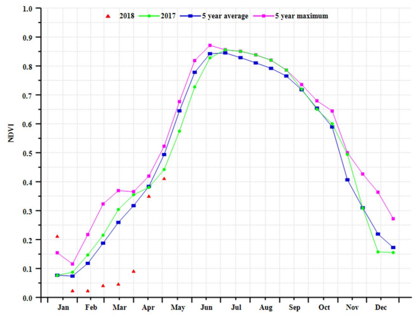
(e) NDVI profiles



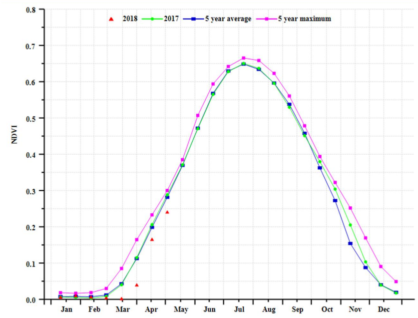


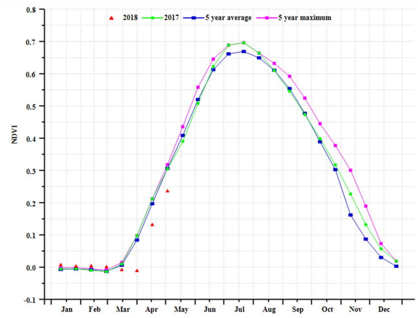
(f) Crop condition development graph based on NDVI (The Caucasus (left) and Central Economic Region (right))



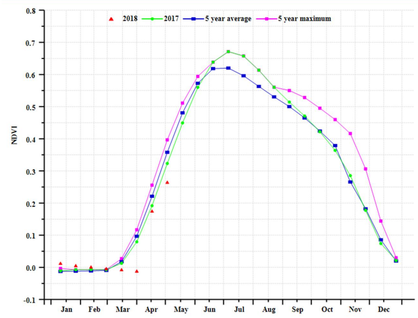


(g) Crop condition development graph based on NDVI (Kaliningrad oblast (left) and Northwest region (right))





(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 3.80. Russia's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m2)	Departure from 15YA (%)
The Caucasus	239	9	1.6	-0.1	594	-6
Central Economic Region	196	18	-3.6	-0.9	490	3
Kaliningrad oblast	172	-2	0.9	-0.4	466	2
Northwest region including Novgorod	185	12	-2.8	-0.5	392	-4
Southern Siberian area	96	5	-11.8	-0.5	562	-6
Southern Urals	100	-3	-9.4	-1.4	497	-3
Volga Basin	170	10	-7.1	-1.7	518	2

Table 3.81. Russia's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
The Caucasus	719	1	60%	-19.1	0.78
Central Economic Region	540	-8	25%	-63.3	0.71
Kaliningrad oblast	761	3	77%	-15.2	0.70
Northwest region including Novgorod	563	-4	30%	-61.1	0.56
Southern Siberian area	284	-6	1%	-77.6	0.69
Southern Urals	334	-18	1%	-88.4	0.67
Volga Basin	399	-18	5%	-86.8	0.58

Table 3.82. CropWatch-estimated Wheat production for Russia in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Wheat	58912	-4.2%	-3.8%	54264	-7.9%

[THA] Thailand

The harvest of Thailand’s main rice was completely in early January, while the second season rice was ready for harvest in April, at the time when maize was being sowed.

According to Agroclimatic indicators, rainfall was close to average over the reporting period (RAIN, +2%), while temperature (TEMP, -1.1°C) and radiation (RADPAR, -8%) were below. The biomass production potential (BIOMSS) is up by 9%, and the fraction of cropped arable land (CALF) also increased by 6% over its average for the period. Nationwide Crop condition based on NDVI was above average and reached the 5-year maximum before April. It slightly decreases later but remained above average. According to the NDVI departure clustering map, 25% of the arable land was below average over the monitoring period although it partially recovered from February (in the south and northeast of Thailand and in Nakhon Sawan). 20.6% of the crop areas were slightly better than 5-year average before March and decreased to slightly below average later (middle of Central double and triple-cropped rice lowlands and south of Western and southern hill areas). Other areas, accounting for 54.4% of cropland was below average before mid-January and recovered to above average in February. The areas under consideration include patches over the whole country except for Prachuap Khilikhan, Chumphon, Ranong, Phangnga, Krabi, Trang, Satun, Songkhla and Yala in south of the country. To sum up, crop condition is anticipated to be average or above but below last year's. For rice, Cropwatch projects that the production will decrease 5.2% compared to last years output.

Regional analysis

The regional analysis below focuses on some of the already mentioned agro-ecological zones of Thailand, of which some are mostly defined by the rice cultivation typology. Agro-ecological zones include 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.

Indicators for the Central double and triple-cropped rice lowlands follow the same patterns as those for the country as a whole: temperature (TEMP -1.1ºC) and radiation (RADPAR -10%) were below average, and accumulated rainfall was significantly above (RAIN +21%), resulting in the largest biomass production potential increase in Thailand (BIOMSS +26%). According to the NDVI development graph, crop condition was above the 5-year maximum before April and reached to 5-year maximum in April. This is confirmed by a favorable VCIx index of 0.86. Overall, the situation was above average and may reach to maximum of previous 5 years.

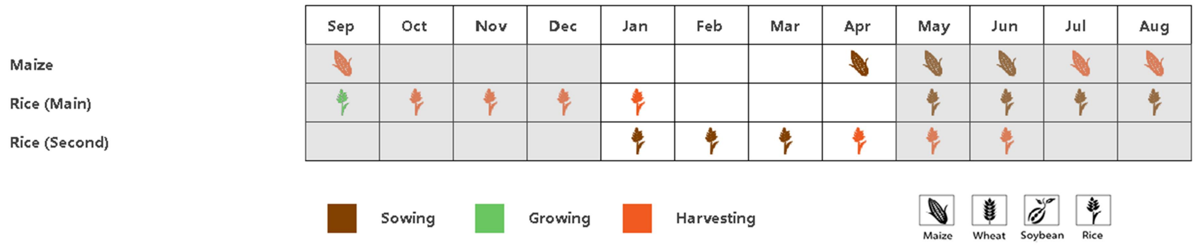
The temperature of the South-eastern horticulture area suffered a decrease of 1.4ºC, while rainfall (RAIN, +54%) and radiation (RADPAR, -9%) experienced the same changes as the whole country. The VCIx map, NDVI development graph, and BIOMSS indicators (+45%) all lead to the conclusion that crop condition was close to 5-year maximum.

Crop condition in the Western and southern hill areas was average according to the Agroclimatic indicators: TEMP -0.8°C, RADPAR -8%, and BIOMSS +1% when compared to their respective averages; rainfall (-6%) was below average. According to the NDVI development graph, crop condition was close to average.

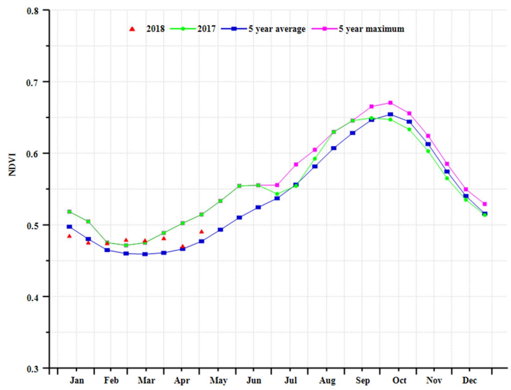
Finally, the situation in the Single-cropped rice north-eastern region was close to average. According to Cropwatch indicators rainfall (RAIN -5%), temperature (TEMP -0.5°C) and radiation (RADPAR -9%) were below average. BIOMSS (+7%) shows above average values. The NDVI development graph shows that crop condition was close to average, which is confirmed by the NDVI profiles.

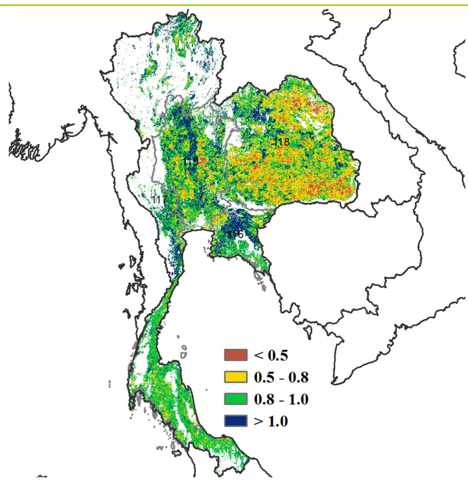
At the national level, most arable land was cropped during the season and had favorable VCIx values around 0.79. CropWatch projects that the production of rice will be above average.

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

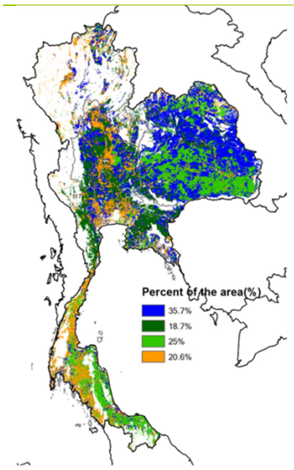


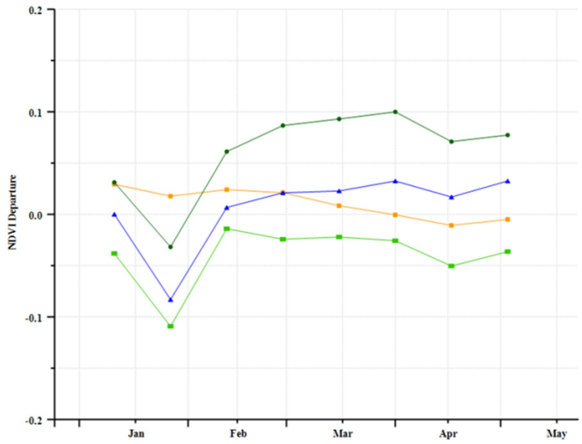
(a). Phenology of major crops



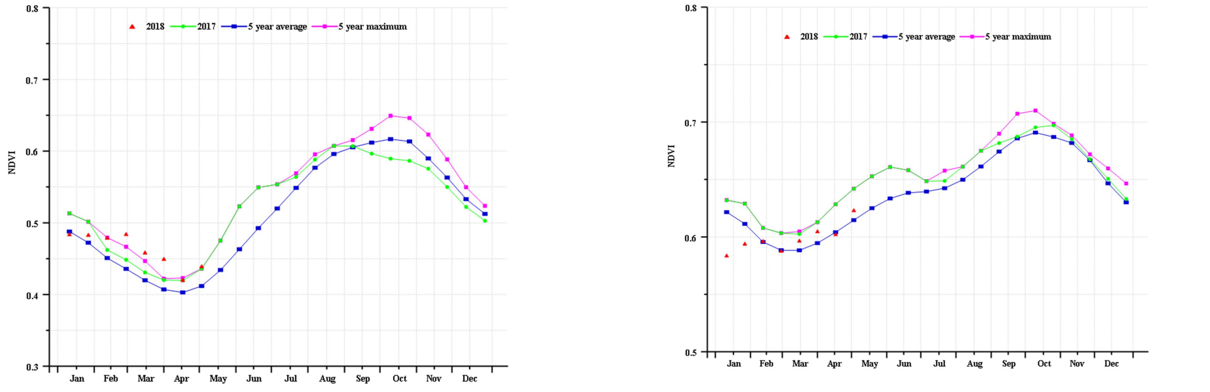


(b) Crop condition development graph based on NDVI (c) Maximum VCI

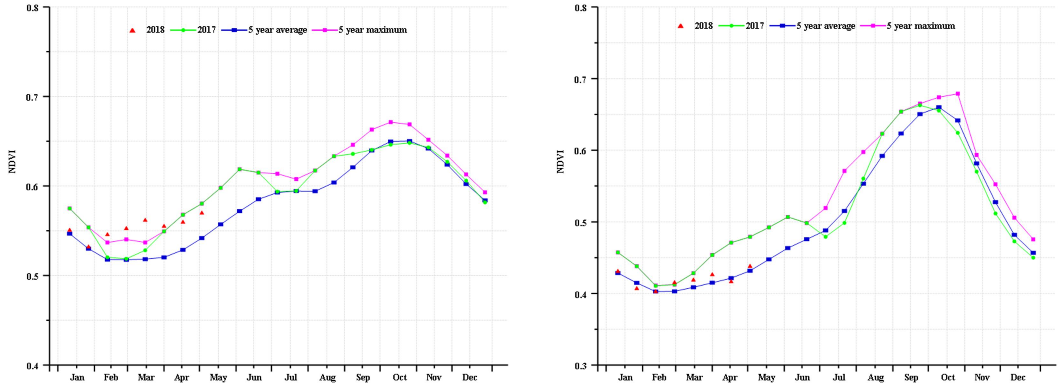




(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles



(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 3.83. Thailand's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 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	170	21	26.9	-1.1	1060	-10
South-eastern horticulture area	347	54	26.6	-1.4	1044	-9
Western and southern hill areas	237	-6	25.8	-0.8	1068	-8
Single-cropped rice north-eastern region	150	-5	26.1	-1.3	1061	-8

Table 3.84. Thailand's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 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	670	26	94	8	0.86
South-eastern horticulture area	1172	45	97	4	0.90
Western and southern hill areas	703	1	99	3	0.79

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Single-cropped rice north-eastern region	618	2	69	7	0.74

Table 3.85. CropWatch-estimated rice production for Thailand in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Rice	38495	-4.7%	-0.5%	36502	-5.2%

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[TUR] Turkey

Winter wheat was still in the fields during the monitoring period, while maize and rice were being planted from April. Nationwide, RAIN was close to average and TEMP 2.8℃ above. These favorable climate conditions resulted in the increase of cropped arable land fraction (CALF, +10%) and led to a national average VCIx of 0.92. According to both NDVI profile clusters and map and the VCIx map, spatially coherent below average conditions occur only in south-eastern Anatolia (along the Syrian border) centered around Şanlıurfa and Gaziantep.

CropWatch assesses the crop condition as above the average of the previous five years and puts the yield for wheat 7.5% above the 2017 value, and the cropped area 0.3% above. The resulting wheat production is estimated to be 7.9% up.

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.

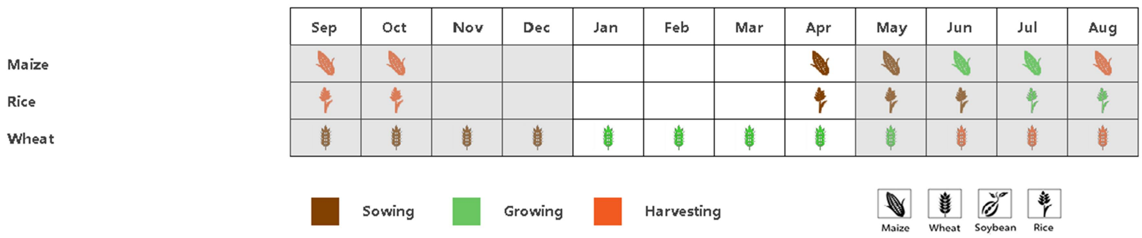
In the Black Sea zone, crop condition was above 5YA average according to NDVI profiles. The rainfall and the temperature were above average (RAIN +12%, TEMP +2.4°C), which led to favourable BIOMSS (+16%) compared with average. The maximum VCI (VCIx) reached 0.89.

The Central Anatolia zone also enjoyed good crop condition during the reporting period. Rainfall and the temperature were conducive to crop growth (RAIN, +14%; TEMP, +3.0°C). The CALF is up 25%, and so is BIOMSS (+12%). The VCIx was 0.90 in the Central Anatolia zone.

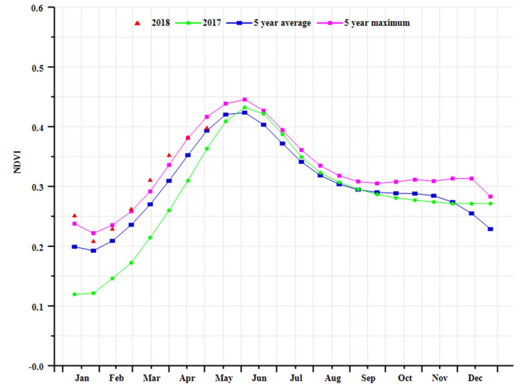
In the Eastern Anatolia zone, CropWatch puts the crop condition above average, which is confirmed by the NDVI profile. Although the zone experienced a slight drop in rainfall and radiation compared to average, current values remained high (RAIN 278mm, RADPAR 834 MJ/㎡). The temperature was significantly above average (+3.8°C). Altogether, the biomass and the cropped arable land fraction were above average (BIOMSS, +14%; CALF, +4%). The VCIx was 1.02, the highest on record so far.

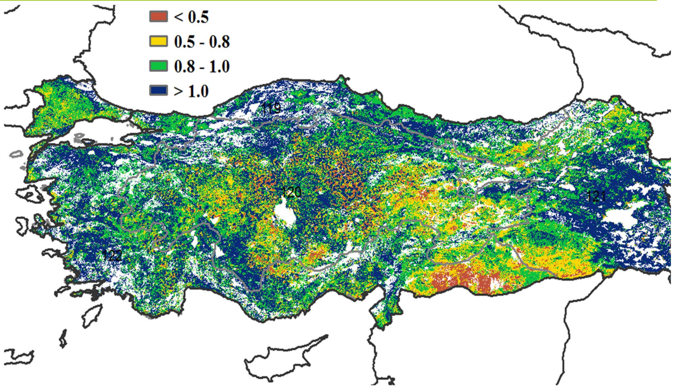
As shown in Table 3.74, the Marmara Agean Mediterranean lowland zone, recorded temperature 2.2°C above average. Both rainfall and the radiation have suffered a slight decrease, but current values were still high (RAIN 300mm, RADPAR 799 MJ/㎡). BIOMSS increased 5%, and the CALF rose 4%. VCIx (0.87) and NDVI agree in assessing the crop condition as above average.

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

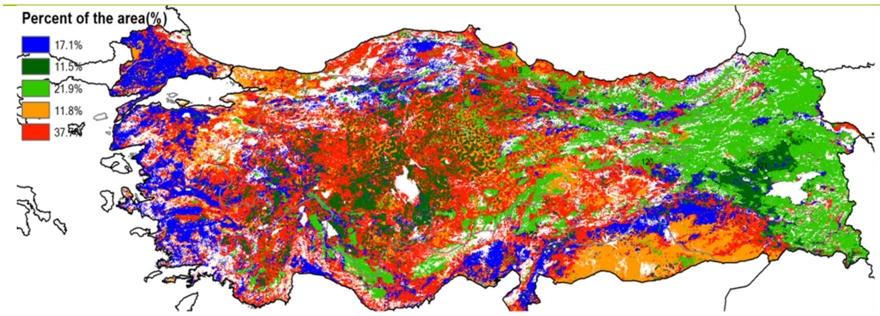


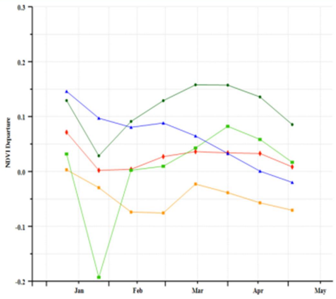
(a). Phenology of major crops



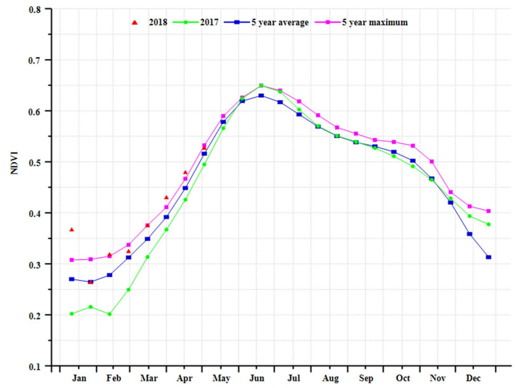


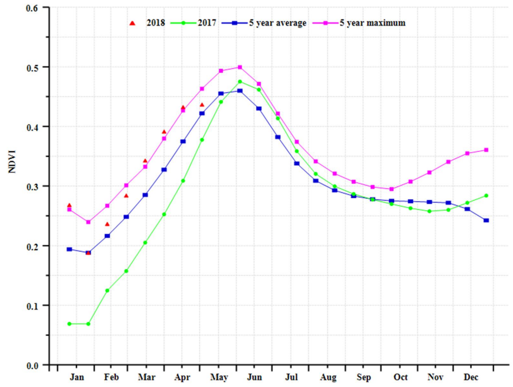
(b) Crop condition development graph based on NDVI (c) Maximum VCI



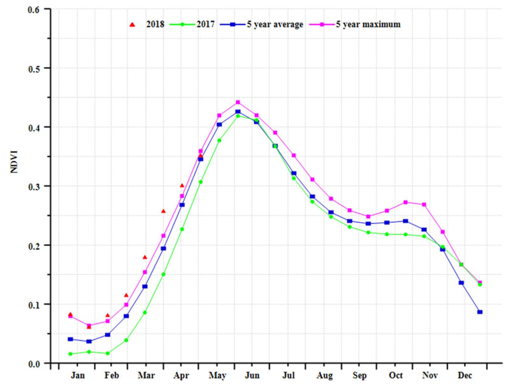


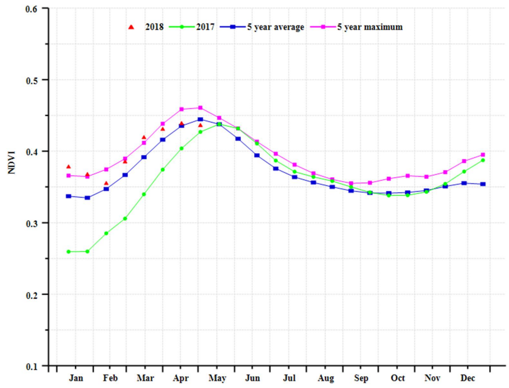
(d) Spatial NDVI patterns compared to 5YA (e) NDVI profiles





(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 3.86. Turkey's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 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	355	12	6.4	2.4	728	-4
Central Anatolia region	301	14	6.5	3.0	817	-4
Eastern Anatolia region	278	-9	3.5	3.8	834	-5
Marmara Agean Mediterranean lowland region	300	-10	9.7	2.2	799	-5

Table 3.87. Turkey's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Black Sea region	995	16	76	-1	0.89
Central Anatolia region	924	12	55	25	0.90
Eastern Anatolia region	765	14	43	4	1.02
Marmara Agean Mediterranean lowland region	1020	5	77	4	0.87

Table 3.88. CropWatch-estimated Wheat production for Turkey in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Wheat	19174	7.5	0.3	20682	7.9

[UKR] Ukraine

During the monitoring period, only winter wheat was in the filed while maize will not be planted until May.

According to the agroclimatic indicators, rainfall was abundant (RAIN 208 mm, +18%), with above average temperature (TEMP, 1.5℃, +0.1℃). At 568 MJ/m² RADPAR was 2% above average, further contributing to providing favorable conditions for crop growth. Agronomic indicators include a favourable maximum vegetation condition index at the national level (VCIx, 0.86). Even if the cropped arable land fraction was just fair (CALF , 69%), overall crop condition was good, which was confirmed by a significant increase for the BIOMSS indicator (778 g DM/m2, +8.2%).

As shown in the crop condition development graph, national NDVI was persistently below the 5-year average until late April, possibly due to temperature. The spatial NDVI pattern also shows that NDVI was consistently lower than the 5-year average during this monitoring period (in about 65.5% of Ukraine, concentrated in northern areas). NDVI recovered to average in late April. According to maximum VCI, the cropped arable land in most central and west area reached 80-100%, while it is 50-80% in the east.

CropWatch predicts that wheat production will increase by 4.1% in 2018.

Regional analysis

Regional analyses are provided for four agroecological zones (AEZ) defined by their cropping systems, climatic zones and topographic conditions. They are referred to as Central wheat area, Northern wheat area, Eastern Carpathian hills, and Southern wheat and maize area.

