Chapter 3. Main producing and exporting countries

Building on the global patterns presented in previous chapters, this chapter assesses the situation of crops in 30 key countries that represent the global major producers and exporters or otherwise are of global or CropWatch relevance. In addition, the overview section (3.1) pays attention to all countries worldwide, to provide some spatial and thematic detail to the overall features described in section 1.1. In section 3.2, the CropWatch monitored countries are presented, and for each country maps are included illustrating NDVI-based crop condition development graphs, maximum VCI, and spatial NDVI patterns with associated NDVI profiles. Additional detail on the agroclimatic and BIOMSS indicators, in particular for some of the larger countries, is included in Annex A, tables A.2-A.11. Annex B includes 2016 wheat production estimates for Argentina, Australia, and Brazil.

3.1 Overview

Table 3.1 presents the agroclimatic and agronomic indicators for October 2016-January 2017, showing their departure from the five and fifteen-year averages as applicable; the underlying CWAI indicators are presented in figures 3.2-3.5. Many of the global rainfall patterns that characterize the current reporting period (October 2016 to November 2017, or "ONDJ") were already present in the previous CropWatch bulletin that covered the July-October 2016 (JASO) period. In some cases, the patterns are remarkably similar and can be summarized, as done in the section below, with descriptions based essentially on rainfall. This part of the report presents an overview of areas with extreme weather events, followed by brief descriptions of five areas (W01-W05) with wet conditions and ten areas (D01-D10) with dry conditions, as shown in figure 3.1.

Extreme weather

At the global scale, the largest rainfall deficits (RAIN more than 60% below average) occurred in five areas located in (i) India (Andhra Pradesh, Goa, Karnataka, Kerala, Puducherry, Sikkim and the western coastal agro-ecological region), (ii) the Brazilian nordeste (Sergipe, Alagoas and Pernambuco), (iii) the east of Africa (Somalia), (iv) Yemen, and (v) an agro-ecological region of France known as the "mixed maize, barley and rapeseed zone," which approximately coincides with the regions of Poitou-Charentes, Centre, and Pays de Loire. Although this is not maize and rapeseed season, the deficit is likely to affect winter wheat and barley, as well as rain-fed summer crops if abundant rain does not set in during the next reporting period. Some of the listed extremes (the mentioned areas in India, Africa, and France) are part of larger coherent areas defined below as D09, D05, and D03, respectively.

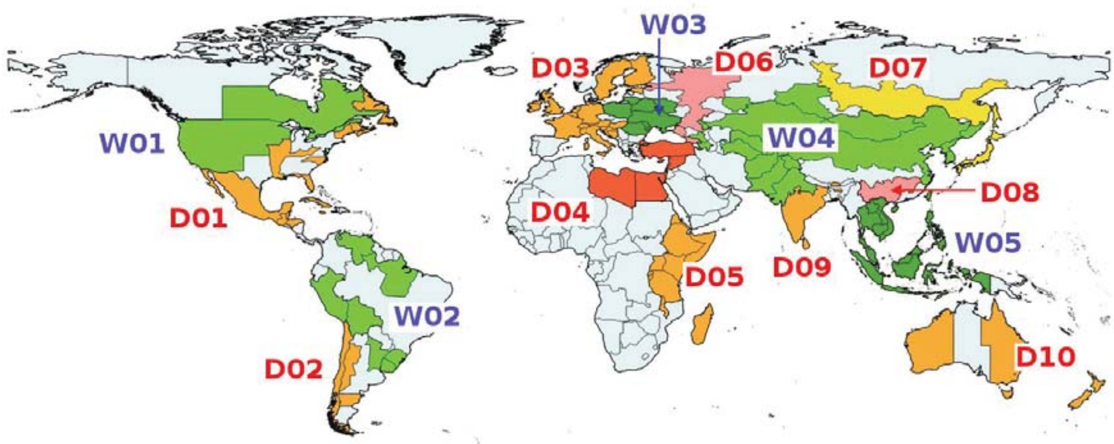
Most areas with very high rainfall excesses (RAIN departures larger than +120%) occur in the areas identified below as W04 and W05. The only exception is the province of Santa Cruz in southern Argentina where 33 mm represent almost a triplication (RAIN, +197%) of the expected rainfall. Since the area is semi-arid, however, this rainfall can have a significant effect on biomass production (BIOMSS, +258%). The second largest rainfall departure belongs to other areas that normally expect little rainfall during winter: Gujarat (RAIN, +473%) and Rajastan (+292%); both part of the W04 western and central Asia area, as shown in figure 3.1.