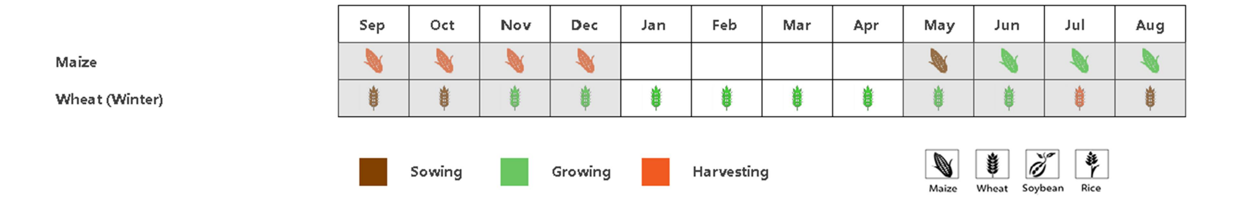
The Central wheat area (Poltava, Cherkasy, Dnipropetrovsk and Kirovohrad oblasts) received abundant rainfall (RAIN 227mm, +33%), normal temperature (TEMP 0.9℃, -0.2℃) and sunshine (RADPAR 562 gDM/m², +2%). In spite of low CALF (58%, 21% below the 5Y reference), high VCIx (0.87) and BIOMSS (+9%) indicate favorable crop condition.

The Northern wheat area (Rivne, Zhytomyr and Kiev oblasts) experienced basically normal agroclimatic conditions for rainfall (RAIN 180 mm, +6%), temperature (TEMP 0.8℃, -0.1℃) and radiation (RADPAR 553 gDM/m2, +5%). BIOMSS is up 5% above the 5-year average. NDVI, CALF (0.74) and VCIx (0.89) all indicate favorable condition for crops.

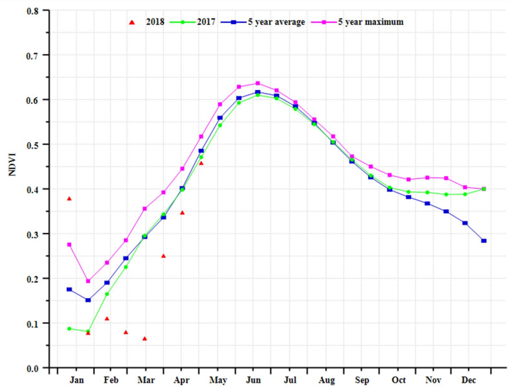
The Eastern Carpathian hills (Lviv, Zakarpattia and Ivano-Frankivsk oblasts) were 6% short in rainfall, but temperature and sunshine were high (TEMP 2.0℃, +0.5℃; RADPAR 580 gDM/m², +4%). Compared with the recent 5YA, agronomic indicators point good crops with BIOMSS +6%, CALF at 0.97 and VCIx at 0.85.

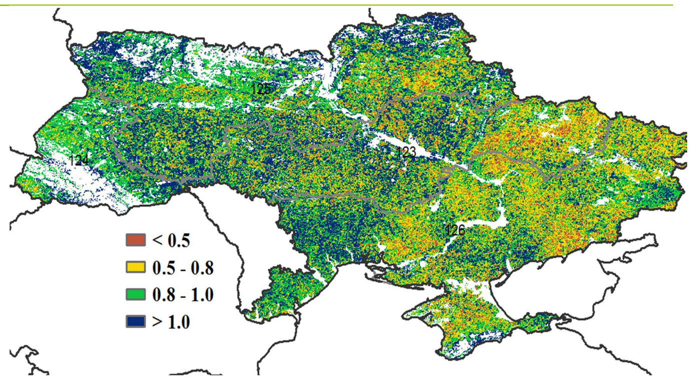
The Southern wheat and maize area (Mykolaiv, Kherson and Zaporizhia oblasts) recorded substantial rainfall (RAIN 226 mm, +20%), normal temperature (TEMP 2.4℃, +0.2℃) and radiation (RADPAR 586, -1%). Despite low CALF (0.68), VCIx (0.83) and BIOMSS (up 12%) indicate satisfactory output of winter wheat.

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



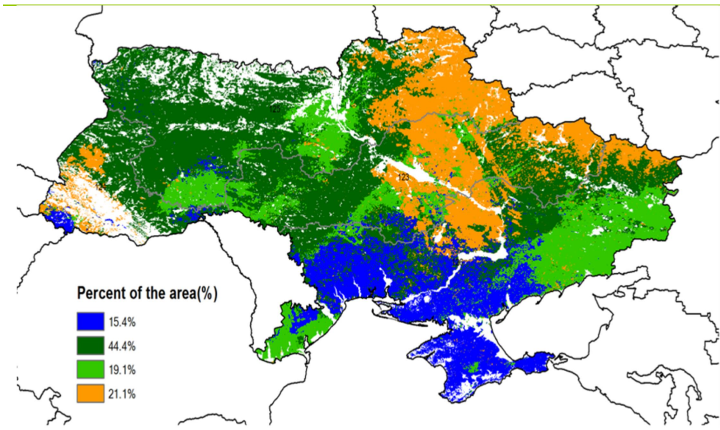
(a). Phenology of major crops

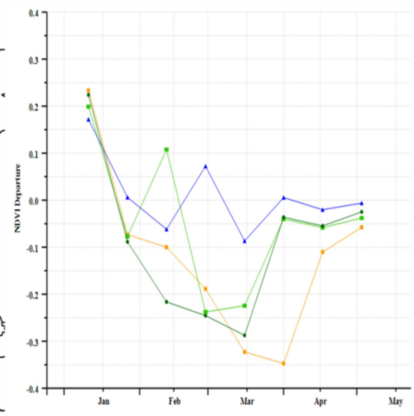




(b) Crop condition development graph based on NDVI

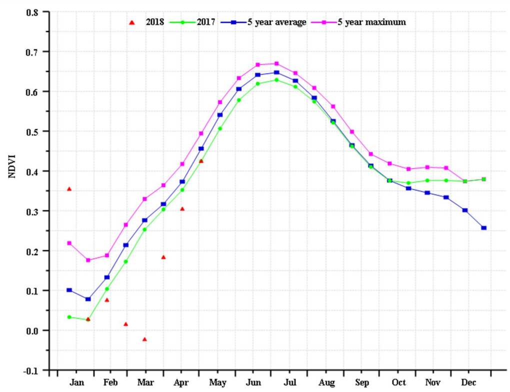
(c) Maximum VCI

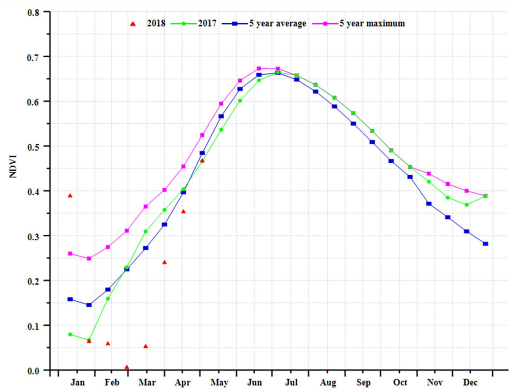




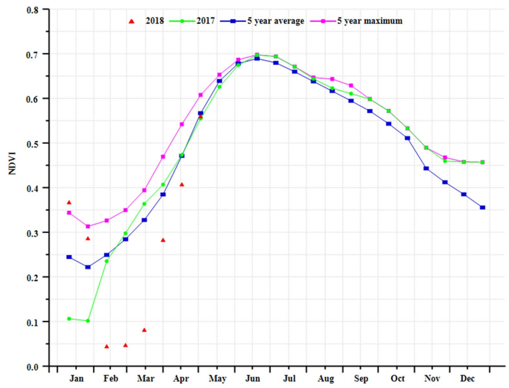
(d) Spatial NDVI patterns compared to 5YA

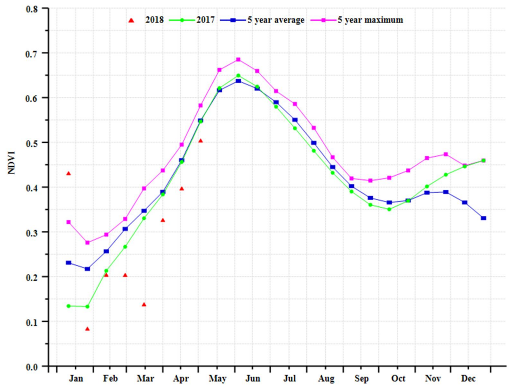
(e) NDVI profiles





(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 3.89. Ukraine's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 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)	227	33	0.9	-0.2	562	2
Northern wheat area (Ukraine)	180	6	0.8	-0.1	553	5
Eastern Carpathian hills (Ukraine)	204	-6	2.0	0.5	580	4
Southern wheat and maize area (Ukraine)	226	20	2.4	0.2	586	-1

Table 3.90. Ukraine's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 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)	777	9	58	-21	0.87
Northern wheat area (Ukraine)	761	5	74	-11	0.89
Eastern Carpathian hills (Ukraine)	814	6	97	0	0.85
Southern wheat and maize area (Ukraine)	787	12	68	-20	0.83

Table 3.91. CropWatch-estimated Wheat production for Ukraine in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Wheat	22662	4.3%	-0.2%	23600	4.1%

[USA] United States

This monitoring period (January to April 2018) covers the overwintering stages of winter crops, and the sowing of summer crops: maize, rice, soybean, and spring wheat.

In general, crop condition described by the national NDVI profiles is below average. For the whole country, RAIN (315 mm) was 5% above average, while temperature (4.6°C) was below (-0.8°C), and radiation (RADPAR) significantly so (-6%). The biomass production potential was 9% below average.

Dry weather prevailed in the major winter wheat areas; in the Southern Plains and California RAIN was -12% and-19% below average, respectively, which in turn resulted in 22% and 6% below average biomass production potential. In other major winter wheat areas, RAIN in the Northwest was 1% above the average, temperature up 0.2°C and RADPAR below average by a significant 9%.

Almost all major winter wheat states suffered serious precipitation deficit problems. RAIN in Kansas, Oklahoma, Texas, California, Oregon and Nebraska was 58%, 15%, 14%, 19%, 22% and 27% below the average, respectively. Dry weather also prevailed in Iowa, Illinois and Missouri states, where RAIN was 17%, 6% and 10% below the average. Water stress caused the marked drop in BIOMASS of major winter wheat states, including Kansas (-49%), Texas (-17%), California (-6%), Oklahoma (-23%), and Nebraska (-17%).

Drought is also responsible for the significant CALF drop in major winter crops regions such as the Southern Plains (-24%) and the South-west (-34%). The performance of crop growth condition was also far below the average with maximum VCI (VCIx) reaching only 0.55 in the Southern Plains.

NDVI profiles indicated that the water deficit resulted in a significant decline of NDVI below average for the whole country after the middle of January. A negative NDVI trend was observed in the whole Southern Plains after the middle of February. Until the end of April, crop growth condition in almost regions was below the average.

Considering the drought and significant decline of CALF in the major winter crop regions, below average crop production is currently estimated by CropWatch for the USA.

Regional analysis

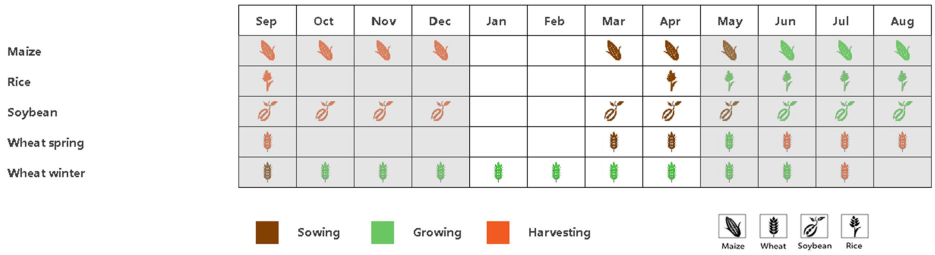
Based on cropping systems, climatic zones, and topographic conditions, 11 sub-national agricultural regions was distinguished for the USA. They are listed in the tables below. However, considering the timing of the season only three will be described in detail, namely the Southern Plains, Northwest and California.

The most important winter wheat region of United States, the Southern Plains suffered drought during this monitoring period. RAIN, temperature and RADPAR were 12%, 1.1℃, and 4% below the average. In Kansas, the most important winter wheat State, RAIN was 58% below the average, which has affected the growth of winter wheat. Unfavorable weather condition resulted in below average crop condition in the Southern Plains, with maximum VCI (VCIx) estimated by CropWatch not to exceed 0.55. In the north-western areas, VCIx was below 0.5, indicating bad crop growth condition.

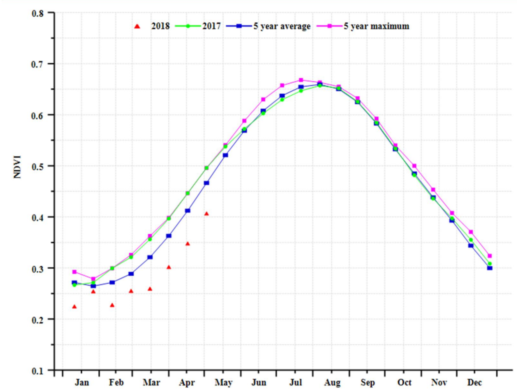
The weather condition in the Northwest was better than the Southern Plains: RAIN (237 mm) was average, and temperature was 0.2 ℃ above the average, while RADPAR was significant 9% below the average. In this region, Oregon State suffered serious drought with RAIN 22% below the average. The CALF was a marked 19% below the average which would entail reduced production. Below average crops and production are expected in this region.

The crop condition in California was also below the average. This region was also dominated by dry weather: RAIN was 19% below the average, Temp was average, while the RADPAR was 5% below. The biomass accumulation potential was 6% below the average.

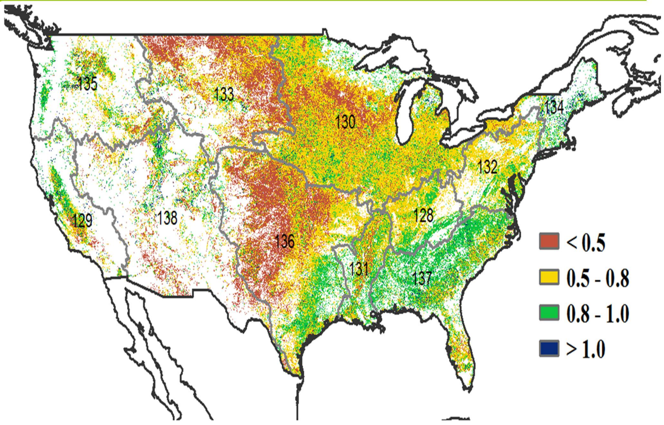
Figure 3.43. United States's crop condition, January-April 2018



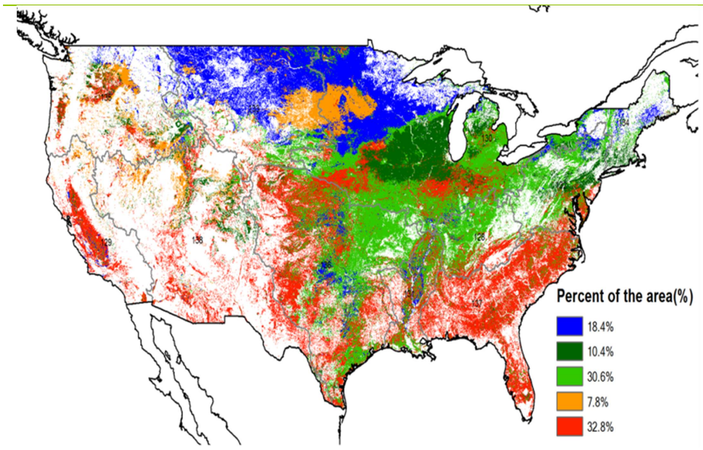
(a). Phenology of major crops



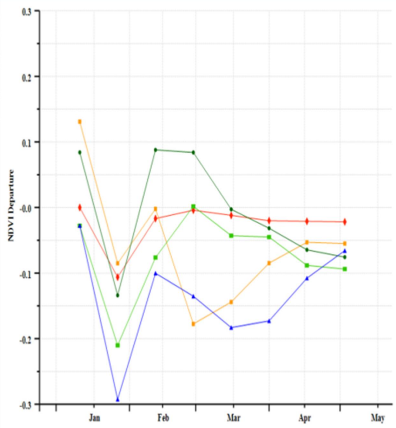
(b) Crop condition development graph based on NDVI



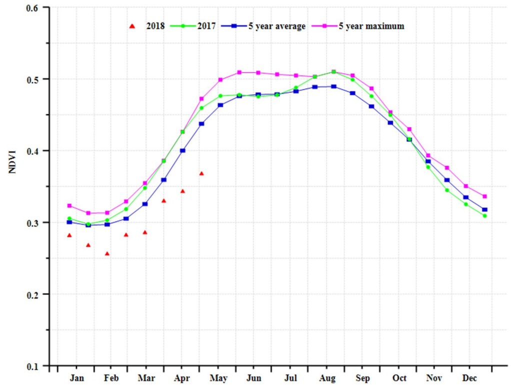
(c) Maximum VCI

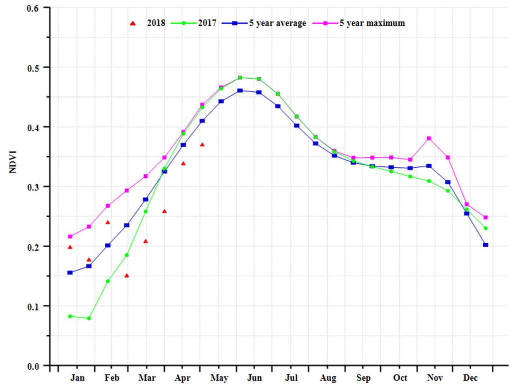


(d) Spatial NDVI patterns compared to 5YA

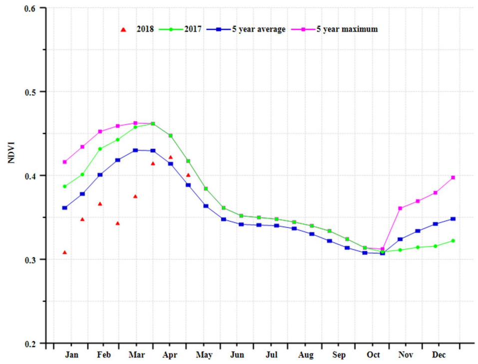


(e) NDVI profiles





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



(g) Crop condition development graph based on NDVI (California)

Table 3.92. United States's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Blue Grass region	590	18	6.5	-0.9	711	-10
California	190	-19	7.9	0.0	870	-5
Corn Belt	302	11	-1.3	-1.7	719of	-5
Lower Mississippi	583	13	11.4	-0.9	805	-6
Middle Atlantic	431	26	2.9	-0.7	666	-11
Northern Plains	198	50	-4.1	-2.8	762	-4
Northeast	426	27	-1.1	0.3	609	-13
Northwest	237	1	1.6	0.2	652	-9
Southern Plains	241	-12	9.0	-1.1	876	-4
Southeast	359	-16	12.6	-0.4	856	-4
Southwest	72	-23	5.7	1.4	1003	-4

Table 3.93. United States's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Blue Grass region	1143	-5	0.95	-3	0.76
California	598	-6	0.71	-3	0.73
Corn Belt	598	-16	0.15	-60	0.65
Lower Mississippi	1430	3	0.70	-9	0.73
Middle Atlantic	863	-3	0.84	-15	0.73
Northern Plains	483	-5	0.01	-86	0.50
Northeast	613	-1	0.67	-28	0.79
Northwest	681	9	0.47	-19	0.72
Southern Plains	601	-22	0.47	-24	0.55
Southeast	1194	-6	0.99	0	0.83
Southwest	303	-18	0.09	-34	0.61

Table 3.94. CropWatch-estimated Wheat production for United States in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Wheat	54812	-8.7	-5.3	47399	-13.5

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

[UZB] Uzbekistan

The monitoring period covers the growing stage of winter wheat and the sowing of maize. Crop condition was generally unfavorable. The national average VCIx was 0.63, and the cropped arable land fraction decreased by 26% compared with the 5YA. Among the CropWatch agroclimatic indicators, RAIN and RADPAR were below average (-11% and-8%), while TEMP increased by 0.7°C. The combination of factors resulted in decreased BIOMSS (-5%) compared to the recent five-year average. As shown by the NDVI development graph, crop condition was below average from late January to the end of March.

NDVI cluster graphs and profiles show that 16.6% of the agriculture area had above average conditions from late March to late April. This includes parts of the four eastern provinces (Namangan, Andijon, Quqon and Farghona) where most wheat is produced, and some patches in Kitab, Samarqand, Bukhoro and Guliston provinces. NDVI was below average in the western provinces and most parts of northern, central and southern provinces. Overall, CropWatch expects a decrease of 7.3% in wheat production compared with last year.

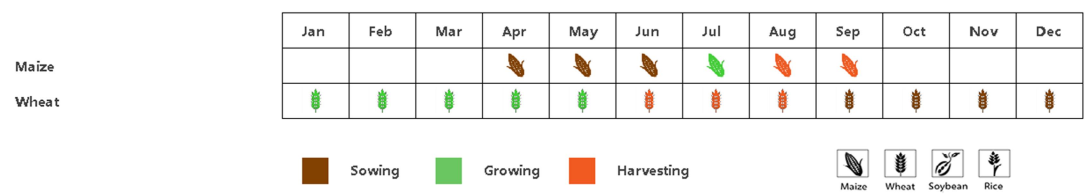
Regional analysis

For the regional analysis, additional detail is provided for two agro-ecological zones in the country: the maize and cereals zone and the cotton zone.

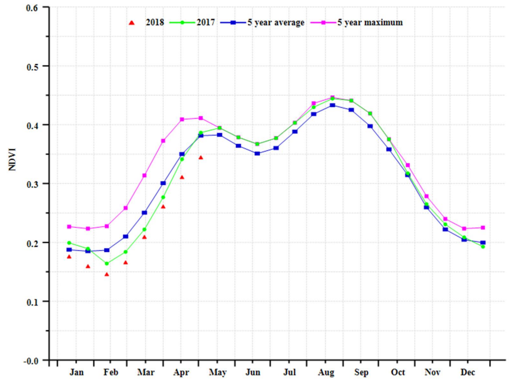
In the maize and cereals zone, NDVI was generally below the five-year average from January to April. The RAIN and RADPAR were 14% and 7% below average (respectively), but TEMP was slightly (0.8°C) above average. The agroclimatic indicators also include a decrease of the BIOMSS index by 11%.

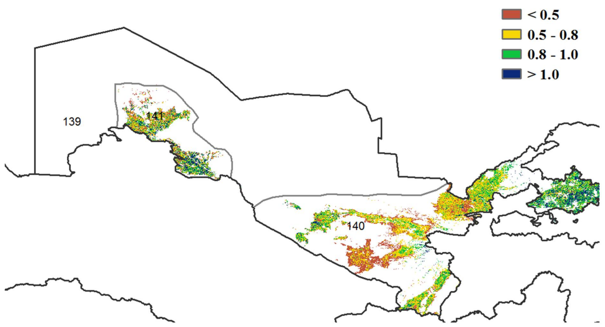
The western and northern areas of the country constitute the cotton zone. Crop condition was below the five-year average from late January to late April. Accumulated rainfall was above average during the monitoring period (RAIN +49%), radiation and temperature were below average (RADPAR -12% and TEMP -0.5°C). The BIOMSS index increased by 37% compared to the five-year average. The maximum VCI index was 0.69, while the cropped arable land decreased by 82%. Overall crop prospects for the region in this season are poor.

Figure 3.44. Uzbekistan's crop condition, January-April 2018

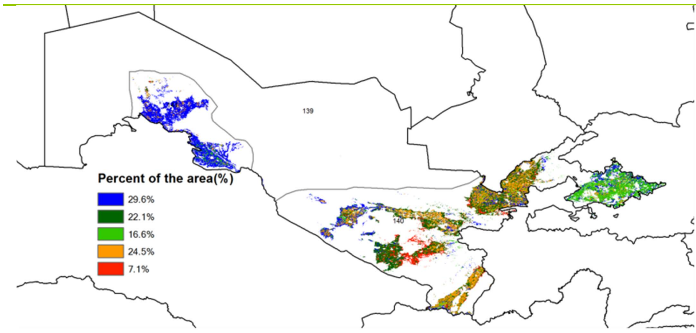


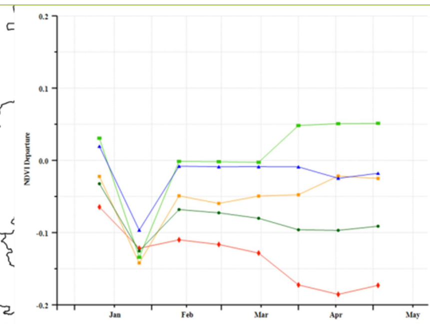
(a). Phenology of major crops



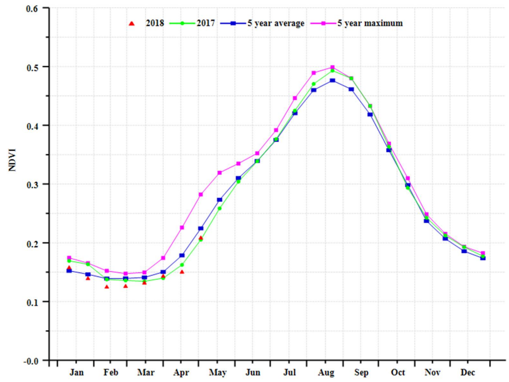


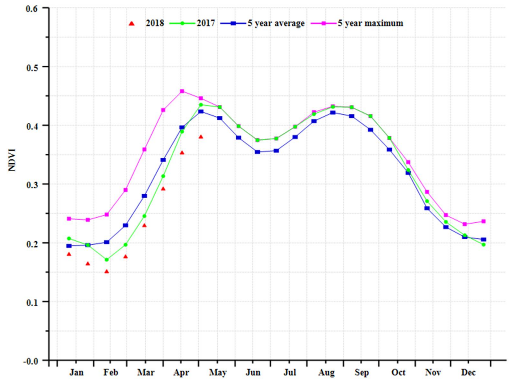
(b) Crop condition development graph based on NDVI (c) Maximum VCI





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





(f) Crop condition development graph based on NDVI (Cotton region (left) (f) Maize and Cereals region (right)

Table 3.95. Uzbekistan's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 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)	139	49	3.4	-0.5	708	-12
Maize and Cereals zone (UZB)	184	-14	6.9	0.8	760	-7

Table 3.96. Uzbekistan's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Cotton zone (UZB)	550	37	33	-82	0.69
Maize and Cereals zone (UZB)	639	-11	-	-	0.61

Table 3.97. CropWatch-estimated Wheat production for Uzbekistan in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Wheat	6442	-8	1	5973	-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

[VNM] Vietnam

The period from January to April covers the sowing and growing periods of spring rice in both the north and south of the country, with differences due to altitude. Most of the rice cultivation regions are distributed in the northern Red River delta and in the Mekong Delta in the south.

Nationwide, rainfall was 134 mm, 37% above average. The temperature was about average but at 865 MJ/d/m2, RADPAR was 10% below. The biomass production potential fell 12% against the 5YA, with the cropped arable land fraction (CALF) at 0.96 (up 1% over the 5YA) and the maximum vegetation condition index at 0.84. CropWatch currently predicts rice production to decrease about 1.4% below 2017 output.

Regional analysis

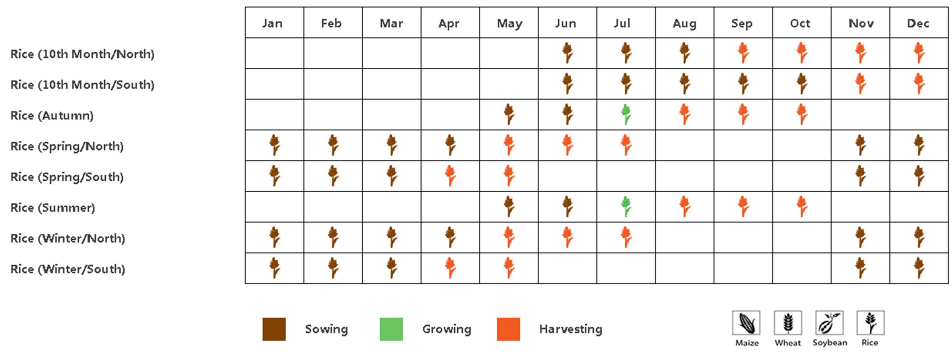
According to the cropping system, climatic zones, and topographic conditions, several agro-ecological zones (AEZ) could be distinguished. The Northern zone with the Red River Delta, the Central coastal areas from Thanh Hoa to Khanh Hoa and the Southern zone with the Mekong Delta.

The current biomass in the North Zone is lower than the last 5-years average by 19%, as a result of rain and RADPAR reductions of 35% and 18%, respectively. In the central zone, the biomass increased up to 13% as an effect of rain increasing 9% above average; RADPAR dropped 10%. The biomass in the southern zone decreased 20% below the 5YA in parallel with a 23% drop in RAIN; RADPAR was about average.

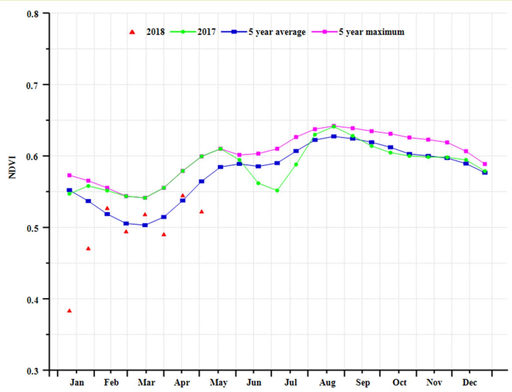
The central coastal zone did better than the other areas as over 80% of the croplands show average or better than average crop condition.

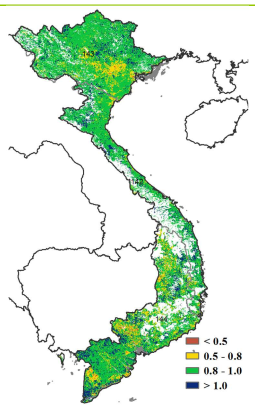
In general, crop prospects are expected to be satisfactory.

Figure 3.45. Vietnam's crop condition, January-April 2018



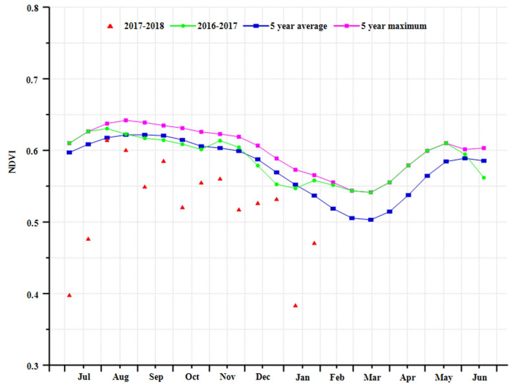
(a). Phenology of major crops





(b) Crop condition development graph based on NDVI

(c) Maximum VCI



(d) NDVI profiles

Table 3.98. Vietnam's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 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	131	-35	18.3	-0.5	631	-18
Central coastal areas from Thanh Hoa to Khanh Hoa	169	9	22.3	-0.9	794	-10
Southern zone with Mekong Delta	113	-23	25.3	-0.8	1139	-4

Table 3.99. Vietnam's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 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	543	-19	1.0	0.2	0.8
Central coastal areas from Thanh Hoa to Khanh Hoa	635	13	1.0	-0.2	0.8
Southern zone with Mekong Delta	421	-20	0.9	2.8	0.9

Table 3.100. CropWatch-estimated rice production for Vietnam's in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Rice	45422	-1.50%	0.05%	44765	-1.45%

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

The monitoring period corresponds to the main growing period for maize in South Africa. Favorable conditions prevailed in Free State, Kwa-Zulu Natal, Gauteng, Eastern Cape, North West and Mpumalanga provinces with VCIx between 0.5-0.8, while a large part of the Free State had VCIx above 0.8. Vegetation conditions reflect the agroclimatic conditions that prevailed during this period, essentially average rainfall nationwide (RAIN +2%). The major production regions in the country experienced a slight reduction in temperature not exceeding 1°C. The RADPAR was highest in the Mediterranean zone, where the growing season is just starting.

Agronomic indicators reveal a Biomass reduction in all the zones, with the Mediterranean recording a 12% departure from average. Correspondingly, its CALF dropped by 43% which is of little consequence at this time of the year. CALF in the Humid Cape Fold Mountains increased by 24%, which is far less relevant, in terms of production, than the 6% increment noted in the main rainfed summer maize production zone of the Dry Highveld and Bushveld.

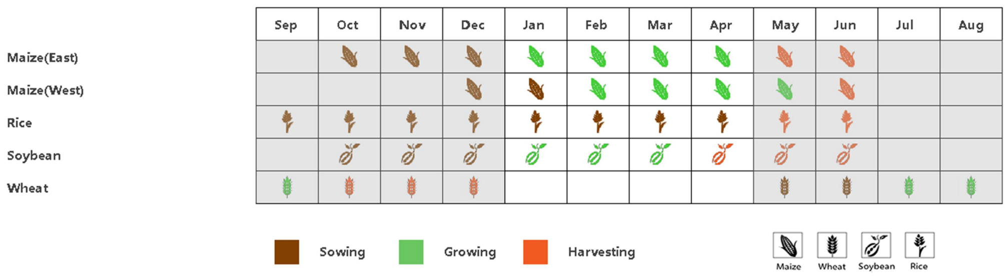
Overall compared to last years production, maize is expected to be quite comparable to last season’s.

Regional analysis

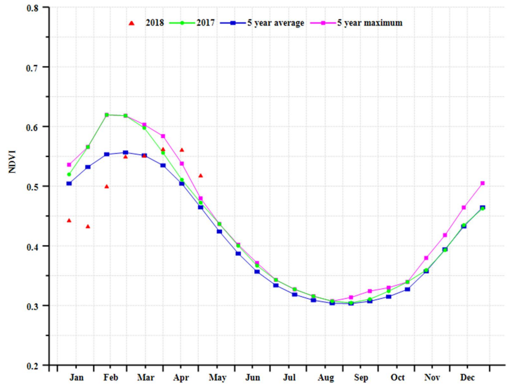
The Mediterranean, Humid Cape Fold Mountains, and Dry Highveld and Bushveld maize zones are the major crop producing agro-ecological zones (AEZs) covered in this analysis. In the HumidCape Fold Mountains zone, the crop conditions were poor and below average during the monitoring period compared to last season. However, the conditions showed a fairly healthy vegetation status as given by a VCIx of 0.64.

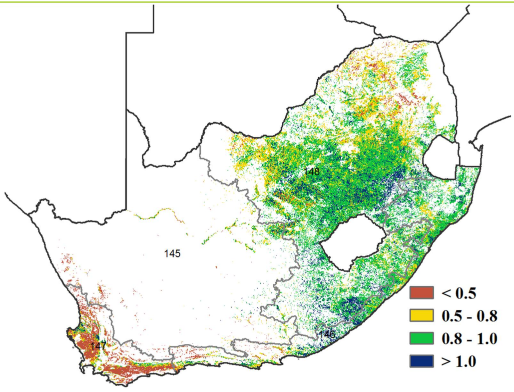
While the season is about to start in the Mediterranean zone, maize has reached the time of harvest in the Dry Highveld and Bushvelds. NDVI profiles were initially poor during initial growth stages but improved and were above average between starting in February, a period corresponding to the active vegetative stages and eventual flowering of most summer maize. This period enjoyed a notable increment in rainfall and temperature. About 18% of the cropped area experienced better conditions compared to the average, especially in Free State and parts of Gauteng Provinces. The VCIx in this zone was 0.70. While some concern may persist for parts of the Limpopo and Mpumalanga provinces, the overall situation for maize in South Africa is at least fair.

Figure 3.46. South Africa’s crop condition, January-April 2018



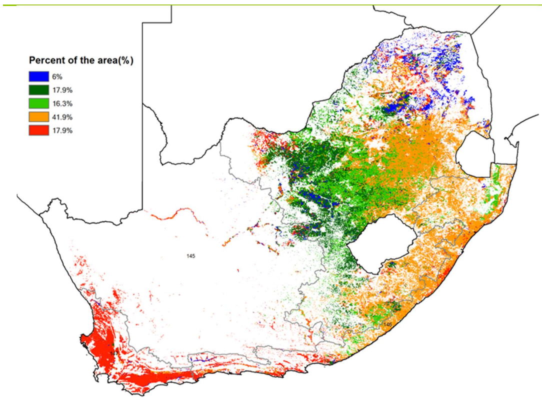
(a). Phenology of major crops

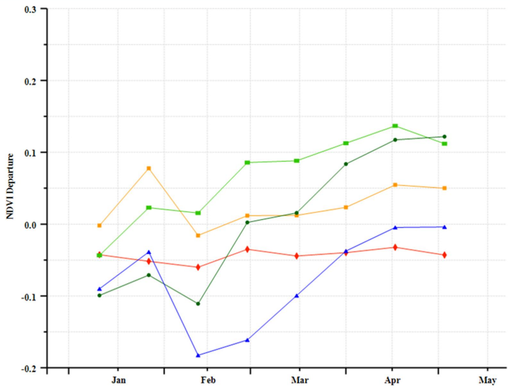




(b) Crop condition development graph based on NDVI

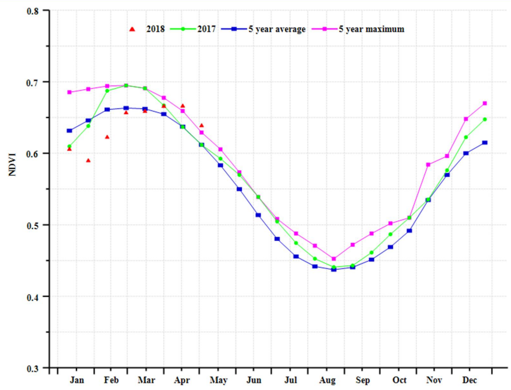
(c) Maximum VCI

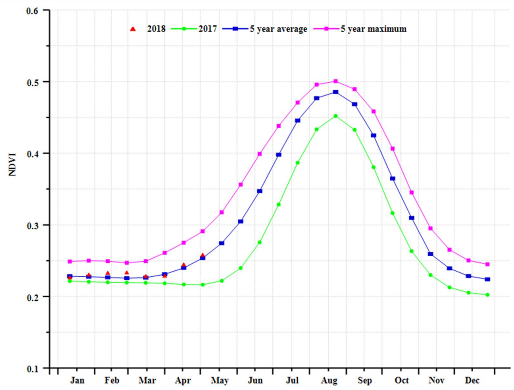




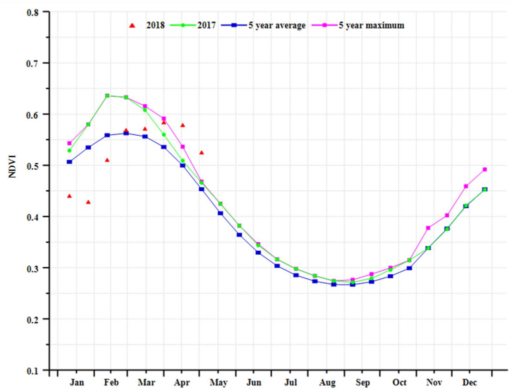
(d) Spatial NDVI patterns compared to 5YA

(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 3.101. South Africa's agroclimatic indicators by sub-national regions, current season's values and departure from 15YA, January-April 2018

Region	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 15YA (%)	Current (°C)	Departure from 15YA (°C)	Current (MJ/m^2)	Departure from 15YA (%)
Humid Cape Fold Mountains	318	-2	21	-0.73	1098	-2
Mediterranean Zone	65	-22	19	-0.50	1285	-3
Dry Highveld and Bushveld	355	2	20	-0.37	1207	-1

Table 3.102. South Africa's agronomic indicators by sub-national regions, current season's values and departure from 5YA, January-April 2018

Region	BIOMSS		Cropped arable land fraction		Maximum VCI
	Current (gDM/m^2)	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
Humid Cape Fold Mountains	1035	-4	1	24	0.64
Mediterranean Zone	294	-12	0	-43	0.33
Dry Highveld and Bushveld	1180	-1	1	6	0.70

Table 3.103. CropWatch-estimated maize production for South Africa in 2018 (thousand tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Maize	14161	0	0	13197	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**

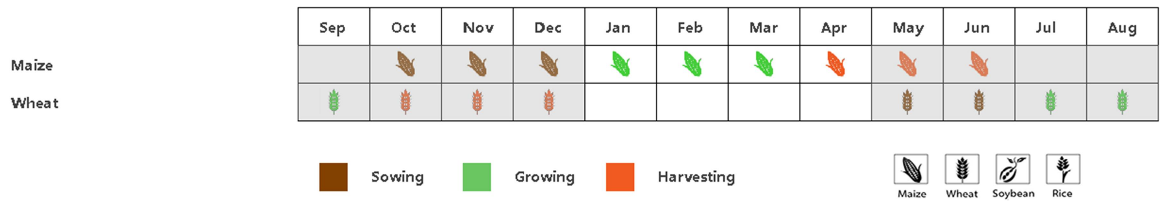
[ZMB] Zambia

The monitoring period cover the growing season of white maize, the main staple in Zambia. At the national scale, rainfall and temperature were slightly below average (RAIN -6%, TEMP -0.7℃) and sunshine measured by RADPAR was up 1%. Crop condition was slightly below average.

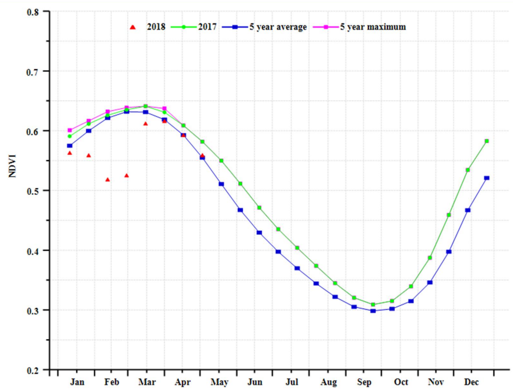
The spatial NDVI patterns show that Central, Southern and Eastern Provinces experienced a sharp decline in condition in the middle stages of growth. They represent about 20% of the cropped area and are the grain basket of the country. The observation is probably coupled with the agricultural drought that occurred in some of these areas. However, this was offset later when rains returned and even led to floods in certain areas. In the Southern and Western Provinces (representing about 15% of the cropped areas) severe conditions prevailed that could lead to poor yields and worsen local food insecurity.

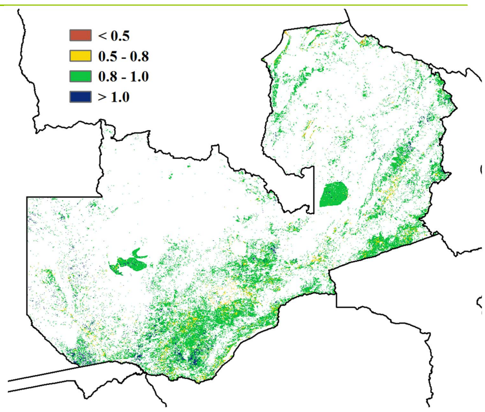
Compared to the 5YA, CALF remained unchanged and accumulated biomass fell 2%. A drop in production is anticipated in most smallholder farms that were affected by the unfavourable rainfall patterns and armyworm attacks. Altogether, CropWatch estimates that the maize production will not vary significantly compared with 2017.

Figure 3.47. Zambia's crop condition, January-April 2018



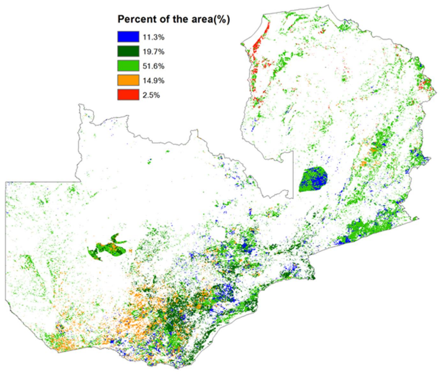
(a). Phenology of major crops

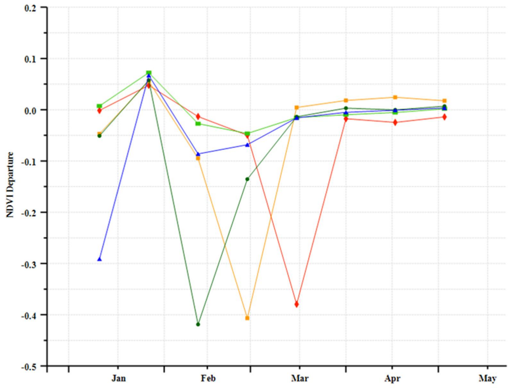




(b) Crop condition development graph based on NDVI

(c) Maximum VCI





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

Table 3.104. CropWatch-estimated maize production for Zambia in 2018 (thousands tons)

Crops	Production 2017	Yield variation	Area variation	Production 2018	Production variation
Maize	2394	-1.8%	0.7%	2367	-1.1%

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 from January to April, winter crops in China (i.e. winter wheat and rapeseed) were growing in the field. Overall, agro-climatic and agronomic conditions were unfavorable. Both rainfall and RADPAR at the national level dropped by 8% compared to average, while temperature was substantially average (+0.1°C). BIOMSS was 7% above average but CALF was 14% below. At 0.54, average national VCIx was rather low.

On the subnational scale, rainfall significantly exceeded average by more than 30% in Huanghuaihai, Inner Mongolia, the Loess region and North East China but decreased by 18% in the in Lower Yangtze region and by 17% in Southern China. Rainfall in South-West China was average (+2%). Temperature was close to average for all the regions, with the anomalies ranging between -0.4 °C and 0.5 °C. All the regions experienced below-average RADPAR, with significant departures between -14% and -6%. Moreover, CALF decreased everywhere, compared to average. The VCIx in Inner Mongolia was very low at 0.38. The values for other six regions were also rather low, ranging between 0.43 and 0.66.

As to the spatial pattern of agro-climatic and agronomic condition, rainfall was affected by large fluctuations in 8.9% of the cropped areas, mostly in southeastern China: from about 100mm above average in the first dekad of January to 60 mm below average during the last dekad of March in Fujian, Guangdong, southern Jiangxi and eastern Guangxi province, as indicated by figure 4.1. On the contrary, 79% of the planted areas continuously experienced average rainfall in Central, South-west and North-eastern. According to figure 4.2, temperature varied frequently everywhere during the reporting period with large departures from -5°C in late January to +6°C in late March in north-est China. Interestingly, areas which recorded variable precipitations over time are those that had stable temperatures, and vice versa. As shown in figure 4.3, cropped areas are mainly located in the southern and central parts of China whereas uncropped areas occur in the northeast, northern and northwest parts in accordance with the prevailing climates. The highest VCIx values (greater than 1) occur in the central part of China but lower values (below 0.5) are confined to the northeast (Figure 4.4). The VHIn pattern map (figure 4.5) shows that the values were varied between 51 and 100 in almost all the regions, indicating that water supply was generally sufficient for crops growth during this monitoring period.