Table 3.1. CropWatch agroclimatic and agronomic indicators for October 2016-January 2017, 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	23	-1.0	2	8	8	0.86
Australia	-15	-0.5	1	-8	40	0.70
Bangladesh	5	-0.3	0	16	1	0.92
Brazil	5	-0.4	2	-2	-4	0.81
Cambodia	120	-0.3	-10	62	-4	0.87
Canada	12	1.5	-9	17	2	0.92
China	12	0.8	-12	25	1	0.67
Egypt	-35	-0.6	0	-3	1	0.89
Ethiopia	-26	0.2	8	-20	7	0.90
France	-36	-3.5	3	-35	1	0.73
Germany	-24	-1.4	-8	-11	0	0.83
India	-30	0.1	3	-21	-1	0.96
Indonesia	13	-0.6	-5	6	0	0.87
Iran	-1	-0.3	1	-15	n.a.	0.42
Kazakhstan	41	-1.3	-8	-7	n.a.	0.87
Mexico	-24	0.6	1	-8	8	0.88
Myanmar	7	0.2	-3	10	0	0.94
Nigeria	-5	0.0	0	-9	2	0.90
Pakistan	30	0.4	-1	20	5	0.82
Philippines	50	-0.5	-6	20	0	0.90
Poland	31	-1.0	-14	-2	0	0.88
Romania	11	-2.2	-6	-2	2	0.73
Russia	-1	-1.8	-2	-18	16	0.87
S. Africa	9	-0.2	1	-1	7	0.79
Thailand	82	0.0	-7	38	0	0.94
Turkey	-15	-1.3	2	-16	-20	0.55
United Kingdom	-31	-2.3	-1	-18	0	0.87
Ukraine	33	-1.7	-7	-4	-12	0.67
United States	5	1.1	-3	12	10	0.97
Uzbekistan	100	-0.8	-2	51	n.a.	0.84
Vietnam	74	0.7	-11	38	-2	0.88

Note: n.a. = not applicable. Over the monitoring period, no crops are in the field in Iran, Kazakhstan and Uzbekistan.

Figure 3.1. Major wet (shades of green) and dry (shades of yellow and red) areas of global importance



Note: W01-W05 (in blue) indicate wet areas, while areas D01-D10 (in red) are dry.

All large temperature drops (in excess of 3.0°C) occurred in France (in area D03) and Russia (D06) where negative departures close to -4.0°C were common, in terms of cold spell intensity. This is followed by an area between D06 and D07 where temperature was about 3.5°C below average in the Oblasts of Kurgan, Perm, Sverdlovsk, and Tyumen. The largest positive departures occurred in American Boreal areas of little agricultural relevance.

Lowest relative sunshine (RADPAR departure below -15%) occurred almost all in D08, especially in the southeast (including China's Jiangsu, -22%; Henan -18%; and Shaanxi, -15%) and northwest in Russia and Kazakhstan with values about -10% to -15%. The highest RADPAR departures (+10% to +13%) do not follow a well-defined spatial pattern and occur in Ethiopia, boreal Canada, and the Democratic Republic of the Congo, Belize, and Uganda, among others.

The analysis of the combined anomalies highlights cold and dry Western Europe (D03), warm and wet areas in China (part of eastern W04), dry and warm India (parts of D09), as well as wet and cold southwest D09.