Table 4.1. CropWatch agro-climatic and agronomic indicators for China, January - April 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	36	0.2	-14	31	-30	0.56
Inner Mongolia	35	0.4	-6	27	-93	0.38
Loess region	38	0.5	-9	28	-54	0.43
Lower Yangtze	-18	0.2	-9	-8	-12	0.60
Northeast China	31	-0.4	-6	31	-96	0.54
Southern China	-17	-0.2	-7	-4	-3	0.64
Southwest China	2	0.1	-6	8	-2	0.66

Figure 4.1. China spatial distribution of rainfall profiles, January - April 2018

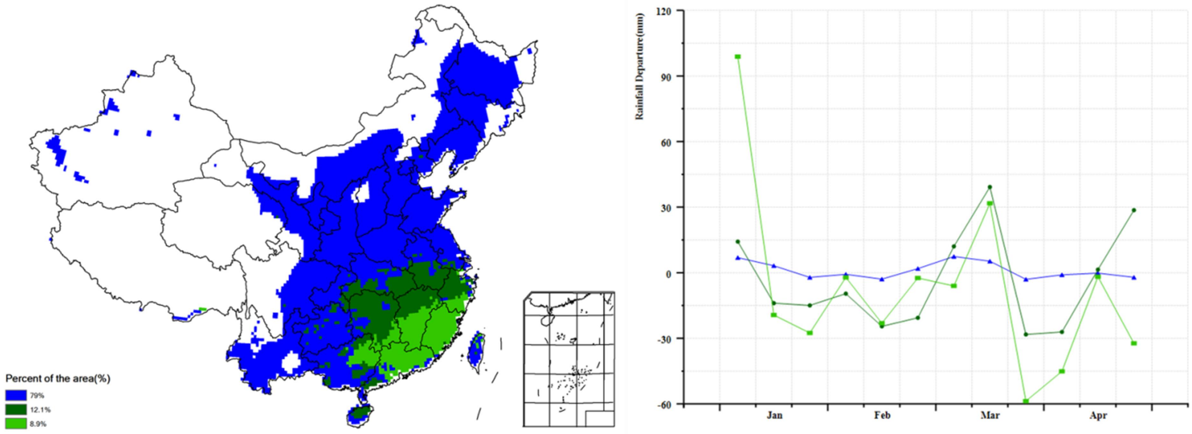


Figure 4.2. China spatial distribution of temperature profiles, January - April 2018

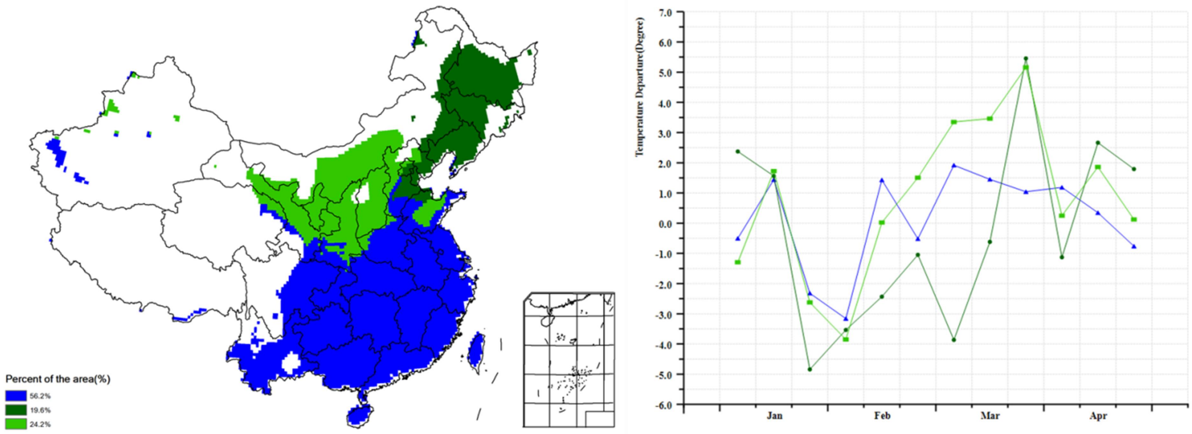


Figure 4.3. China cropped and uncropped arable land, by pixel, January - April 2018

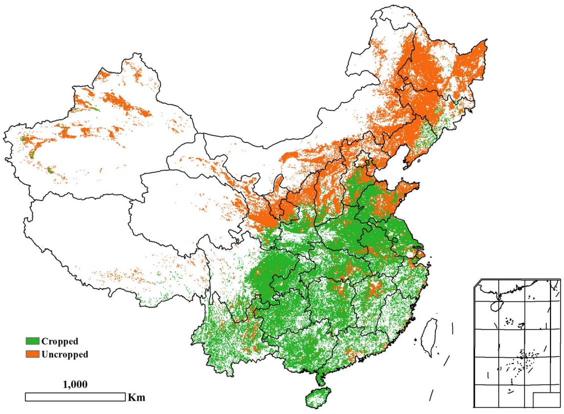


Figure 4.4. China maximum Vegetation Condition Index (VCIx), by pixel, January - April 2018

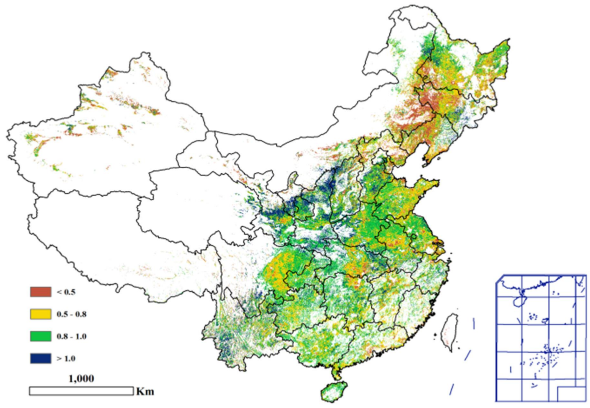
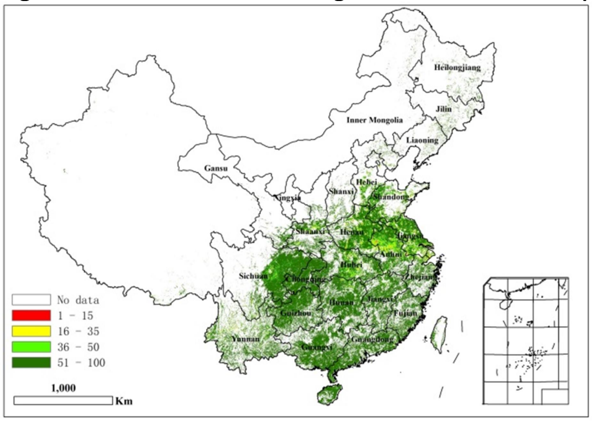


Figure 4.5. China minimum Vegetation Health Index (VHIn), by pixel, January - April 2018



4.2 China crop production

Overall agro-climatic conditions were unfavorable for winter wheat in major production zones, resulting in a 1.4% decrease of yield compared to the 2016-2017 season. Winter wheat production is forecast at 112.7 million tons, a decrease of 3.3 million tons or 2.8% below the 2016-2017 winter season (table 4.2). The total planted area is 23,218 thousand hectares, 1.4% down from 2016-2017. Among the major winter wheat producing provinces, the area decreased by 1% for Hebei, Jiangsu, Shandong and Henan and decreased by 2% in Sichuan. In Anhui, 2016-17 and 2017-18 hectarages were similar but they decreased 1% in Jiangsu. The largest increase of winter wheat hectarage was observed in the provinces of Shanxi (+3%) and Shaanxi (+5%). The previous Bulletin had already mentioned the delayed sowing of winter crops in Anhui and Henan provinces. The area, however, remained stable because farmers planted a late sowing wheat variety as a replacement. The largest drop of winter wheat yield (5%) was observed in Shandong province mainly due to the late breaking of dormancy. Winter wheat yield for Hebei, Henan, Hunan and Sichuan dropped slightly (1%) compared to 2016-2017. Shanxi, Jiangsu, Anhui, Shaanxi and Gansu enjoyed favourable conditions after over-wintering and yields are expected to be up between 2% and 6% from the previous year.

The largest winter wheat production inter-annual change (+11%) occurred in Shaanxi as a result of both increased planted area and yield. Other provinces with large production increases includes Shanxi (5%, due to both increased planted area and the yield), Anhui (5% because of increased yield), and Gansu (7%, due to both decreased planted area and the yield). Jiangsu (+4%) and Chongqing (+1%) mainly contributed by increased yield. The top three winter wheat producing provinces (Henan, Shandong and

Hebei) all suffered from unfavorable conditions and report large production drop of 2%, 6% and 2%, respectively. Hebei mainly suffered from drought while the decreased production for Shandong and Henan was mostly due to the delay of crop development.

Table 4.2. China, 2018 winter wheat area, yield, and production and percentage difference with 2017, by province.

	Area (kha)			Yield (kg/ha)			Production (thousand ton)		
	2017	**2018**	**Δ(%)**	**2017**	**2018**	**Δ(%)**	**2017**	**2018**	**Δ(%)**
Hebei	2048	2026	-1	5898	5827	-1	12080	11802	-2
Shanxi	517	533	3	4289	4374	2	2219	2332	5
Jiangsu	1962	1946	-1	4863	5045	4	9540	9816	3
Anhui	2420	2422	0	4441	4655	5	10747	11275	5
Shandong	4113	4091	-1	5963	5653	-5	24527	23124	-6
Henan	5115	5049	-1	5111	5058	-1	26142	25539	-2
Hubei	1040	1044	0	4117	4082	-1	4281	4263	0
Chongqing	350	349	0	3299	3343	1	1155	1167	1
Sichuan	1290	1268	-2	3627	3594	-1	4677	4559	-3
Shaanxi	1027	1076	5	3740	3957	6	3841	4257	11
Gansu	388	390	0	3858	4099	6	1499	1598	7
Sub total	20270	20193	-0.4	-	-	-	100709	99731	-1
Other provinces	3278	3025	-8	-	-	-	15273	12975	-15
National total*	23548	23218	-1.4	4925	4854	-1.4	115981	112707	-2.8

Note: National total production does not include Taiwan province.*

In China, winter wheat represents almost 92% of the total output for winter crops. For 2018, CropWatch puts the total winter crop production at 122.8 million tons, a 2.8 percent decrease from the 2017's bumper production (table 4.3). Due to the low return from winter wheat and rapeseed cultivation, farmers have reduced areas by 1.6% nationwide. Some farmers in lower Yangtze River region decide to keep the field fallow during winter and plant single rice after spring. The most significant drop of winter crop area occurred in Sichuan province (-2%). Favorable conditions in the Loess Region benefited the crops there and both planted area and yield were up from the previous year resulting in the largest production increase for Shanxi, Shaanxi and Gansu (Area up 3% in Shanxi, 5% inr Shaanxi and 1% in Gansu; Yield up 2% in Shanxi, +7% in Shaanxi and +6% in Gansu). Yield increased by 3% for both Jiangsu and Anhui thanks to favorable climatic condition which compensated the decreased hectarage. It is worth mentioning that the top two winter crop producing provinces suffered drops in winter wheat output (Henan 6%, Shandong 2%). As a result, the national winter crop production dropped from the previous years high output.

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 winter crops production (thousand tons) and percentage difference with 2017, by province

	2017	2018			
	(thousand ton)	Area change	Yield change	Production change	Production (thousand ton)

		(%)	(%)	(%)	
Hebei	12077	-1	-1	-2	11784
Shanxi	2251	3	2	5	2366
Jiangsu	9585	-1	3	2	9753
Anhui	11662	-1	3	2	11839
Shandong	24898	-1	-6	-6	23330
Henan	26293	-1	-2	-2	25636
Hubei	5756	-1	0	-1	5695
Chongqing	2289	0	2	2	2336
Sichuan	5513	-2	0	-1	5444
Shaanxi	3889	5	7	12	4373
Gansu	2999	1	6	7	3211
Sub total	107211	-	-	-1	105767
Other provinces	19064	-	-	-11	16986
National total*	126275	-2	-1	-3	122753

** Production for Taiwan province is not included.*

4.3 Regional analysis

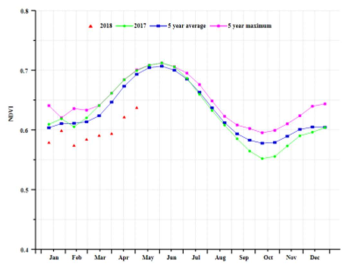
Figures 4.6 through 4.12 present crop condition information for each of China's seven agricultural regions. The provided information is as follows: (a) Phenology of major crops; (b) Crop condition development graph based on NDVI, comparing the current season up to April 2018 to the previous season, to the five-year average (5YA), and to the five-year maximum; (c) Spatial NDVI patterns for January - April 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 January - April 2018. Additional information about agro-climatic indicators and BIOMSS for China is provided in Annex A.

Northeast region

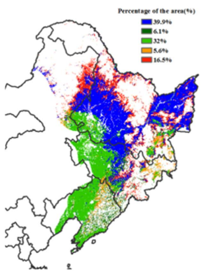
In northeast China, April is the month of sowing and germination for most crops, including maize and soybean. January to April weather was colder and more humid than average; rainfall was well above average (+31%) and RADPAR dropped by 6%. Temperature was slightly below average (-0.4°C). The agro-climatic conditions mentioned resulted in a 31% above average potential biomass in the region. It is still cold for crops before April in the region and NDVI variations depend on snow-melt more than crop condition.

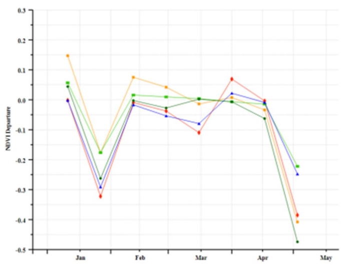
In general, sufficient water supply in the region ensures good soil moisture, which will benefit crops in 2018.

Figure 4.6. Crop condition China Northeast region, January - April 2018

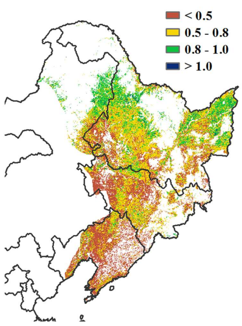


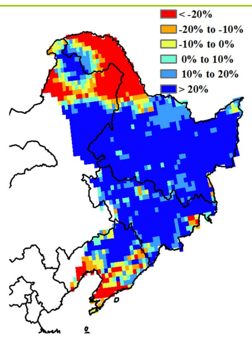
(a) Crop condition development graph based on NDVI





(b) Spatial NDVI patterns compared to 5YA (c) NDVI profiles



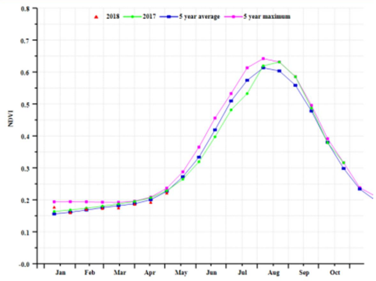


(d) Maximum VCI (e) Biomass

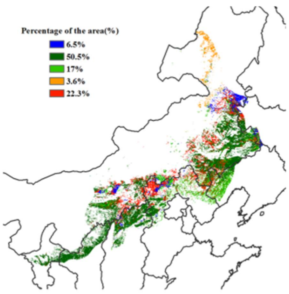
Inner Mongolia

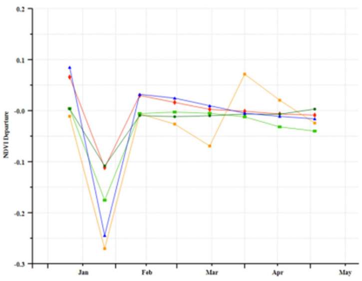
No crops were cultivated in Inner Mongolia over the reporting period due to the seasonally low temperatures. Crops started to be sowed only from late April, along with gradually increasing temperatures. Considering agro-climatic indicators in the first four months of this year, rainfall indices were above average (RAIN +35 %), TEMP was slightly up and the PAR accumulation was above average (RADPAR, +6%), resulting in a potential biomass increase of 27%. VCIx was below 0.5 in most areas, which is of little agronomic significance at this time of the year. Stored soil moisture is abundant and will benefit the germination of crops and grazing lands alike. It is just very early stage of crop growing in April. If these conditions continue in the future, the outcome may be a good season.

Figure 4.7. Crop condition China Inner Mongolia, January - April 2018



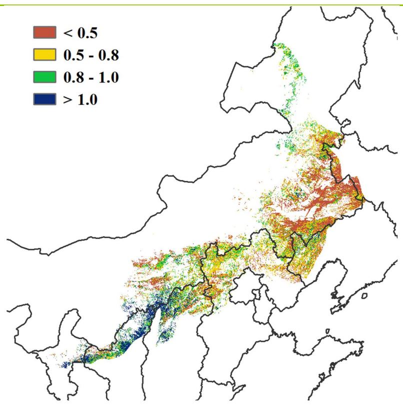
(a) Crop condition development graph based on NDVI

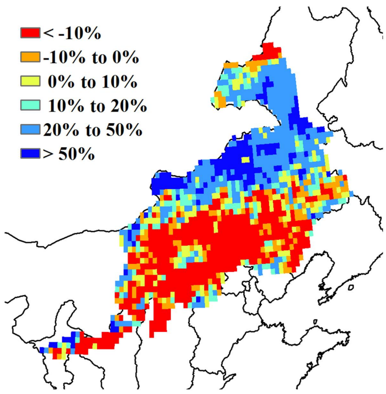




(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles





(d) Maximum VCI

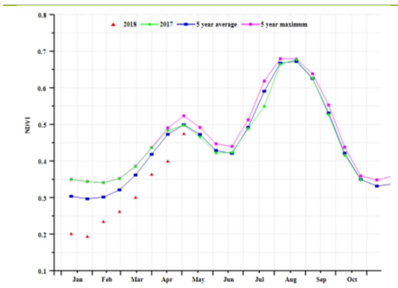
(e) Biomass

Huanghuaihai

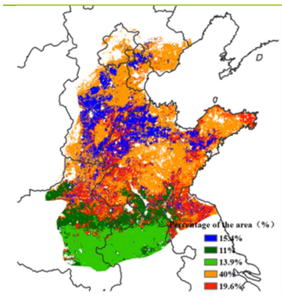
The main crop during the monitoring period is winter wheat, which was planted in early October will complete its cycle by mid -June. According to the crop condition development graph based on NDVI, crop condition was below 5YA during the entire period and slightly recovered in late April. According to the CropWatch agro-climatic indicators, temperature (TEMP) was generally average and precipitation (RAIN) was 36% above, while radiation (RADPAR) was 14% below. Sufficient precipitation provided good soil moisture and led to a 31% increase in biomass potential. The fraction of cropped arable land (CALF), however, decreased by 30%. Favorable yield conditions are shown by the biomass departure map: most areas exhibit more than 20% increase except for parts of southern Hebei and Shandong, which show negative departures.

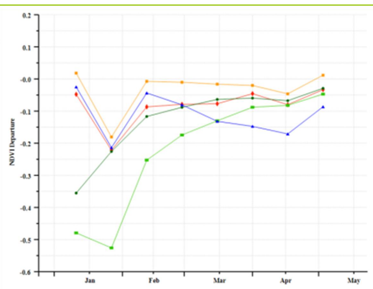
The whole region currently displays NDVI values that are below but close to average. This contrasts with the beginning of the monitoring period when NDVI showed large negative departures from average for almost the whole region, with very low values in the south. The improvement is confirmed by the VCIx distribution maps. Eastern Shandong and some isolated areas display low VCIx values. The current regional average was 0.56 at the end of April.

Figure 4.8. Crop condition China Huanghuaihai, January - April 2018

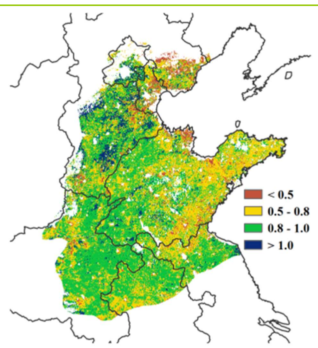


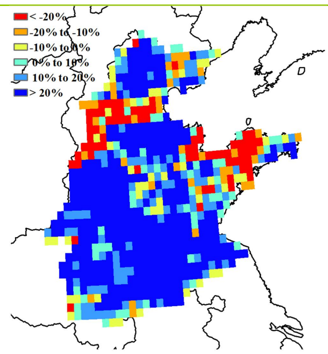
(a) Crop condition development graph based on NDVI





(b) Spatial NDVI patterns compared to 5YA (c) NDVI profiles



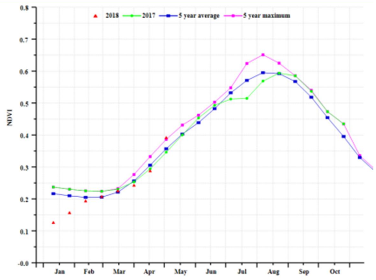


(d) Maximum VCI (e) Biomass

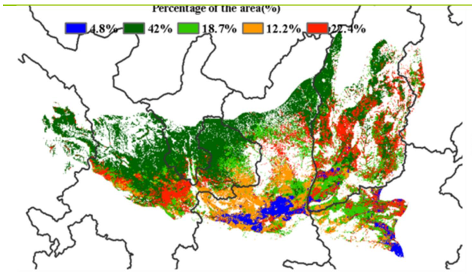
Loess region

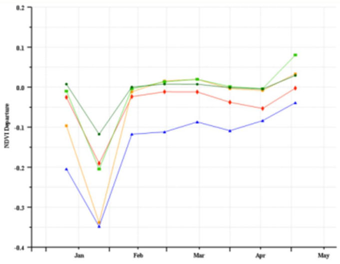
According to the regional NDVI development graph, crop condition was generally fair in the Loess region. The main crops in the region are currently winter wheat, spring wheat, and spring Maize. Winter wheat was sowed during late September to middle October and will be harvested in middle June. Spring wheat and Maize were just sowed during late March to April. During the monitoring period, rainfall (RAIN) exceeded average by 38%, while temperature (TEMP) was 0.5°C above. Radiation (RADPAR) was 9% below average, which may adversely affect photosynthesis. NDVI clusters and profiles shows that crop condition was close to average in most parts of the region and even improved slightly in late April. The fraction of cropped arable land (CALF) for the region decreased 54 percentage points when compared with the five-year average, which indicates about half of the land is uncropped. The potential biomass indicator (BIOMASS) was 28% above average, with above average values in every province within the Loess region. According to the VCIx map, with the exception of central Shanxi and central Gansu, current crop condition in the region is quite favorable, especially in the north.

Figure 4.9. Crop condition China Loess region, January - April 2018



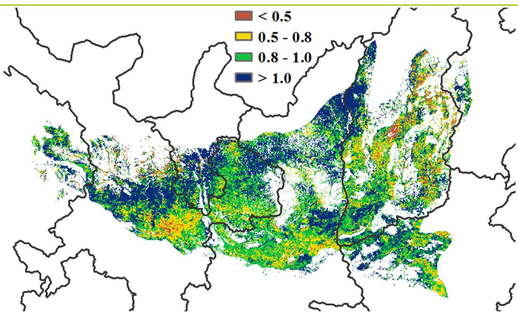
(a) Crop condition development graph based on NDVI

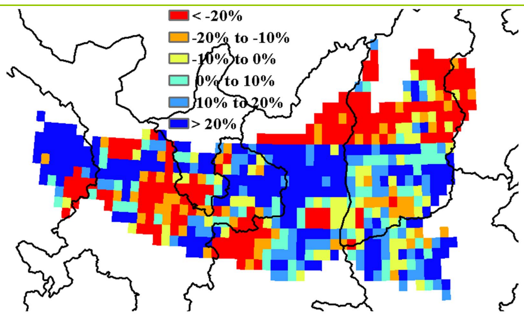




(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles





(d) Maximum VCI

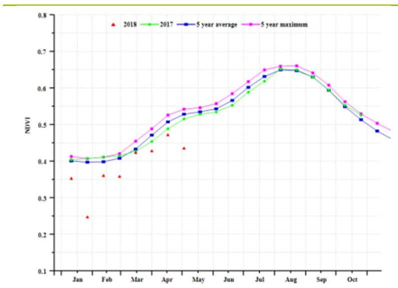
(e) Biomass

Lower Yangtze region

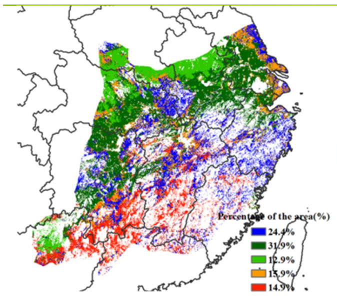
During this monitoring period from January to April, early rice was being transplanted while, in the north of the region, winter wheat had reached flowering and milky ripeness. Rapeseed has been harvested completely in early April.

The regional crop development graph based on NDVI shows below average conditions, due to mostly unfavourable rainfall (RAIN -18% compared to average) and sunshine (RADPAR, -9%). Although temperature was about average (+0.4°C), the potential BIOMSS dropped 8% compared to the average level and the regional VCIx was just 0.6. The BIOMSS map, however, has favourable conditions in the central-eastern Hubei (which is confirmed by VCIx), south Jiangsu, central Zhejiang and the north of Jiangxi and Guangdong provinces. According to NDVI profiles crop condition was below average in the whole region especially in the south, covering 14.9% of arable land. Considering that the fraction of cropped arable land (CALF) was 12 percentage points below the average of recent years, crop production is anticipated to be mostly unfavorable.

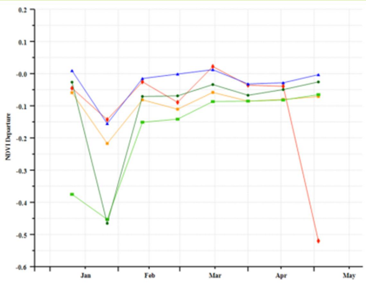
Figure 4.10. Crop condition Lower Yangtze region, January - April 2018



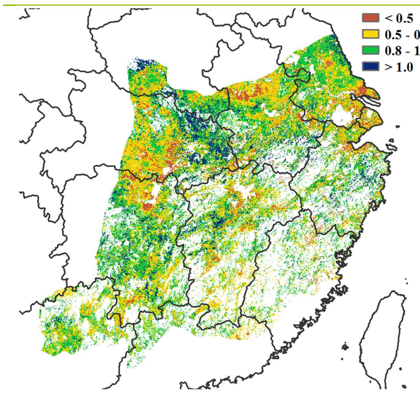
(a) Crop condition development graph based on NDVI



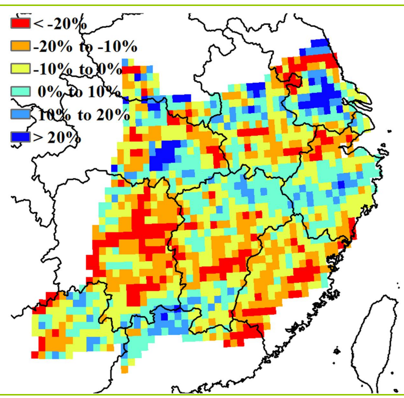
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI



(e) Biomass

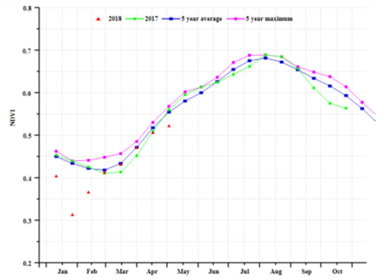
Southwest China

The reporting period covers the booting and heading of winter wheat in southwestern China.

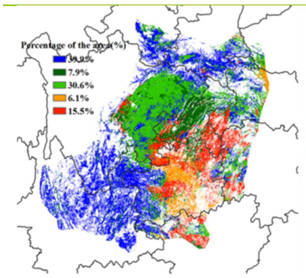
According to the regional NDVI profile, crop condition was partly below average. Rainfall exceed average (RAIN +2%), sunshine was low (RADPAR -6%) while temperature was average (TEMP +0.1℃). Compared to the average of the past 5 years, the cropped arable land fraction was slightly below (CALF -2%) and the potential biomass production index was high (BIOMSS +8%). The maximum VCI was 0.66 indicating mostly average crop conditions.

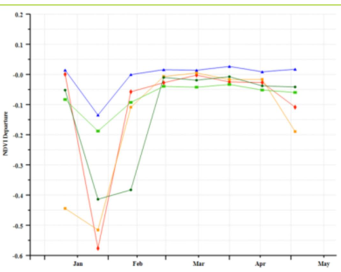
As shown by NDVI clusters and maps, NDVI in the region was close to average from early February to the end of April, except in central-east Guizhou and neigbouring areas in Chongqing; both had already experienced very low NDVI due to abundant precipitation (RAIN +10%, RADPAR -7%) early in the season. In Sichuan, rainfall and sunshine were low but close to average (RAIN and RADPAR -2%). The most favourable profile occurs in Yunnan in spite of low rainfall (RAIN -24%). Altogether, the situation is the region is as yet inconclusive and deserves close monitoring.

Figure 4.11. Crop condition Southwest China region, January - April 2018



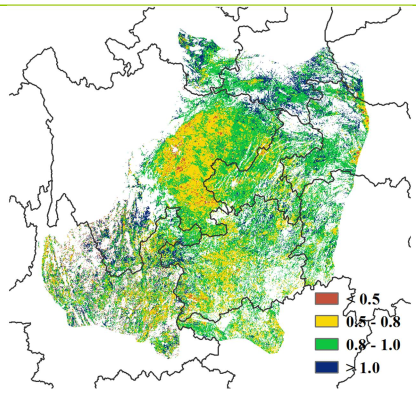
(a) Crop condition development graph based on NDVI

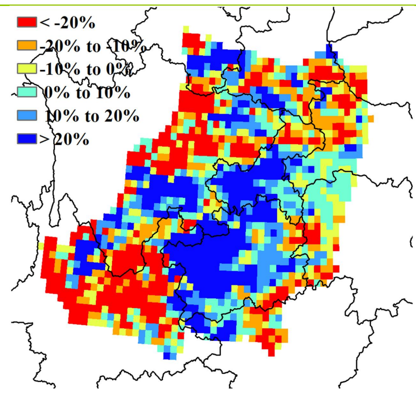




(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles





(d) Maximum VCI

(e) Biomass

Southern China

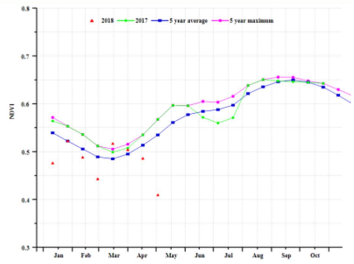
In southern China, the main crop was early rice during the reporting period; the crop was still in the vegetative stage.

Crop condition in Southern China was below average compared with the average of the previous five years. The region recorded average temperature (TEMP -0.2℃) but suffered a deficit of both rainfall and sunshine (RAIN -17%, RADPAR -7%). As a result, the biomass production potential fell as well (BIOMSS -4%), the cropped arable land fraction (CALF) was 3% below average and the maximum VCI (VCIx) was just average at 0.64.

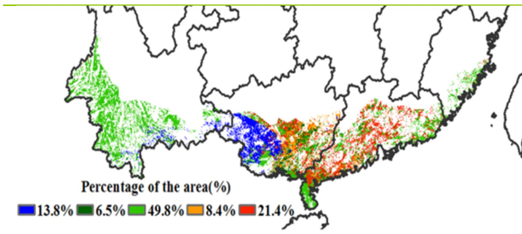
Southern China covers the four provinces of Fujian, Guangdong, Guangxi and parts of Yunnan. In Fujian, rainfall and radiation were below average (RAIN, -23%; RADPAR, -1%), and so was BIOMSS (-18%). Similar conditions prevailed in Guangdong (RAIN -13%, RADPAR -2%). VCIx was below 0.8 in more than half of this province. Guangxi as well had low RAIN and even lower RADPAR (-11% and -10%, respectively). In Yunnan, the rainfall, temperature and radiation were 24%, 0.6℃ and 8% below average, respectively.

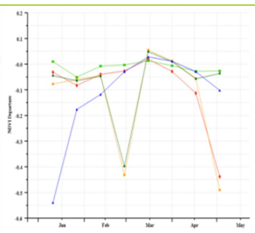
At the time of reporting, crop condition is about average in 70.1% of the arable land in the region, corresponding to south Yunnan, west Guangxi and coastal Fujian. Crop condition is poor (with NDVI more than 0.4 units below average) or planting was delayed in most of Guangdong and south-east Guangxi. The next monitoring period will show if the low NDVI values indicate poor crops or some transient effect.

Figure 4.12. Crop condition Southern China region, January - April 2018



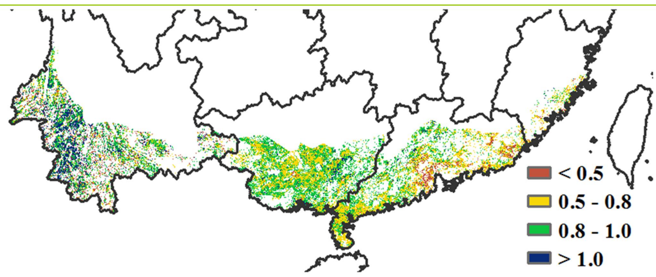
(a) Crop condition development graph based on NDVI



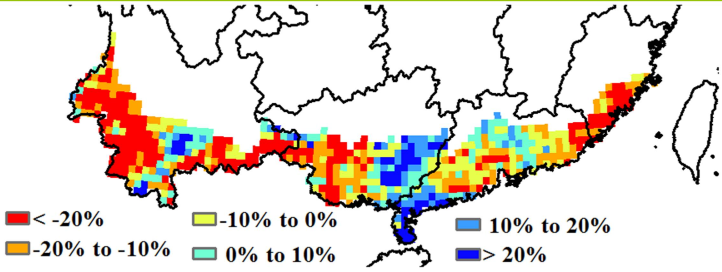


(b) Spatial NDVI patterns compared to 5YA

(c) NDVI profiles



(d) Maximum VCI



(e) Biomass

4.4 Pest and diseases monitoring

Up to mid-May 2018, the precipitation in northern China, eastern and central Huanghuaihai was higher than during 2017, while the temperature was lower. This resulted in moderate occurrence of wheat yellow rust, sheath blight and aphids; the total affected area reached 15.2 million hectares.

wheat yellow rust

The distribution of wheat yellow rust in 2018 is shown in Figure 4.13 (a) and Table 4.4. The total area affected by the yellow rust reached 1 million hectares, with the disease moderately occurring in southern Henan, southern Shaanxi, northern Anhui, and southern Hunan, and slightly in southern Shandong and central Jiangsu.

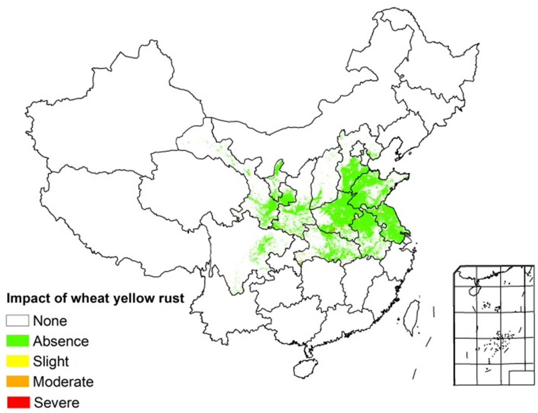
Wheat sheath blight

Wheat sheath blight (Figure 4.13 (b) and Table 4.5) damaged around 6.6 million hectares in mid May 2018, with the disease severely occurring in most of Anhui, northern Jiangsu, and western Shandong, and moderately in central Sichuan, central Shaanxi, and southern Hubei. Slight impact was observed in eastern Gansu, southern Hebei, and central Henan.

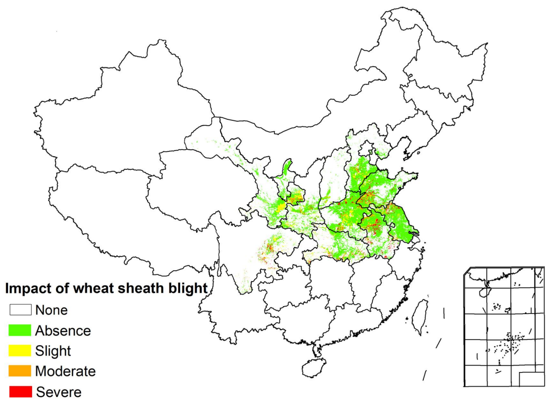
Wheat aphids

The total wheat area affected with aphids (Figure 4.13 (c) and Table 4.6) has reached 7.6 million hectares in mid May 2018, with severe impact in northern Jiangsu, northern Anhui, western Shandong, and most of Henan. Eastern Sichuan, and central Shaanxi had moderate infestation and only slight infestation occurred in southern Hebei, eastern Gansu.

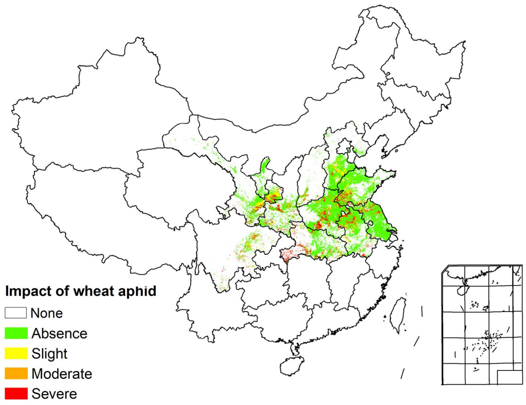
Figure 4.13. Distribution of wheat yellow rust (a), sheath blight (b) and aphids (c) in China (mid May 2018)



(a)



(b)



(c)

Table 4.4. Statistics of wheat yellow rust in China (mid May 2018)

Region	Occurrence ratio (%)			
	Absence	Slight	Moderate	Severe
Huanghuaihai	96	2	1	1
Loess region	95	3	1	1
Lower Yangtze	95	2	2	1
Southwest China	96	2	1	1

Table 4.5. Statistics of wheat sheath blight in China (mid May 2018)

Region	Occurrence ratio (%)			
	Absence	Slight	Moderate	Severe
Huanghuaihai	74	11	9	6
Loess region	71	18	7	4
Lower Yangtze	72	11	10	7
Southwest China	70	15	9	6

Table 4.6. Statistics of rice sheath blight in China, mid to late July 2017

Region	Occurrence ratio (%)			
	Absence	Slight	Moderate	Severe
Huanghuaihai	70	13	10	7
Loess region	67	14	11	8
Lower Yangtze	71	10	11	8
Southwest China	65	12	13	10

4.5 Major crops trade prospects

Imported and exported grains in the first quarter of 2018

Rice

The total imports of rice by China amounted to 0.7752 million tons, a decrease of 11.0% compared to the previous year. The rice mainly stems from Vietnam (46.9% of imports), Thailand (32.3%) and Pakistan

(12.3%). The expenditure for rice import was US$426 million. Total exports over the period were 337,100 tons, mainly 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 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

Maize imports reached 557,300 tons, an increase of 81.8% over 2017. The main suppliers 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, which reached to 700 tons for a value of US$0.2343 million.

Soybean

In the first quarter of 2018, the total imports of soybean were up 0.2% to 19,566,800 tons. 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 will increase by 5.6% and 24.7% respectively in 2018. Due to the price differences at home and abroad, the low production cost of the main import sources (Vietnam , Cambodia, Pakistan and others), and the influence of the China-ASEAN Free Trade Area Agreement, rice imports in 2018 will maintain their growth momentum within the quota range.

Wheat

Wheat imports are projected to increase by 3.4%, while exports will decrease by 7.8%. As a result of the relaxed pattern of global supply and demand, global wheat price increased only slightly. However, due to the persistence of the wheat price difference at home and abroad wheat imports will increase slightly in 2018.

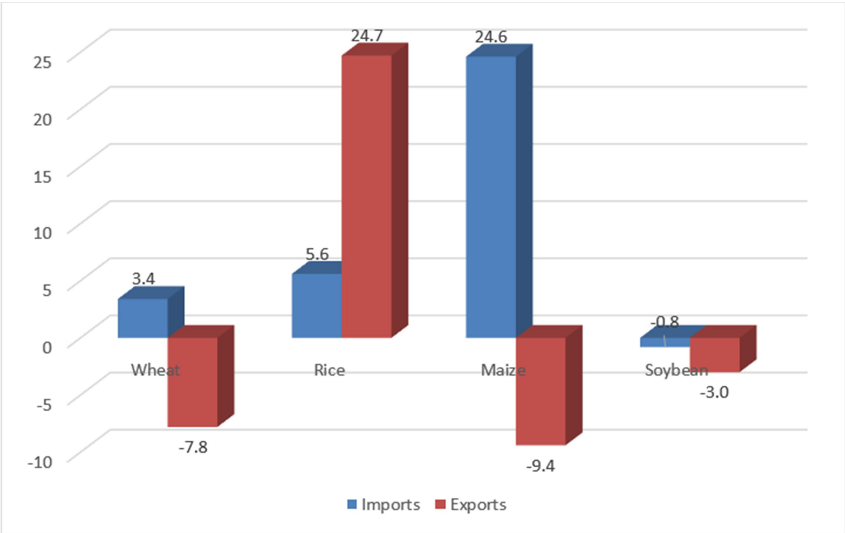
Maize

The model forecasts an increase of maize imports (+24.6%) in 2018, while exports decrease 9.4%. At present, global supply and demand of maize is relaxed, and prices are on a downward trend. Due to the strong demand by the 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 4.14. 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), Mediterranean Agriculture: Features and recent trends (5.3) and an update on El Niño (5.4).

5.1 CropWatch food production estimates

Methodological introduction

Table 5.1 presents the first estimate by the CropWatch team of global maize, rice, wheat and soybeans production in 2018. It is issued at a time when many winter crops in the northern hemisphere are still growing and summer crops are in very early stages, or even to be planted; in the southern hemisphere the harvest of the summer season/monsoon season has been completed.

The estimate is based on a combination of remote-sensing models (for major commodities at the national level) and statistical trend-based projections for minor producers and for those countries which will harvest their crops later during 2017, for which no directly observed crop condition information is as yet available. In the table below, modelled outputs are red bolded. The percentage of modelled production varies according to crops: 18% for maize, 58% for rice, 83% of wheat (most of it being winter wheat) and 43% for soybeans. The share of modelled production will gradually increase and reach to 80% to 90% in the November bulletin.

It is important to note that the current bulletin increases the countries that are monitored in detail from 30 +1 ("1" being China) to 41 +1, to put more emphasis on some African and Asian countries. More countries may be added in the next bulletins. The 41 countries are described in detail in chapter 3 while a whole chapter is devoted to China (Chapter 4). The 41 + 1 countries are referred to conventionally as the "Major producers". "Others" include the 142 countries from Albania, Algeria, Armenia [...] to Venezuela, Yemen and Zimbabwe. The total output for "other" countries was obtained by adding national projections for 2018 rather than projecting the sum. The reason for doing so is that countries sometimes phase out crops for a variety of reasons (e.g. soybean in Macedonia or Syria) and production projections that turn negative can be set to zero. This effect remains hidden when sums are projected.

Production estimates

CropWatch estimates the global 2018 production of the major commodities at 1045 million tonnes of maize, up 1.8% over 2017, 745 millions for rice (up 0.6%), 697 million tonnes of wheat (a 3.2% drop below 2017) and 323 million tonnes of soybeans, virtually equivalent to 2017 (-0.1%). The major producers contribute 960 million tonnes of maize (+1.8%), 678 millions for rice (+0.6%), 629 million tonnes of wheat (-3.5%) and 302 million tonnes of soybeans (-0.5%). The share of the "minor producers" (shown as "Others" in the table) to the global production varies from 6.4% (soybean) to 9.6% (wheat) with maize and rice being at 8.2% and 8.9%, respectively. Compared with the final CropWatch estimates for 2017, the relative importance of "others" has decreased as the percentages were 7.7% for soybean, 15.2% (wheat), 12.1% (maize) and 10.2% (rice as paddy).

Major producers outperform "others" for maize and rice (1.8% Vs. 1.4% and 0.6% Vs. 0.3%, respectively) while minor producers outperform the major producers for wheat (0.5% Vs. -3.5%) and especially soybean (6.4% Vs. -0.5%) which is a common observation showing that more countries are trying to join the closed club of soybean producers dominated by the USA, Argentina and Brazil and some of their south-American neighbours.

Table 5.1: 2018 cereal and soybean productions estimates in thousands tonnes. Although more complex situations do occur in the case of multiple cropping, numbers in black are trend-based while numbers in red generally corresponds to modelled crops that have been harvested or were growing at the time of reporting.

Table 5.1. CropWatch productions estimates, thousands tons

	Maize		Rice		Wheat		Soybean	
	Production (ktons)	% change from 2017	Production (ktons)	% change from 2017	Production (ktons)	% change from 2017	Production (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
Argentina	28819	−3.8	1516	−15.3	15674	−1.4	46942	−8.2
Australia	476	−0.7	490	−29.3	21123	−9.1	80	3
Bangladesh	3124	11.6	46724	3.2	1448	7.7	112	9.3
Belarus	280	−46.0			3033	9.7		
Brazil	86607	3.1	11137	−1.8	6740	7	97495	0.8
Cambodia	196	−42.0	8596	−2.2			186	9.6
Canada	13490	1.4			26691	−13.0	6977	5
China	194108	2.2	200959	0.2	115544	−2.8	14081	2.4
Egypt	6295	6.4	6897	5.4	11730	7	44	12.5
Ethiopia	8929	4.3	160	6.8	4595	9.9	111	6.3
France	12955	−7.0	51	−19.5	38484	1.1	430	19.2
Germany	3695	−11.0			29496	4.9	50	22.3
Hungary	7759	2.6	9	−5.8	5382	2.8	171	12.3
India	26464	2.8	167323	2.6	87584	−6.3	10608	−3.1
Indonesia	17769	−0.1	67665	−1.1			1017	4.9
Iran	728	−27.6	2527	4.9	13529	6.2	147	2.5
Italy	6299	−8.6	1522	0.6	6820	−5.3	1388	14.3
Kazakhstan	888	8.2	467	6.8	14451	−12.9	283	6.3
Kenya	3986	32.9	121	−4.7	156	−10.5	2	−7.0
Mexico	23439	−1.8	278	10.5	3883	3.3	565	12
Mongolia					233	0.7		
Morocco	47	−0.6	62	12.4	6814	−4.0	1	0
Mozambique	2085	2.2	41	−40.4	19	−2.5		
Myanmar	1987	3.9	25790	1.5	126	−8.5	131	6.6
Nigeria	11276	1	6934	4.8	13	−66.0	656	−1.5
Pakistan	6539	5.5	11584	1.3	23946	−1.4		
Philippines	7791	2.2	20950	3.8			1	−2.8
Poland	4877	2.1			12236	11.9	11	29.6
Romania	10863	0.7	36	−9.3	8172	6.5	320	14.9
Russia	18735	7.6	1091	1.7	54264	−7.9	3609	10.7
South Africa	13197	−6.8	3	0.4	1660	−7.2	1036	3.4
Sri Lanka	333	9.8	2501	0.1			9	13.3
Thailand	4685	−1.3	36502	−5.2	1	3.4	11	−4.8
Turkey	7628	7.3	914	0.2	20682	7.9	203	5.2
Ukraine	31492	−1.4			23600	4.1	5280	9.3
United Kingdom					14734	1.5		
United States	380182	2.7	9918	6.5	47399	−13.5	109815	0.2

	Maize		Rice		Wheat		Soybean	
	Production (ktons)	% change from 2017	Production (ktons)	% change from 2017	Production (ktons)	% change from 2017	Production (ktons)	% change from 2017
Uzbekistan	568	8.1	391	7.1	5973	−7.3		
Vietnam	5543	1.1	44765	−1.4			89	−10.8
Zambia	2367	−1.1	19	−21.9	167	−15.2	137	−15.5
Major producers	**959614**	**1.8**	**678281**	**0.6**	**629758**	**−3.5**	**302018**	**−0.5**
Others	85766	1.4	66301	0.3	66829	0.5	20610	6.4
Total	**1045379**	**1.8**	**744582**	**0.6**	**696588**	**−3.2**	**322628**	**−0.1**

Note: Although more complex situations do occur in the case of multiple cropping, numbers in black are trend-based while numbers in red generally corresponds to modelled crops that have been harvested or were growing at the time of reporting.

Maize

As for the other crops in table 5.1, the discussion concentrates on actual numbers (those in red) rather than on statistical projections (black). Countries that experienced large production increases include mostly Egypt (+6.4%) and Brazil (+3.1%) , one of the largest global suppliers of the crop (3rd exporter worldwide). The second largest exporter (Argentina) suffered a drop in maize output of 3.8% due to drought in the northern provinces, which affected as well adjoining areas in Uruguay and Brazil.

The spectacular production increase in Kenya (+32.9%) is due to two factors: dry conditions in 2017 and a recent wet spell in the country, which has favoured the early planting and development of long rains maize. Although the abundant precipitation has provided needed soil moisture and may have a lasting effect on crop condition, the final outcome of the “mahindi” season will depend on the development of the ongoing long rains.

Mixed conditions prevail in southern Africa where maize is a main staple. South Africa is an important exporter (10th worldwide) but suffered a reduced output 6.8% below last year’s. Neighbouring Angola and Mozambique are both up (+4.1% and +2.2%, respectively) but Zambia is down (-1.1%).

Also to be mentioned: Mexico had a drop in maize production of 1.8% and the Philippines, a minor producer when considering the maize potential in the country is up 2.2%.

Rice

A major observation is the generalised drop in rice production in South-East Asia, starting with Cambodia (-2.2%), Indonesia (-1.1%), Thailand (-5.2%) 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 countries export capacity.

Wheat

Good actual satellite data are available for northern hemisphere wheat. Some of the southernmost countries (India, Pakistan, Bangladesh, 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 unfavourable 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 unfavourable 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%,), Iran and Turkey (+6.2% and +7.9%, in both countries the first favourable 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 wheat crop is to be added to increased maize and rice productions.

Soybean

In the northern hemisphere the crop 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 2017. 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 (+1.4% Vs. +1.8% 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. Comparison of 2018 and 2017 production of top 5 and top 10 importers and exporters as well as the change in the offer and demand for the top 10 importers and exporters between 2017 and 2018

	Maize		Rice		Wheat		Soybean	
	Prod. (ktons)	% change from 2017	Prod. (ktons)	% change from 2017	Prod. (ktons)	% change from 2017	Prod. (ktons)	% change from 2017
5 top importers	223922	1.9	30603	3.9	28540	2.0	14700	2.8
10 top importers	231078	1.6	301695	0.3	36303	1.3	17406	3.8
Δ demand ktonnes	-3629		-912		-452		-637	
5 top exporters	540054	1.9	270091	0.9	187961	−8.6	271751	−0.8
10 top exporters	604013	1.8	311341	0.7	279354	−5.8	298282	−0.4

	Maize		Rice		Wheat		Soybean	
	Prod. (ktons)	% change from 2017	Prod. (ktons)	% change from 2017	Prod. (ktons)	% change from 2017	Prod. (ktons)	% change from 2017
Δ offer ktonnes	10548		2103		−17296		−1073	

Note: in addition to the 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.

5.2 Disaster events

According to a recent report issued earlier this year by the European Academies Science Advisory Council (EACSAC 2018) global floods and extreme rainfall events have increased more than 50% this decade. The increase is more than fourfold compared with 1980. For abnormally high temperature, of which agricultural drought and fires are a usual consequence, the increase over 1980 is more than twofold. Most of the changes can now be clearly assigned to climate change and resulting deep impacts, e.g. on ocean currents.

We also need to mention, according mostly to ReliefWeb, that several Caribbean Islands (Haiti, Dominica, …and even Puerto Rico) are still struggling with the consequences of Hurricanes Irma (September 2017) and especially Maria (September-October 2017) . The damage due to the cyclones is highest in US$ terms in US territories (e.g. 90 billion in Puerto Rico for Maria) because of the high value of lost infrastructure. In terms of long-term deterioration of living conditions, the damage caused by Maria in Dominica, however (1.4 billion US$) is considerably larger.

This section also tends to focus on atmospheric disasters because their impact on food production tends to be larger than the impact of lithospheric disasters such as earthquakes and volcanic eruptions. It remains, however, that the Papua New Guinea 7.5 magnitude earthquake of 25 February needs to mentioned as more that 500,000 people were strongly affected. The tremor was the largest earthquake recorded in the region since a similar event in 1922. Two months after the event, 270,000 people were still in need of assistance across four provinces and close to 45,000 remained displaced. Major problems include water supply as landslides and landslips destroyed many traditional water sources (UNDP 2018).

Disasters by category

Globally, the impact of disasters was relatively limited this reporting period.

Heat and fire and drought

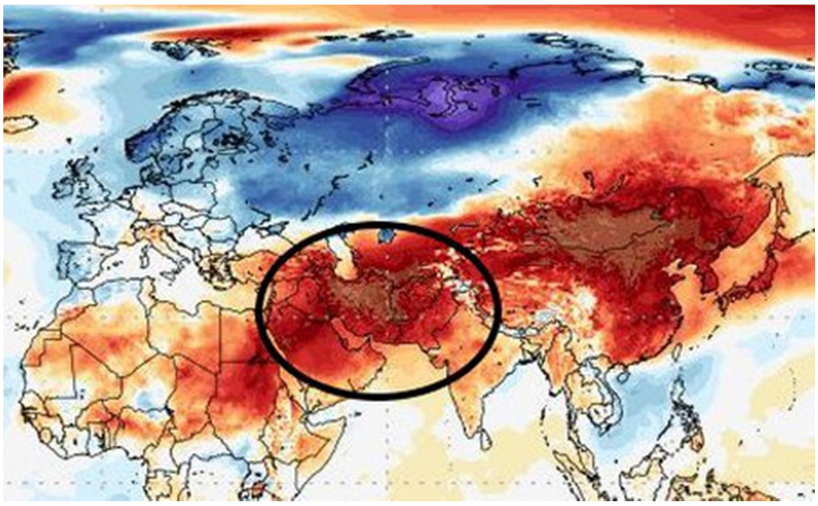
Drought, that has been affecting parts of Australia for months continued into the current reporting period with the Tathra (New South Wales) bush-fires destroying many homes.

The most serious drought in terms of agricultural impacts, however, occurred from the beginning of 2018 in parts of Latin America, lasting into March and early April. In Uruguay, the most severely affected Departments are Tacuarembó, Salto, Durazno and parts of Artigas, Paysandú, Rivera and Río Negro. Lack of water has considerably reduced available areas for growing crops and raising livestock, and is likely to continue affecting food supply. The National Emergencies System (SINAE) warns that the drought – which is possibly linked to La Niña – might last until the middle of the year or beyond. In Argentina, the State of Entre Rios, which borders Uruguay, was declared agricultural disaster area on for one year, on 27 March.

A significant heatwave was reported from parts of Europe but mostly from Asia in March-April, centered over Iran but extending eastward into Pakistan and as far as Japan and westward into north-east Africa. Long term temperature records were broken in many countries, reaching 45.5°C in Pakistan (mostly in

Sindh province), 43.8°C in Iraq, 40.2°C in Turkmenistan, 37.2°C in Uzbekistan and 35.3°C in Tajikistan. Thousands are deemed to have died due to heat stress. Some impacts on crops are likely but no early estimates cold be located.

Figure 5.1. "Center" of March-April heatwave



Source: https://mashable.com/2018/04/03/severe-heat-wave-asia-monthly-records/

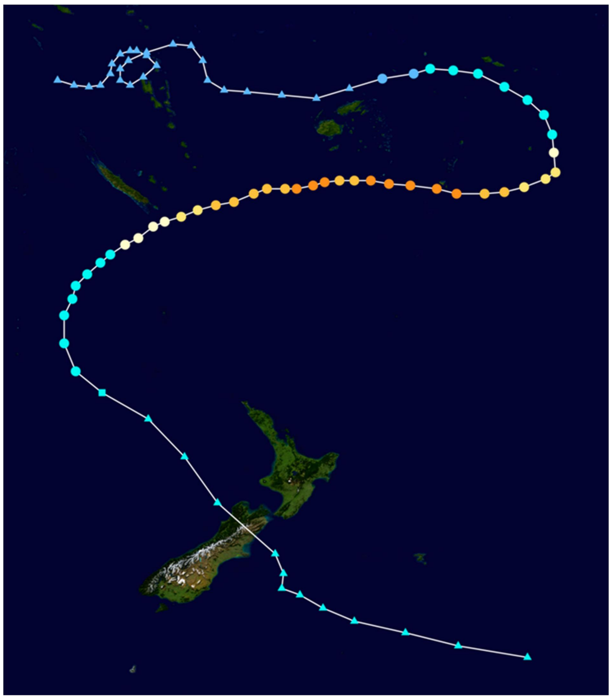
Cold wave

The United Kingdom and Ireland were affected by a late winter cold that lasted from late February to mid-March. Storm Emma, which caused 93 casualties was part of this event which the media nicknamed “the Beast from the East” (Wikipedia 2018).

Cyclones

Between 3 and 22 February an intense tropical cyclone (Gita, Figure 5.2) affected Vanuatu, Fiji, Wallis and Futuna, Samoa, American Samoa, Niue, Tonga, New Caledonia, Queensland and New Zealand causing damage for about 200 million US$. The cyclone brought mostly rainfall, floods and strong winds (230 km/h in Tonga), destroying houses and infrastructure, and most seriously affecting Tonga. Crops were damaged in parts of Fiji but mostly in Tonga (75% of the cyclone’s total losses: 150 million US$). Gita is the most severe cyclone ever recorded in Tonga. In addition to agriculture, the cyclone caused extensive damage to buildings (private and public) and infrastructure (water supply, transport and communication infrastructure). Some 50,000 people were affected.

Figure 5.2. Track of cyclone Gita



At the beginning of February, the precursor of Gita "looped" over Vanuatu and then moved east and back west passing north of Fiji on 8 Feb and south of the island on 11 Feb. It collapsed on 22 Feb south-east of New-Zealand. Source: Wikipedia 2018

Additional cyclones occurred in the Pacific area but did not cause serious damage.

Floods

Significant floods are reported from Europe and Asia, seriously affecting the east of the continent at mid-March, for instance Belarus and the southern part of European Russia (Volgograd Region), as a result of rapid snow thaw and run-off of meltwater into riverbeds. In Russia, 11,550 people were assisted by the Russian Red Cross Society. Still in Russia, at the end of March, floods were reported from the Altai Krai.

The most serious floods are those that occurred in Africa, affecting large areas in the Horn of Africa, starting at the beginning of March heavy rain fell over the centre and south causing floods, flash floods and killing 15 people. In Mandera county, at least 750 homes were swept away and an estimated 4,500 people have been displaced. The above-normal precipitation constitutes an early start to the March to May “long rains” and, in spite of the damage caused, provides badly needed relief after a long period of drought. The same rains also caused concern and some damage in neighbouring Rwanda.

In early April flooding and landslides occurred in Burundi. A week later, heavy rains resulted in flash floods in Somalia creating damage and stressing refugees living under difficult conditions but resulting in few casualties. About 30,000 people were displaced. In Ethiopia flash flood left hundreds of thousands of people in need of immediate humanitarian support in Afar, Oromia and Somali regions. Several villages lost their crops at flowering stage, far too late for replanting. Many people’s houses and livestock have been washed away. Kenya was affected by floods in April too, mostly in the semi-arid eastern parts bordering Somalia. In the south, abundant rain fell over the northern half of Tanzania from mid-April. ,

Floods are ALSO reported from southern African in Botswana at the end of February.

5.3 Mediterranean Agriculture: Features and recent trends

Overview

The Mediterranean Sea covers about 2.5 million km². It is bordered by just under 20 countries and territories[1] and about 3500 islands of various sizes in Europe (EU), Africa (AF) and Asia (AS).

The countries of the Mediterranean area have much in common, starting with history. The Ottoman empire englobed all of it at the end of the 17th century, except Italy, the Iberian peninsula and Morocco. At the end of the second century, all of the region was part of the Roman empire, to the extent that the Romans used to call the Mediterranean "Mare nostrum" ("Our sea"). Today, the phrase is often used in the ambit of exchanges and cooperation among Mediterranean nations (Wikipedia 2018a) to stress the commonalities among them. This is also the spirit that led to the foundation of the International Centre for Advanced Mediterranean Agronomic Studies 1962 (CIHEAM 2018), a Mediterranean intergovernmental organisation devoted to the sustainable development of agriculture and fisheries, food and nutrition security and rural and coastal areas. There are several other Mediterranean institutions, such as the Union for the Mediterranean (Wikipedia 2018b) and the Parliamentary Assembly of the Mediterranean (Wikipedia 2018c)

The region is home to about 440 million people (282 million live in rural areas) and the population grew 11% from the early 21st century[2] (16% in rural areas). The current average rate of urbanization (64%) hides a large disparity with the lowest values in Bosnia-Herzegovina (36%) followed by a group of countries close to 50% (Albania, Egypt, Slovenia, Syria) and three countries close to 90% or above (Israel, Lebanon and Malta).

Population age structure varies significantly among countries. The percentage of people younger than 15 years is 14% in Italy and Portugal, but 32% and 37% in Egypt and Syria, respectively. People above 65 years, on the other hand, make up about 20% of the population in Italy and Portugal, but only 4 to 5% in Egypt and Syria. Average values (about 20% in the below 15 group and 12% in the above 65 age class) do occur in Cyprus and Albania. The age structure provides a very straightforward stratification of the Mediterranean countries from "very young" (Syria, Algeria, Tunisia) to "middle-aged" (Lebanon, Israel and most former Yugoslav republics) to "old" (Spain, Croatia, Italy). Refer to Eurostat 2015 for additional information about the Region's age structure. As confirmed by net migration numbers available from the website of the World Bank (2018), the different age pyramids is one of the factors explaining ongoing and future population movements from south and east to north across the Mediterranean.

The share of agriculture in the GDP currently stands at 6.8% (2009-16 average) for the region, a decrease of about 17% since the turn of the century in the region. Agricultural shares of GDP above 10% occur in Albania (22%), Morocco (10%), Egypt (12%) and Algeria (11%). The lowest values (2% and below) are those of Slovenia, Italy, Israel and Malta and the highest is found in Algeria (+17%). The largest decreases were recorded in two islands with sometimes atypical development patterns (Malta -33%, Cyprus -32%) followed by a random mix where Lebanon (-24%) tops the list which has Italy, Israel, Tunisia and Morocco at -11%, -9%, -5% and -1%, respectively.

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[1] Albania* (EU), Algeria* (AF), Bosnia and Herzegovina (EU), Croatia (EU), Cyprus (AS), Egypt* (AF and AS), Greece* (EU), Israel (AS), Italy* (EU), Lebanon* (AS), Libya (AF), Malta* (EU), Morocco* (AF), Occupied Palestinian territory (State of Palestine: Gaza Strip and West Bank, AS), Portugal* (EU), Slovenia (EU), Spain* (EU), Syria (AS), Tunisia* (AF) and Turkey* (AS and EU). CIHEAM members (which also include France) are marked by an asterisk. When the text refers to "the Region" (capital R) the list above is intended. The list is conventional. France was omitted because only the south is Mediterranean. Other countries for instance Macedonia, Serbia, Montenegro, parts of Iran do have a "Mediterranean tendency" (climatically) although they do not border the sea.

[2] The phrase "percent change from the early 21st century" is used repeatedly in this note. It refers to the percent change from the 2001-2008 average (or total) to the average (or total) of the period from 2009 to the most recent data available, which can vary from 2013 to 2016. Similarly, quoted variables correspond to 2009-onwards sums or averages.

Environment and agriculture

It is environment and landscape, however, which constitute the most typical common features across the Mediterranean areas, in particular the semi-arid climate characterised by winter precipitation and summer dryness. Winters tend to be mild and winter crops can grow almost everywhere. Summer crop cultivation is more problematic.

The region has many hill and mountain areas which lead to rather complex climatic and cropping patterns. To some extent, the mosaic of micro-climates is typical of the Mediterranean area. Some of them are unique; for instance, it is not uncommon that bananas and temperate fruits (such as plums and apples) grow together in the highlands of southern Morocco. Steep local environmental gradients and ecological patchiness contribute to the region's diversity and make it relatively safe are in terms of food security.

Figure 5.3. Excess of annual rainfall over annual potential evapotranspiration (mm) over the Mediterranean area. Based on rainfall from Hijmans et al (2005) and PET from Trabucco et al (2009)

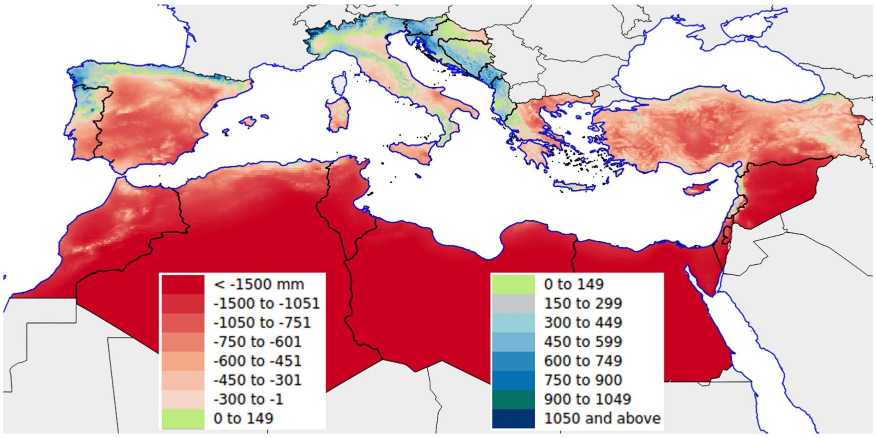
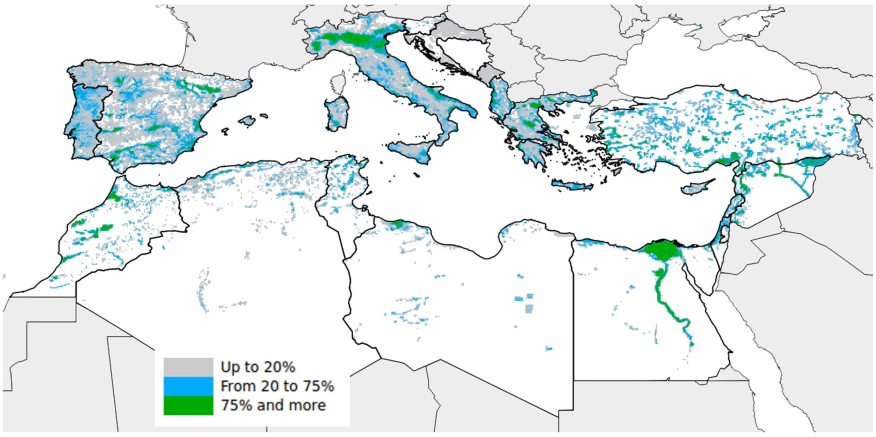


Figure 5.4. Irrigated areas x over the Mediterranean basin. Values are expressed in % of pixel area. Based on data from GMIA 2016



Paradoxically, irrigation plays a limited role in the region, with about 13 million Ha of irrigated land, which is about 6.0% of the total agricultural land (216 million Ha). The percentage of irrigated land remained stable since the first years of the century, i.e. both total agricultural land and irrigated land dropped by about the same percentage (2.2% and 2.3%, respectively). With the exception of Egypt, where virtually all land is irrigated, the percentages of irrigated land are close to 20% or above in Albania (17.4%), Italy (18.3%), Cyprus and Malta (21.3% and 34%). The average mentioned above (6%) essentially results from most values being close to 10% (Turkey, 13.5%) with very low irrigation percentages is some countries, e.g. Bosnia and Herzegovina.

It is likely that, in the near future, irrigation will become more common in the Region. As repeatedly mentioned in the previous CropWatch bulletins[3] , the Mediterranean area appears to be undergoing a relative aridification that affects the whole Basin (Figure 5.5). This may be a general “weakness” of Mediterranean climates as long-term drought is observed as well in other areas with Mediterranean climates, such as California, parts of Southern Africa and Australia.

Figure 5.5. A near-empty water reservoir in Cyprus in 2016. Source: Guardian 2016

According to data available in FAOSTAT, the region undergoes a marked warming: 2001-8 winter temperature (DJF) exceeded the 1951-80 reference values by 0.8°C. For 2009-16, the change is 1.1°C in Winter and a rather significant 1.7°C in summer (JJA). In winter, the largest changes occur in the north-east and east (Slovenia, Syria and Turkey) while summer heat-waves seem to have become the norm (e.g. +2.0°C and more in Bosnia, Croatia).

The Mediterranean crops “package”

The Mediterranean area and the near east are among the main centres of origins of cultivated crops (Daminia et al 1998). About 85 crops are of “Mediterranean” and “near-eastern” origin and are often treated as a category of plants that tend to grow in the same areas (Patterson and Josling 2005); they constitute the “Mediterranean plant package” and are at the basis of the “Mediterranean diet[4]”, with cereals, typical fruits and herbs. Plants that originated in the Mediterranean and Near-East include wheat, rye, oats, and barley, as well as many forage plants (including legumes) but mostly vegetables and fruits, not to mention other typical products such as cheese. In fact, Patterson and Josling consider the following among the typical “Mediterranean” plants of major economic importance: olives, tree nuts (e.g. pistachios, almonds, hazelnuts) , grapes and wine, tomatoes and citrus. Olive trees and oil, the most typical markers of the Mediterranean package are often used to define the region.

Table 1 illustrates some recent changes that have occurred in the production and trade in the region. For many commodities, the percent change in export values by far exceeds the change in production, indicating the increased focus of the region on exports and the high value of Mediterranean products.

[3] In August 2016, a special feature was devoted to drought in Morocco (CropWatch, 2016).
[4] Not all ingredients typical of the "modern" Mediterranean diet are of Mediterranean origin, e.g. tomatoes.

Table 5.3. percent change from the early 21st century of some production and export statistics in the Mediterranean region

Product	Production	Value of exports	Exported Product
Cereals	3.8	73.8	
Barley	−4.2	−17.5	
Potatoes	15.1	43.8	
Soybeans	43.4	446	
Vegetables	10.7	63.4	
Sugar beet	−3.9	114.6	Sugar
Sugar cane	−5.7		
Citrus	17.3	61.2	Orange
			Tangerine
			Clementine
		74.3	Other citrus
Grapes	0.1	60.9	Grapes
		87.7	Grape juice
Whole hazelnuts	−8.8	36.33	Shelled hazelnuts
Pistachios	40.4	141.3	
Olives	11.8	24.2	olive oil
Tomato	8.4	40.54	Tomato juice
		54.74	Tomatoes as fruit

The production of some traditional and popular crops in the Mediterranean region, such as barley (mostly grown as winter crop in north Africa and the Middle East; Algeria is the major producer with 1.4 million tons) and sugar crops have been decreasing. In the case of sugar, it is probably the EC Common Agricultural Policy (CAP[5]) and stagnating prices during the first decade of the century that have reduced the appeal of growing sugar crops. In fact, after a peak in 2012, sugar prices have been low again. For soybean, for instance, prices varied between 400 US$ and 1000 US$ per ton between 2001 and 2008, but reached 1800 US$ per ton in 2013, resulting in high average values between 2009 and 2016 (Trading economics website). A large fraction of the listed trade actually regards exports to the European Union by southern Mediterranean countries.

In the case of barley, an important source of straw used as cattle feed, the crop has often been replaced by winter wheat while other sources of feed (e.g. soybeans) are used more frequently. The production of coarse grains, which include mostly maize (and some barley) in the region, has undergone a modest increase of 2.3%. The region has four significant producers of maize (million tonnes), two in the north (Italy 8.1, Spain 4.2), one in the east (Turkey 5.2) and only one in the south (Egypt 7.7)

The typical Mediterranean commodities from citrus to tomatoes are doing well, and are frequently seen as a natural way to reduce production risk through increased diversification. It is stressed that the listed

[5] For a general overview of the CAP's effect on the Mediterranean countries, refer to Cakmak 2013 and De Castro and di Mambro 2013

products are just some of the very typical ones. There are dozens more that all occupy niche markets and remain in high demand, including for instance herbs and spices (e.g. peppers and saffron) , and products such as dates (+124.9% export value) or figs (+11.6%) and many other dried fruits. Dried fruits have relatively long shell-lives using traditional technology. They can be produced at low cost thanks to the dry climate in unsophisticated environments and provide small-scale farmers with regular and dependable income. Even tomatoes are traditionally dried in many areas.

Exports of fresh fruits are also increasing, although they are more difficult to handle, due to cost of storage and food safety risks. This results in situations where the qualitatively different micro-productions continue to thrive while the production of the basic sources of calories (especially wheat) cannot keep pace with growing demand in much of the Near East and North Africa, basically because of shortage of land (Zdruli and Lamaddalena, 2014). The countries seriously affected by the land gap include mainly Egypt, Turkey and Tunisia (Mediterra 2008). As a result, many Mediterranean countries are now net importers of food (Hallam and Balbi 2012). In the words of Marty et al (2016) "the demand for agricultural products increased six fold from 1961 to 2011 in the Middle-east and north-Africa region, as a result of the population's growth combined with a pronounced nutritional transition, the domestic supply rised only fourfold, partly due to the region's severely limited land and water resources.

Nevertheless, FAO 2015 report stresses that there is a general shift towards high-value exports in developing countries, as indeed observed in several Mediterranean developing countries, which somehow conterbalances the unfavourable situation of wheat.

The values in the table hide large disparities among countries, including for instance large decreases in potato production in some countries that used to be part of Yugoslavia (Croatia -53%); others report production increases (Albania +133%, Morocco +21% and Algeria +133%). Soybean has difficulties establishing itself in the area and sizeable amounts are produced only in Turkey (125 thousand tonnes), Croatia (150 thousand tonnes) and Italy which lead the producers in the region with 720 thousand tonnes.

Olives, tomatoes, grapes and citrus

All countries in the region produce olives, which is a mainstay of agriculture for most of them (Figure 5.6 (A)). By far the largest producer is Spain (6.5 million tonnes), followed by Italy (2.8), Greece (2.3), Turkey (1.6) and Morocco (1.3) . Cultivated areas remain stable or increase everywhere, especially in former Yugoslavia (Bosnia and Herzegovina +120%, Croatia +40%) and in north-west Africa (Algeria +49%, Morocco +69%). Production tends to decrease in some areas due the neglect or preference for other crops, but mostly due the combined effect of drought and disease, in particular the bacteria Xylella fastidiosa in Italy where production dropped 21% (Figure 5.6(B)). Yields are down in more than 50% of the Mediterranean countries.

The four major tomato producers with an output in excess of 4 million tonnes include Spain (4.4 million tonnes), Italy (6.6 million tonnes), Egypt (8.5 million tonnes) and Turkey (11.5 million tonnes) are followed by four countries in the range of 1 million tonnes (Portugal, Morocco, Tunisia and Greece). Production is up everywhere, sometimes significantly so (Tunisia +34%, Portugal +39%) while drops occurred in Greece (-27%) and in Italy (-8%). This refers to industrial tomato production; it is stressed, however, that tomato is an extremely popular crop in the Mediterranean region and that actual output from countless home gardens is not included. As a result, the total production of 39.0 million tonnes underestimates actual output by at least a factor 2.

Figure 5.6. (A) Olive trees are very long lived and often become huge and spectacularly beautiful. Two 6000 years old olive trees growing in Bechealeh in northern Lebanon. They are part of a group of 16 nicknamed "the sisters" (Sisters 2018); (B) An olive tree infected by Xylella fastidiosa in southern Italy (New York Times 2018)

The largest areas cultivated in grapes are those of Spain (just under 1 million Ha), followed by Italy (715 thousand hectares) and Turkey (466 thousand hectares). Remaining countries, with the exception of Portugal (179 thousand hectares) are all below 100 thousand hectares. Grapes are mostly used for wine production and, in the European Union, it is subject to complex policy measures under the Common Agricultural Policy. Like olives and, to some extent tomatoes and citrus, quality of grapes is often a more important factor than the volume. Like olives, grapes are also one of the crops that potentially generate much income per Ha, especially as table grapes. In the Mediterranean context, few crops outperform grapes in terms of income, except some nuts (hazelnuts, pistachios) and some orchard fruits. Yet, the area dropped 12% since the beginning of the century, while production stagnated. Areas increased essentially in countries where wine production is marginal or illegal (Algeria, Egypt, Israel and Bosnia Herzegovina, +6.2 to +18.9%). Three of them (Egypt +13.4%, Bosnia Herzegovina +38.7% and Algeria +78%) are also among the countries where production increased. Others include Morocco (+16.4%), Tunisia (+21.6%) and Albania (+70.4%).

Citrus cultivation (area) recently increased 9.8% in the Region; production increased to 24.3 million tonnes, up 17% compared with the first years of the century. Areas increased from Turkey to Morocco (between +15% and +35%), and in Croatia. Three of the four major producers (output larger than 3 million tonnes) increased their output (Spain +6.6%, Egypt +21.7% and Turkey +15.2%) while Italy suffered an 8.3% reduction.

Organic agriculture

There is a large increase in demand for organic food production. While production may be riskier, the benefits accrued along the food chain are larger than for "chemical" crops. The statistics about organic production have been assembled by FAO for about 15 years but numbers remain imprecise because organic standards themselves, certification and reporting requirements of organic production may vary from country to country. The Mediterranean currently has 10 to 15 million hectares of organic agricultural areas, an increase of 17% between the years 2001-2008 and 2009-2016. The area includes all agricultural land uses, including pastures and concentrates in Greece, Turkey and Italy.

Livestock

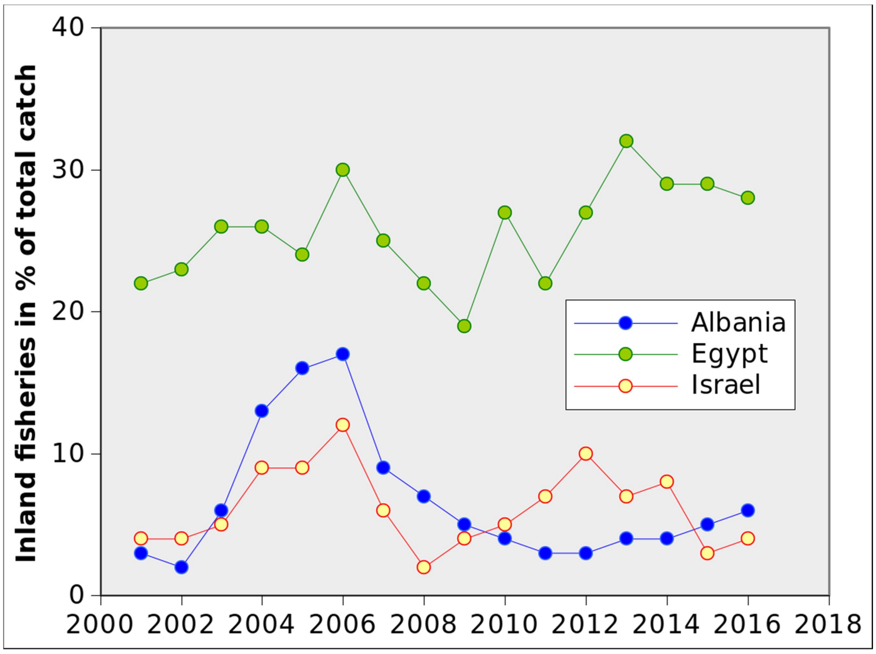
The Region currently counts about 190 million sheep and goats (about 75% are sheep) , 45 million of pigs and the same number of large ruminants (cattle and buffaloes). Camels are less than 1 million and farm birds number 1.4 billions. All have increased their numbers between 3% and 4% since 2001, with chickens and camels growing 16% and 19%, respectively. The largest countries have the largest herds and numbers of bird and pigs, with a clear "leader" for every type of animal: 13 millions for cattle in Turkey, with Spain, Italy and Egypt at 6, 6 and 5 millions, respectively; 270 million chickens in Turkey and 181 millions in Morocco; 27 million pigs in Spain, followed by 9 millions only in Italy; Turkey leads the flock of sheep and goats (34 million heads) followed by Algeria and Morocco (30 million and 24 million, respectively).

The regions uncontested animal production leader is Turkey and recent growth rates of the sector indicate that Turkey will consolidate its position for beef cattle (+22.2% since the turn of the century), sheep and goats (+5.5%). Chicken numbers underwent a slight decrease (-2.5%) and pigs fell 32.6%. Countries with significant animal production increases include Algeria (cattle +19.5%), Lebanon and Albania (both up more than 60% for chickens), Albania and Syria for pigs (+160% and +47.8%, respectively). Small ruminants are up 36% in Algeria.

Fisheries

The section above stressed the relative increase in high value exports in the Mediterranean region. One of those high-value products is fish. Based on the average 2014-16 catch, Morocco and Spain dominate the fishing industry in the Mediterranean area with productions reaching about 1.4 million tonnes and 0.9 million tonnes, respectively. They are followed by Turkey (278 thousand tonnes), Portugal (166 thousand tonnes) and Italy (130 thousand tonnes) and, decreasing from 95 thousand tonnes to 25 thousand tonnes by Tunisia, Algeria, Egypt, Croatia, Greece and Libya. Other countries are all below 5 thousand tonnes.

Figure 5.7. relative share of inland fisheries among the three main Mediterranean freshwater fish producers



Inland fisheries play a minor part in most Mediterranean countries (Figure 5.7), among others because of limited water availability. The only countries where they play a part include Greece (about 1% of the total catch) and Turkey (about 2%) but mainly Israel (between 2 and 10%), Albania (currently at 6% but at 17% ten years ago) and, naturally, Egypt where a stable contribution of Nile fish reaches about 30% of the total catch.

Summary

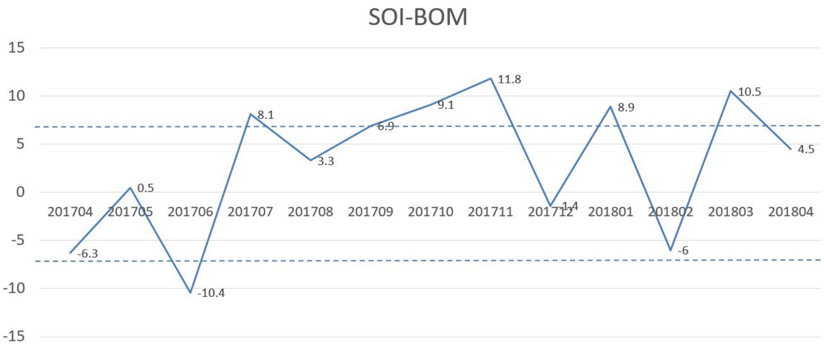
Due to semi-arid climate with winter rainfall and other factors, there is a marked homogeneity of farming across the Mediterranean region, which has been affected probably more than other areas by global warming. One commonality is the “Mediterranean package” of crops, especially fruits and vegetables, of which many originated in the area. Typical products include olives, citrus, tomatoes and grapes and constitute the mainstay of smallholder and industrial farmer’s income. They are all high-value crops and the region has successfully developed their exports. Productions are growing as demand changes (e.g. in organic food) but also as the region diversifies exports, for instance table grapes and grape juice instead of wine. Next to the success of typical Mediterranean exports, the region cannot keep pace with the demand for some basic foods: cereal production grew 4% while population increased 11% since the beginning of the century. The production of chickens outpaced population growth (+16%) but other meat production increases are comparable to the modest increase in cereals. In terms of livestock, Turkey clearly dominates the Mediterranean production landscape for almost all products. Current trends indicate that the country will maintain or consolidate its position while at the same time the agricultural import dependence of the Middle-East and North Africa region is likely to continue to rise through 2050 (Marty et al 2016).

5.4 Update on El Niño

El Nino conditions have been neutral across the Pacific Ocean during the first quarter of 2018. Figure 5.8 illustrates the behavior of the standard Southern Oscillation Index (SOI) of the Australian Bureau of Meteorology (BOM) from April 2017 to April 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 increased from -1.4 in December to +8.9 in January, decreased to -6.0 in February, then jumped to +10.5 in March and decreased again to +4.5 in April. The overall fluctuation of SOI between +7.0 and -7.0 indicates that neither El Niño nor La Niña appeared in the tropical Pacific Ocean. Australian BOM reports a neutral state at current stage and from a global point of view. CropWatch will keep on monitoring its condition.

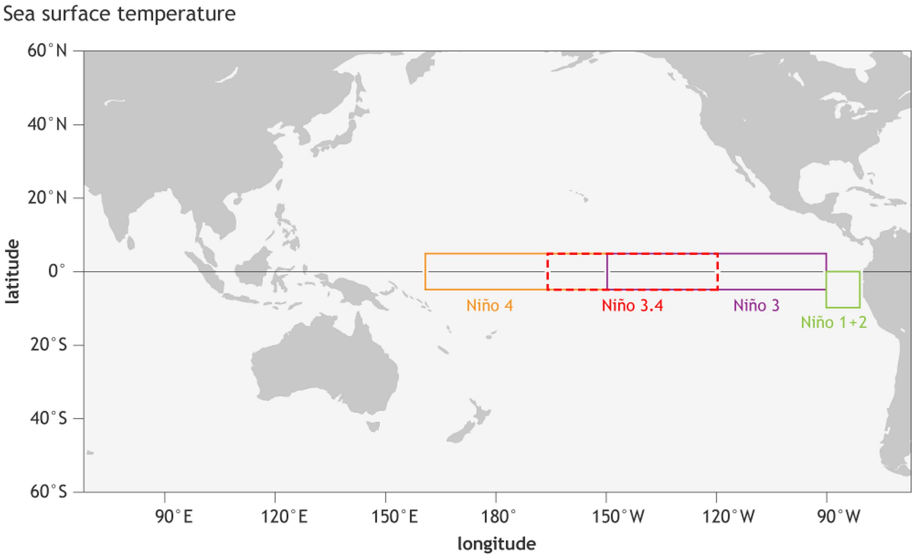
Figure 5.8. Monthly SOI-BOM time series from April 2017 to April 2018



Source: http://www.bom.gov.au/climate/current/soi2.shtml

The sea surface temperature anomalies in April, 2018 for NINO3, NINO3.4 and NINO4 regions are −0.2°C, −0.3°C, and +0.1°C in sequence, slightly cooler than 1961-1990 average according to BOM (see Figure 5.9-5.10). Both of BOM and NOAA posit that the cool sea surface temperature indicates that El Nino conditions are neutral during the southern autumn, and will probably continue into the following winter (N. hemisphere summer).

Figure 5.9. Map of NINO Region



Source:https://www.climate.gov/sites/default/files/Fig3_ENSOindices_SST_large.png

April 2018 sea surface temperature departure from the 1961-1990 average.

Annex A. Agroclimatic indicators and BIOMSS

Table A.1. January-April 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	492	-4	25.4	-0.5	1097	-4	1517	0
C02	East African highlands	254	16	19.7	-1.3	1231	-4	799	6
C03	Gulf of Guinea	219	15	28.1	-1	1093	-11	716	12
C04	Horn of Africa	442	26	23.8	-1.5	1203	-6	1165	13
C05	Madagascar (main)	1113	11	24.4	-0.8	1048	-3	1978	2
C06	Southwest Madagascar	274	-46	25.2	-0.8	1267	5	987	-26
C07	North Africa-Mediterranean	139	-11	11.7	-0.4	874	-9	497	-8
C08	Sahel	26	1	29.3	-0.8	1312	-4	80	-9
C09	Southern Africa	546	8	23.9	-0.6	1159	-1	1363	2
C10	Western Cape (South Africa)	103	-5	19.3	-0.3	1238	-4	410	-6
C11	British Columbia to Colorado	245	15	-3	-0.1	723	-7	467	-2
C12	Northern Great Plains	165	-7	-2.2	-2.2	758	-4	455	-20
C13	Corn Belt	440	26	-0.1	-0.7	667	-8	659	-8
C14	Cotton Belt to Mexican Nordeste	365	-3	11.6	-0.7	848	-5	969	-7
C15	Sub-boreal America	145	9	-10.2	-1.3	602	1	297	-15
C16	West Coast (North America)	226	-23	7	0	752	-6	666	-8
C17	Sierra Madre	75	6	16.3	0.2	1225	-3	289	3
C18	SW U.S. and N. Mexican highlands	74	-11	10	0.8	1024	-4	317	-10
C19	Northern South and Central America	279	12	25.9	-0.7	1061	-2	741	10
C20	Caribbean	285	45	23.8	-0.7	1057	-3	824	30
C21	Central-northern Andes	636	1	16.2	-0.5	1009	-2	1301	-4
C22	Nordeste (Brazil)	485	7	27.4	-0.3	1134	-6	1351	9
C23	Central eastern Brazil	769	0	25.6	-0.8	1094	-1	1830	-1
C24	Amazon	1155	3	26.8	-0.8	940	-2	2272	1
C25	Central-north Argentina	505	4	24.7	-0.6	1092	1	1377	-1
C26	Pampas	498	-14	23.5	0.1	1147	0	1365	-10
C27	Western Patagonia	127	2	13.3	-0.8	1119	-3	523	19
C28	Semi-arid Southern Cone	128	-19	18.7	-0.1	1196	1	496	-5
C29	Caucasus	287	6	4.7	1.9	754	-8	801	8
C30	Pamir area	247	1	4.5	1.4	927	-4	700	10
C31	Western Asia	162	1	7.8	0.6	848	-7	544	-3
C32	Gansu-Xinjiang (China)	57	17	-1.2	0.7	816	-9	264	32
C33	Hainan (China)	221	57	20.8	-1	857	-5	713	47
C34	Huanghuaihai (China)	130	36	6.8	0.2	774	-14	518	31
C35	Inner Mongolia (China)	66	35	-4	0.4	818	-6	293	27
C36	Loess region (China)	87	38	3.6	0.5	844	-9	372	28
C37	Lower Yangtze (China)	356	-18	11.2	0.2	707	-9	1059	-8
C38	Northeast China	101	31	-7.1	-0.4	735	-6	413	31
C39	Qinghai-Tibet (China)	114	-34	2.6	0.4	1033	-2	360	-13
C40	Southern China	199	-17	16.1	-0.2	788	-7	697	-4
C41	Southwest China	163	2	10.3	0.1	724	-6	615	8
C42	Taiwan (China)	233	13	16.9	-0.4	849	-4	932	29
C43	East Asia	142	-18	-1.9	0.2	742	-7	495	2

C44	Southern Himalayas	117	-30	19.6	0.1	983	-9	429	-14
C45	Southern Asia	121	19	26.5	-0.1	1170	-5	379	15
C46	Southern Japan and Korea	349	-7	7.1	0.3	777	-5	1054	2
C47	Southern Mongolia	117	276	-7.5	0.6	805	-5	423	177
C48	Punjab to Gujarat	43	-20	24	0.7	1120	-5	189	-14
C49	Maritime Southeast Asia	1105	1	25.5	-0.5	966	-3	2146	0
C50	Mainland Southeast Asia	163	2	25.9	-0.9	1074	-7	585	7
C51	Eastern Siberia	103	-16	-11.5	-0.4	587	-4	302	2
C52	Eastern Central Asia	42	-10	-13.2	0.7	672	-4	203	-1
C53	Northern Australia	887	6	26.5	-0.6	1076	-2	1683	-1
C54	Queensland to Victoria	173	-25	22.1	0.6	1231	1	609	-18
C55	Nullarbor to Darling	88	-15	20.7	-0.8	1235	-5	384	-12
C56	New Zealand	245	-5	15.8	0.7	928	-9	973	11
C57	Boreal Eurasia	192	0	-6.5	-1.5	421	-1	403	-10
C58	Ukraine to Ural mountains	187	12	-2.9	-0.8	505	1	570	-5
C59	Mediterranean Europe and Turkey	230	-9	8.4	0.7	741	-7	838	2
C60	W. Europe (non Mediterranean)	232	2	4.7	-0.2	546	-5	837	2
C61	Boreal America	301	31	-6.8	2.1	439	-10	371	18
C62	Ural to Altai mountains	116	8	-9.4	-1.2	559	-7	365	-8
C63	Australian desert	105	2	22.8	-0.1	1290	-1	487	11
C64	Sahara to Afghan deserts	90	12	18.4	0.2	1110	-5	319	13
C65	Sub-arctic America	85	74	-17.7	5.6	194	-3	72	127

Table A.2. January-April 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	203	0	6.7	0.8	979	-5	640	1
AGO	Angola	610	5	24.6	0.6	1141	-2	1649	3
ARG	Argentina	411	-18	22.9	0.1	1156	1	1198	-11
AUS	Australia	248	-7	22.4	0.3	1221	0	629	-13
BGD	Bangladesh	257	20	23.0	-1.0	972	-12	810	32
BLR	Belarus	171	1	-0.2	-0.1	488	2	705	4
BRA	Brazil	870	1	25.7	-0.7	1054	-2	1902	0
CAN	Canada	248	25	-7.7	-0.8	608	-3	354	-9
CHN	China	195	-8	7.3	0.1	760	-8	561	7
DEU	Germany	219	6	4.3	0.1	524	1	897	6
EGY	Egypt	45	-20	17.3	1.0	1006	-6	214	20
ETH	Ethiopia	188	1	20.3	-1.3	1243	-2	678	1
FRA	France	200	-13	6.6	-0.7	552	-11	822	-1
GBR	United Kingdom	371	32	4.6	-1.7	404	-12	965	-1
HUN	Hungary	189	19	5.4	0.6	575	-5	770	16
IDN	Indonesia	1147	-2	25.6	-0.6	957	-2	2252	-1
IND	India	86	-15	24.5	0.2	1129	-6	295	-4
IRN	Iran	184	-8	8.9	1.4	910	-9	592	-8
ITA	Italy	186	-19	8.3	0.4	657	-8	728	-7
KAZ	Kazakhstan	128	16	-7.4	-1.2	615	-8	433	0
KEN	Kenya	522	70	22.3	-1.4	1224	-7	1245	33
KHM	Cambodia	173	4	27.5	-1.4	1099	-7	647	6
LKA	Sri_Lanka	528	1	26.6	-0.6	1138	-2	1270	-3
MAR	Morocco	164	-2	10.9	-0.9	899	-11	563	3
MEX	Mexico	115	31	19.9	0.0	1145	-4	339	9
MMR	Myanmar	85	-9	24.0	-0.3	1079	-9	356	0
MNG	Mongolia	53	31	-11.9	1.5	744	-3	249	27

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	687	1	26.2	-0.9	1113	-2	1536	-2
NGA	Nigeria	184	25	28.5	-1.0	1148	-11	482	21
PAK	Pakistan	143	-16	16.9	0.9	1023	-4	384	-10
PHL	Philippines	768	38	25.5	-0.5	1045	-2	1394	18
POL	Poland	143	-19	2.4	0.1	512	3	683	-11
ROU	Romania	229	9	3.9	0.9	617	-3	853	14
RUS	Russia	155	9	-6.7	-0.9	531	-2	412	-9
THA	Thailand	203	2	26.1	-1.1	1063	-8	695	9
TUR	Turkey	302	0	7.0	2.8	804	-4	928	10
UKR	Ukraine	208	15	1.5	0.0	568	2	778	8
USA	United States	315	5	4.6	-0.8	781	-6	660	-9
UZB	Uzbekistan	180	-11	6.6	0.7	755	-8	613	-5
VNM	Vietnam	134	-21	21.9	-0.7	865	-10	518	-12
ZAF	South Africa	326	1	20.4	-0.4	1195	-1	1055	0
ZMB	Zambia	591	-6	23.6	-0.7	1158	1	1627	-2

Table A.3. Argentina, January-April 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	382	-12	21.0	0.4	1199	2	382	-12
Chaco	527	-11	25.6	-0.3	1120	-3	527	-11
Cordoba	275	-41	22.4	0.2	1181	2	275	-41
Corrientes	607	-8	25.3	-0.1	1169	0	607	-8
Entre Rios	362	-41	24.1	0.6	1219	4	362	-41
La Pampa	231	-41	22.0	0.6	1208	0	231	-41
Misiones	542	-25	24.5	-0.4	1094	-3	542	-25
Santiago Del Estero	391	-17	25.2	0.0	1105	1	391	-17
San Luis	245	-41	21.4	0.0	1195	2	245	-41
Salta	617	13	23.3	-0.7	1014	0	617	13
Santa Fe	441	-24	24.4	0.5	1192	2	441	-24
Tucuman	342	-32	22.7	-0.5	1054	4	342	-32

Table A.4. Australia, January-April 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	153	-33	23.0	0.9	1272	3	593	-21
South Australia	100	-8	20.8	0.7	1237	-1	494	6
Victoria	98	-44	19.5	0.6	1180	-2	472	-28
W. Australia	166	19	21.3	-0.8	1234	-5	442	-7

Table A.5. Brazil, January-April 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 (%)

	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	679	6	27.6	-0.3	1055	-8	1713	6
Goias	755	-10	24.9	-1.0	1147	1	2004	-1
Mato Grosso Do Sul	723	2	26.5	-0.8	1112	-2	1807	-3
Mato Grosso	1100	5	26.5	-0.7	1042	0	2351	3
Minas Gerais	616	-4	24.3	-0.5	1140	-1	1618	1
Parana	696	3	23.6	-0.5	1066	-1	1705	-6
Rio Grande Do Sul	578	-7	23.7	0.0	1123	0	1556	-6
Santa Catarina	570	-19	21.8	-0.4	1002	-5	1496	-19
Sao Paulo	595	-22	24.7	-0.4	1128	3	1630	-14

Table A.6. Canada, January-April 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	113	0	-8.5	-2.3	605	0	351	-16
Manitoba	84	-23	-10.0	-1.0	667	0	299	-17
Saskatchewan	94	-9	-10.1	-1.8	650	0	312	-18

Table A.7. India, January-April 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	66	21	27.7	-0.6	1215	-3	267	22
Assam	237	-39	22.6	0.5	856	-10	878	-12
Bihar	52	-25	22.4	-1.5	1064	-9	243	-21
Chhattisgarh	73	-2	25.7	0.1	1163	-4	348	10
Daman and Diu	16	189	25.9	-0.3	1245	-4	76	177
Delhi	24	-73	22.2	0.4	1058	-6	131	-66
Gujarat	18	149	26.9	0.8	1224	-4	92	144
Goa	36	37	25.7	0.0	1244	-6	133	20
Himachal Pradesh	162	-39	7.6	3.1	1052	-3	533	-14
Haryana	73	-34	21.0	0.3	1043	-6	324	-24
Jharkhand	88	19	23.4	-0.6	1109	-7	345	5
Kerala	247	1	26.4	-0.6	1196	-5	744	1
Karnataka	109	39	26.1	-0.7	1233	-5	356	24
Meghalaya	317	-35	19.2	0.4	896	-13	973	0
Maharashtra	32	-10	27.5	0.8	1192	-6	156	-4
Manipur	127	-54	17.7	0.5	937	-13	559	-25
Madhya Pradesh	36	-32	25.3	0.8	1158	-5	172	-23
Mizoram	158	-36	19.4	-0.3	982	-13	625	-9
Nagaland	169	-47	17.0	0.9	886	-11	734	-22
Orissa	141	66	26.0	-0.1	1155	-4	498	41
Puducherry	48	12	27.6	-0.5	1255	0	240	45
Punjab	78	-49	19.6	0.7	993	-6	346	-39
Rajasthan	20	-34	24.4	0.7	1128	-6	95	-32
Sikkim	153	-29	5.9	0.4	993	-10	454	-13

	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 (%)
Tamil Nadu	107	-2	27.7	-0.6	1249	-2	398	4
Tripura	278	-11	22.4	-0.6	931	-13	912	18
Uttarakhand	118	-43	12.3	2.3	1077	-3	439	-24
Uttar Pradesh	46	-43	22.7	-0.1	1080	-7	222	-35
West Bengal	171	37	24.3	-0.4	1029	-10	593	26

Table A.8. Kazakhstan, January-April 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	108	24	-10.5	-1.9	575	-8	354	-9
Karagandinskaya	133	43	-9.3	-1.4	623	-10	394	-3
Kustanayskaya	95	-6	-9.8	-2.0	583	-3	366	-15
Pavlodarskaya	96	43	-10.0	-1.7	566	-10	385	13
Severo kazachstanskaya	86	-5	-10.4	-1.7	532	-7	338	-13
Vostochno kazachstanskaya	164	37	-9.3	0.0	625	-14	401	11
Zapadno kazachstanskaya	140	14	-5.9	-2.1	603	-1	473	-13

Table A.9. Russia, January-April 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.	149	-4	-8.4	-1.5	535	2	356	-18
Chelyabinskaya Oblast	97	-11	-9.5	-2.1	528	-2	340	-18
Gorodovikovsk	271	0	2.9	0.0	571	-6	837	-1
Krasnodarskiy Kray	147	-24	-3.6	-0.2	552	-6	489	-8
Kurganskaya Oblast	94	0	-9.3	-1.4	511	-4	341	-17
Kirovskaya Oblast	183	9	-7.5	-1.4	458	7	367	-18
Kurskaya Oblast	196	17	-2.2	-1.1	548	3	612	-8
Lipetskaya Oblast	189	12	-3.5	-1.2	538	2	553	-10
Mordoviya Rep.	180	11	-5.7	-1.6	510	3	457	-15
Novosibirskaya Oblast	115	17	-11.0	-1.1	504	-8	324	-11
Nizhegorodskaya O.	172	7	-5.5	-1.3	475	4	456	-13
Orenburgskaya Oblast	138	-3	-8.0	-1.8	588	1	395	-17
Omskaya Oblast	97	1	-11.0	-1.4	501	-6	313	-16
Permskaya Oblast	155	-2	-8.5	-1.0	446	1	339	-17

	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 (%)
Penzenskaya Oblast	211	27	-5.9	-1.9	531	1	445	-18
Rostovskaya Oblast	217	4	0.7	-0.5	559	-5	725	0
Ryazanskaya Oblast	182	8	-4.2	-1.0	501	4	519	-10
Stavropolskiy Kray	208	4	3.8	0.7	577	-9	819	7
Sverdlovskaya Oblast	107	-6	-8.8	-1.2	455	-3	337	-18
Samarskaya Oblast	167	14	-7.3	-2.1	553	1	403	-21
Saratovskaya Oblast	184	22	-5.8	-2.4	579	1	461	-20
Tambovskaya Oblast	228	34	-4.3	-1.3	541	2	513	-13
Tyumenskaya Oblast	103	6	-10.0	-1.1	494	-3	320	-18
Tatarstan Rep.	184	26	-7.3	-1.7	506	0	387	-20
Ulyanovskaya Oblast	180	25	-7.1	-2.2	535	2	406	-21
Udmurtiya Rep.	174	12	-7.6	-1.1	460	2	365	-17
Volgogradskaya O.	215	30	-2.8	-1.8	570	-3	586	-11
Voronezhskaya Oblast	243	45	-2.6	-1.1	540	-1	591	-9

Table A.10. United States, January-April 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	595	21	9.0	-1.3	776	-7	1337	0
California	191	-19	8.1	0.0	877	-5	589	-6
Idaho	242	26	-0.5	0.7	716	-10	622	13
Indiana	423	8	2.6	-1.3	684	-10	857	-10
Illinois	328	-6	2.1	-1.7	706	-9	830	-11
Iowa	217	-17	-1.5	-2.2	742	-5	621	-18
Kansas	86	-58	4.0	-1.5	842	-4	357	-49
Michigan	382	28	-2.2	-0.9	668	-4	549	-11
Minnesota	303	67	-6.0	-2.1	726	0	425	-20
Missouri	351	-10	4.3	-1.7	726	-9	917	-13
Montana	236	79	-4.9	-3.3	725	-4	474	-4
Nebraska	122	-27	-0.2	-2.3	806	-5	541	-17
North Dakota	222	82	-7.1	-2.3	730	-2	399	-9
Ohio	484	32	2.3	-0.9	668	-10	834	-8
Oklahoma	245	-15	7.8	-1.7	865	-3	677	-23
Oregon	211	-22	4.0	0.2	641	-9	758	5
South Dakota	189	25	-3.6	-2.9	760	-5	513	-12
Texas	208	-14	13.2	-0.8	918	-3	599	-17
Washington	260	-1	3.0	0.0	582	-9	744	9
Wisconsin	349	30	-3.9	-1.7	732	3	491	-20

Table A.11. China, January-April 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	282	-15	9.4	0.0	731	-13	986	0
Chongqing	210	10	9.7	0.2	608	-7	784	12
Fujian	363	-23	12.9	0.3	786	-1	978	-18
Gansu	75	35	2.2	0.4	893	-6	300	29
Guangdong	319	-13	16.3	0.1	759	-2	1007	3
Guangxi	266	-11	15.6	0.1	626	-10	879	3
Guizhou	230	20	10.9	0.5	612	-9	833	24
Hebei	64	26	2.0	0.2	805	-10	277	12
Heilongjiang	103	47	-9.2	-0.5	711	-6	409	36
Henan	144	12	8.2	0.1	759	-14	614	18
Hubei	264	-4	9.2	0.1	690	-12	875	0
Hunan	328	-23	11.0	0.3	639	-9	1046	-13
Jiangsu	201	2	8.4	0.2	764	-12	787	5
Jiangxi	446	-19	12.1	0.3	709	-7	1231	-9
Jilin	117	42	-5.7	-0.3	763	-6	478	43
Liaoning	87	-6	-1.6	-0.4	783	-8	399	5
Inner Mongolia	73	53	-6.6	0.2	786	-5	313	44
Ningxia	45	43	2.3	1.0	888	-8	219	41
Shaanxi	97	20	5.3	0.5	799	-7	428	23
Shandong	115	35	6.4	0.3	779	-14	494	29
Shanxi	76	25	2.1	0.9	831	-10	327	11
Sichuan	106	-2	9.3	0.2	800	-2	444	0
Yunnan	91	-24	12.8	-0.6	939	-8	396	-12
Zhejiang	369	-17	10.2	0.4	726	-9	1123	-6

Annex B. 2018 production estimates

Tables B.1-B.5 present 2018 CropWatch production estimates for Argentina, Brazil 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	7289	-5	12402	-9
Córdoba	7111	-4	11249	-6
Entre Rios	1176	-7	3315	-13
San Luis	1016	-6		
Santa Fe	4187	-2	9381	-8
Santiago Del Estero	1031	-15		
Sub total	**21811**	**-5**	**36347**	**-8**
Others	7008	-1	10595	-8
Argentina	**28819**	**-4**	**46942**	**-8**

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	8717	36.9			10327	5.4
Mato Grosso	20121	11.9			28146	5
Mato Grosso Do Sul	7735	17.4			6816	6.7
Minas Gerais	6351	5.4			3422	-2.6
Parana	16250	12.4			18327	6.4
Rio Grande Do Sul	4812	4.3	8770	3.3	13684	1.1
Santa Catarina	2957	5.2	1130	10.6	1790	4.8
Sao Paulo	3946	9.9			2195	1
Sub total	70888	13.6	9899	4	84708	4.4
Others	13131	63.8	1230	-20.2	12018	13.1
Brazil	**84019**	**19.3**	**11129**	**0.7**	**96726**	**5.4**

Δ% indicates percentage difference with 2016.

Table B.3. United States, 2018 wheat production, by state (thousand tons)

	Wheat			Wheat	
	2018	Δ%		2018	Δ%
Arkansas	614	-6	Nebraska	1814	-8
California	677	-7	New York	151	-14
Colorado	1814	-2	North Carolina	1367	14
Georgia	341	7	North Dakota	8035	-7
Idaho	2685	-3	Ohio	902	-27
Illinois	745	-38	Oklahoma	880	-35
Indiana	466	-38	Oregon	948	-15
Kansas	5567	-29	Pennsylvania	239	-11
Kentucky	991	-2	South Carolina	302	8
Maryland	517	4	South Dakota	2985	-12
Michigan	1044	-3	Tennessee	807	7
Minnesota	1600	-7	Texas	1515	-24
Mississippi	379	5	Virginia	554	11

Missouri	895	-25	Washington	2331	-27
Montana	4099	-11	Wisconsin	437	21
Sub total			45703		-14
others			1696		28
United States			47399		-14

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**.**

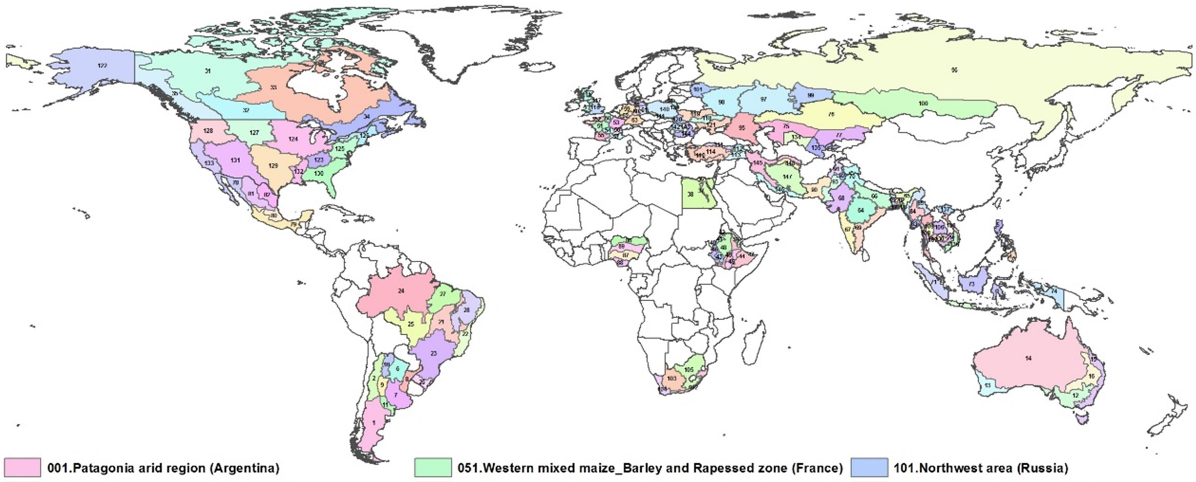
Sub-national regions for 31 key countries

Overview

148 sub-national regions for the 31 key countries across the globe. This bulletin increased 11 countries (Afghanistan, Mongolia, Sri Lanka, Zambia, Mozambique, Kenya, Angola, Morocco, Hungary, Italy, Belarus) for analysis, no sub-national regions are for these newly increased countries in this bulletin.

Description

31 key agricultural countries are divided into 148 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 31 key countries. Some regions are more relevant for rangeland and livestock monitoring which is also essential for food security.



001.Patagonia arid region (Argentina)
002.Andes Mountain region (Argentina)
003.Hilly Agriculture Region (Philippines)
004.Forest Region (Philippines)
005.Lowland Agriculture Region (Philippines)
006.Chaco region (Argentina)
007.Pampas (Argentina)
008.Mesopotamia (Argentina)
009.Pampas Mountains (Argentina)
010.Tropical highland (Argentina)
011.Semi-arid Pampas (Argentina)
012.Southeastern wheat zone (Australia)
013.Southwestern wheat zone (Australia)
014.Arid and semiarid zone (Australia)
015.Wet temperate and subtropical zone (Australia)
016.Subhumid subtropical zone (Australia)
017.Coastal region (Bangladesh)
018.Hill region (Bangladesh)
019.Gangatic plain (Bangladesh)
020.Sylhet basin (Bangladesh)
021.Central Savanna (Brazil)
022.East coast (Brazil)
023.Parana River (Brazil)
024.Amazon (Brazil)
025.Mato Grosso Region (Brazil)
026.Subtropical rangeland (Brazil)
027.Mixed forest and farmland (Brazil)
028.Nordeste (Brazil)
029.Main cropping area (Cambodia)
030.Lake plains (Cambodia)
031.Arctic Ocean (Canada)
032.Canadian Prairies (Canada)
033.Hudson Bay (Canada)
034.Altantic Ocean (Canada)
035.Pacific Ocean (Canada)
036.Cropping area of Nile Delta (Egypt)
037.Cropping area of Nile Valley (Egypt)
038.Sparse or no crop area (Egypt)
039.Northern Arid (Ethiopia)
040.North-western sesame irrigated lowlands (Ethiopia)
041.North-western cereal-root-sesame lowlands (Ethiopia)
042.North-western semi-arid lowlands (Ethiopia)
043.South-western coffee-enset highlands (Ethiopia)
044.Semi-arid pastoral (Ethiopia)
045.South-eastern mixed maize zone (Ethiopia)
046.Western mixed maize zone (Ethiopia)
047.Eastern arid (Ethiopia)
048.Central-northern maize-teff highlands (Ethiopia)
049.South-eastern Mendebo highlands (Ethiopia)
050.Northern Barley zone (France)
051.Western mixed maize_Barley and Rapessed zone (France)
052.Westnorth mixed maize and Barley zone (France)
053.Rapeseed zone (France)
054.Middle arid zone (France)
055.Southwest maize zone (France)
056.Eastern highland (France)
057.Mediterranean climate zone (France)
058.Northern wheat zone (Germany)
059.Northwest mixed wheat and sugarbeets zone (Germany)
060.Central wheat zone (Germany)
061.Eastern sparse crop area (Germany)
062.Western sparse crop area (Germany)
063.Southern highland (Germany)
064.Central India
065.North eastern region (India)
066.Gangatic plain (India)
067.Western coastal region (India)
068.Western dry region (India)
069.Eastern coastal region (India)
070.Western Himalayan region (India)
071.Sumatra (Indonesia)
072.Java (Indonesia)
073.Kalimantan and Sulawesi (Indonesia)
074.Irian Jaya (Indonesia)
075.SouthWest zone (Kazakhstan)
076.Northern zone (Kazakhstan)
077.SouthEast zone (Kazakhstan)
078.Northwestern mixed wheat and maize area (Mexico)
079.Southern maize zone (Mexico)
080.Centre temperate zone (Mexico)
081.Northern mixed cotton and wheat area (Mexico)
082.Northeastern mixed sorghum and maize area (Mexico)
083.Coastal region (Myanmar)
084.Central plain (Myanmar)
085.Hill region (Myanmar)
086.Soudano-sahelian (Nigeria)
087.Derived savanna zone (Nigeria)
088.humid forest zone (Nigeria)
089.Guinean savanna (Nigeria)
090.Balochistan non-agricultural region (Pakistan)
091.Northern highland (Pakistan)
092.Northern Punjab (Pakistan)
093.Lower Indus river basin (Pakistan)
094.Kalingrad (Russia)
095.Caucasian (Russia)
096.North Subarctic area (Russia)
097.Volga (Russia)
098.Central area (Russia)
099.South Urals area (Russia)
100.South Siberian area (Russia)
101.Northwest area (Russia)
102.Humid subtropical zone (South Africa)
103.Arid desert zone (South Africa)
104.Mediterranean zone (South Africa)
105.Semi-arid steppe zone (South Africa)
106.Single-cropped rice area (Thailand)
107.Horticulture area (Thailand)
108.Mountains area (Thailand)
109.Double_triple-cropped rice area (Thailand)
110.Marmara_Agean_Mediterranean (Thailand)
111.Black Sea (Turkey)
112.North East (Turkey)
113.South East (Turkey)
114.Central Turkey
115.Northern Barley area (UK)
116.Southern mixed wheat and Barley zone (UK)
117.Central sparse crop area (UK)
118.Central wheat area (Ukraine)
119.Northern wheat area (Ukraine)
120.Mountains regions (Ukraine)
121.Southern wheat and maize area (Ukraine)
122.Alaska and Hawaii (USA)
123.Blue Grass (USA)
124.Corn Belt (USA)
125.Middle Atlantic (USA)
126.Northeast (USA)
127.North Plains (USA)
128.Northwest (USA)
129.South Plains (USA)
130. Southeast (USA)
131.Southwest (USA)
132.Lower Mississippi (USA)
133.California (USA)
134.Cotton zone (Uzbekistan)
135.Maize and Cereals zone (Uzbekistan)
136.South of Vietnam
137.North of Vietnam
138.Middle of Vietnam
139.Cold and mesic forest zone (Poland)
140.Cool temperate and dry zone (Poland)
141.Cool temperate and moist zone (Poland)
142.West Region (Romania)
143.Middle Region (Romania)
144.South&East Plain (Romania)
145.West&North Region (Iran)
146.South Coast Region (Iran)
147.Central&Eastern Region (Iran)
148.Semnan&Khorasan Region (Iran)

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	RADPAR is shown as the percent departure of the RADPAR value for the reporting period compared to the recent fifteen-year average (2002-2016),

INDICATOR			
		potential.	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.
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.

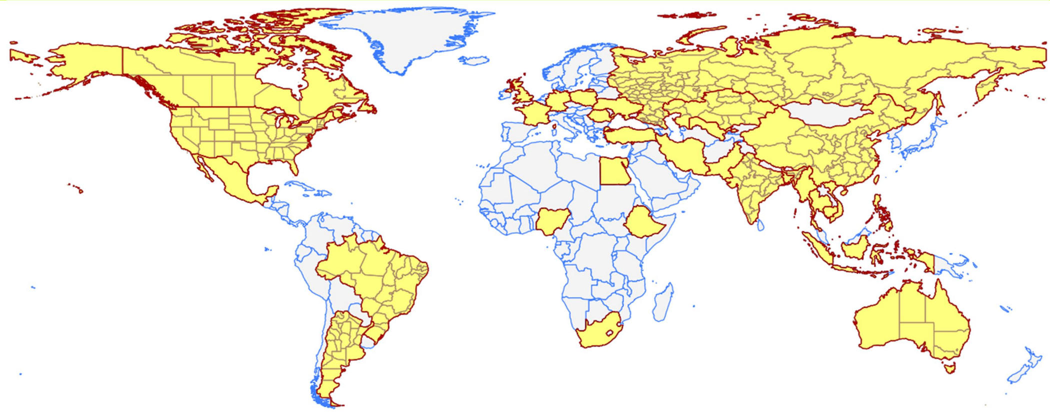
Note: Type is either "Weather" or "Crop"; source specifies if the indicator is obtained from ground data, satellite readings, or a combination; units: in the case of ratios, no unit is used; scale is either pixels or large scale CropWatch spatial units (CWSU). Many indicators are computed for pixels but represented in the CropWatch bulletin at the CWSU scale.

CropWatch spatial units (CWSU)

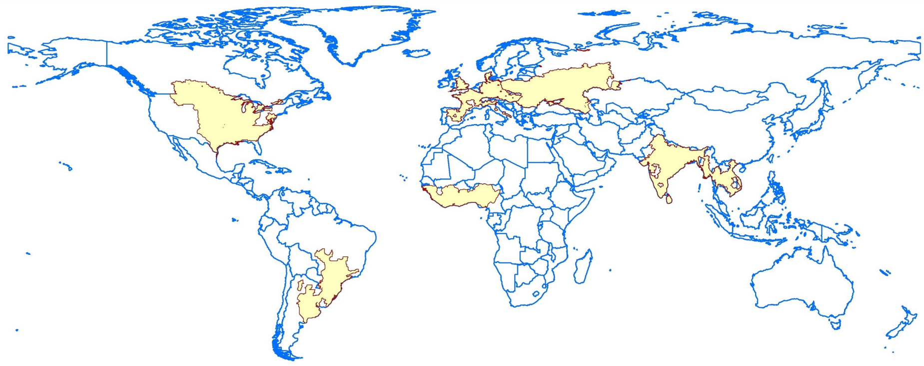
CropWatch analyses are applied to four kinds of CropWatch spatial units (CWSU): Countries, China, Major Production Zones (MPZ), and global crop Monitoring and Reporting Units (MRU). The tables below summarize the key aspects of each spatial unit and show their relation to each other. For more details 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.

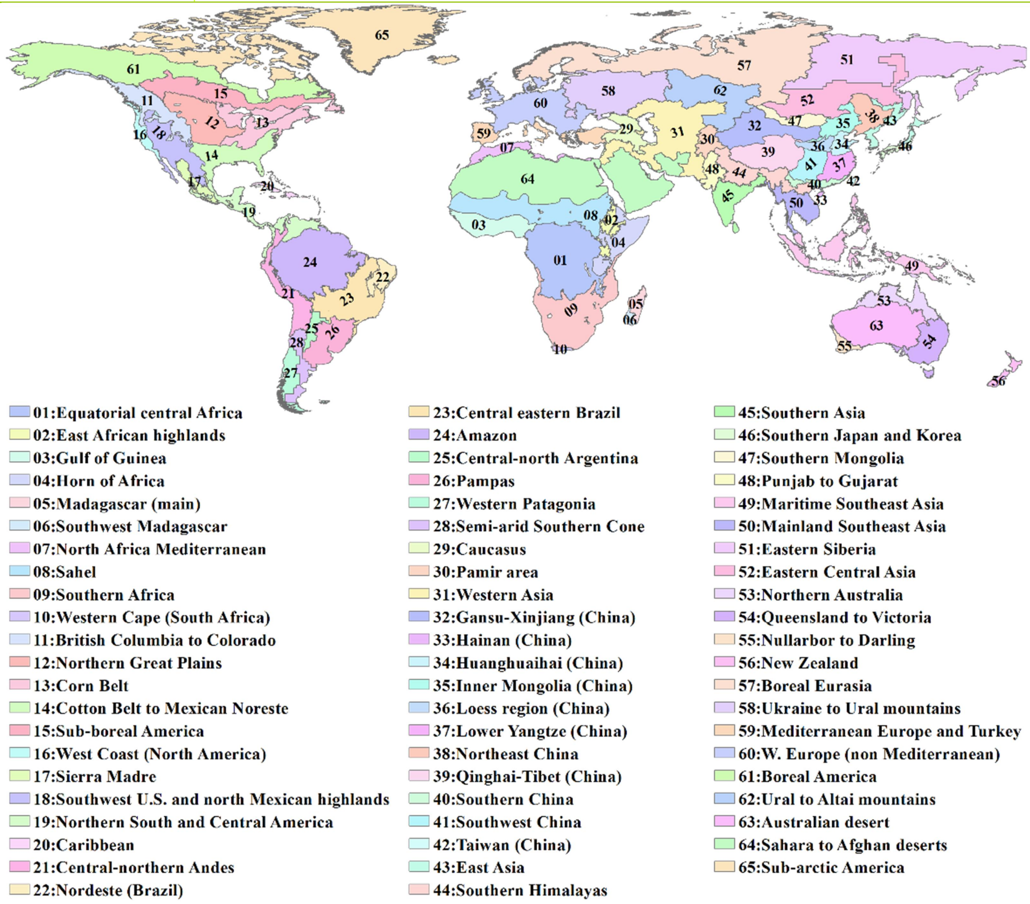
Countries (and first-level administrative districts, e.g., states and provinces)	
Overview	*Description*
"Thirty plus one" countries to represent main producers/exporters and other key countries.	CropWatch monitored countries together represent more than 80% of the production of maize, rice, wheat and 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

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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

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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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