Wet conditions

W01, northern America

Wet conditions occurred over central-western North America, including Ontario and Quebec (RAIN, +24% and +29%, respectively), extending to Kansas (+11%) and California (+45%). In the Canadian Prairies, the average rainfall excess was +30%, while temperature remained negative but nevertheless 1-3°C above average. In the United States, the largest rainfall excesses (about double the average) were recorded around Wyoming, North Dakota, and Montana, with close to average temperature in most places.

W02, northern half of South America

Dry conditions in the Southern Cone of Latin America during the July-October recently improved in the southeast (southern Brazil, Uruguay, and northern Argentina) during the current reporting period. Overall, a large area with favorable precipitation now occupies much of the Andean and Amazonian areas of the continent. The precipitation excess reaches 33% on average, with the largest values in some important production areas such as Entre Rios and Santa Fe (both +48%) in Argentina and 53% in Amapa (Brazil). Temperature was slightly below average with average RADPAR and a potential biomass production increase (BIOMSS) at 12%.

W03, northern-central Europe

The area covers 12 CropWatch polygons in eastern and central European countries, from Poland and the Russian Oblast of Tula in the north and Ukraine and Romania in the south. Rainfall exceeds the average by 20%, with negative anomalies in temperature (TEMP, -1.3°C) and RADPAR (-9%), resulting in below average biomass production potential (BIOMSS, -9%). The most abundant precipitation fell in Poland (RAIN, +31%), Belarus (+41%), and Ukraine (+33%), with Ukraine also experiencing the largest drop in temperature (-1.7°C). Poland and neighboring Lithuania had the largest sunshine deficit, as expressed by a drop in RADPAR of -14% and -13%, respectively.

W04, western and central Asia

This area covers a large region in Asia and includes as much as 60 CropWatch polygons in an area centered around Kashmir, the north Kazakhstan region (Severo Kazakhsatanskaya) to eastern Asia (Primorsky Krai in eastern Russia), and Qinghai province of China. In the west, it reaches as far as the Caspian Sea, while its east-west extension is close to 7,000 km. In the eastern part of the area (for example on the Korean peninsula with RAIN departures of +31% to +44% from south to north), rainfall improved compared to the previous reporting period; this improvement, however, did not reach Japan, which remained dry (RAIN, -36%). Overall, the area experienced about the double of the average precipitation (+84%), accompanied by about average temperature (TEMP, -0.4°C) but low solar radiation (RADPAR, -5%). The biomass production potential (BIOMSSS) increased 38% over average. Rainfall increased more than 200% in Haryana and Delhi (+240%) in India, +251% in Qinghai province in China, and as much as +292% and +473% in Rajastan and Gujarat (India), respectively, two areas that are normally relatively dry during this season. More than double the expected amounts occurred in Uzbekistan (+100%); the Chinese provinces of Shaanxi, Jilin, Gansu, Heilongjiang, Shandong, Xinjiang, Inner Mongolia, and Ningxia, as well as in Beijing (from about 100% to +180%); Tajikistan (+115%) and Kyrgyzstan (+148%); and the Kyzylorda region in Kazakhstan (+145%). Temperature varied spatially, while RADPAR stayed below the reference values and locally dropped well below (-11% in Shandong and -15% in Shaanxi, both in China).

W05, Southeast Asia

Wet conditions prevailed over most of continental and maritime Southeast Asia and adjacent areas in southern East Asia, although departures from average (RAIN, +49%) were in general lower than those just described for the western and central Asia (W04) area. The largest anomalies were recorded in Vietnam (+74%), Thailand (+82%), and Cambodia (+120%, reaching 784 mm). Similar to the W04 area, however, temperature was average and RADPAR -7% below reference values.

Dry conditions

D01, Southern North and Central America

Dry conditions prevailed over the southeastern United States, basically east of Arkansas, Illinois, Louisiana and Missouri, extending into the Caribbean (Cuba) and Central America. In the United States, the rainfall deficit was 10-20%, with temperature (TEMP) 1-2°C above average with a shortage of sunshine (RADPAR) and generally average biomass production potentials (BIOMSS). For the region as a whole, the average rainfall deficit reached 21%, with temperature above average (+1°C), RADPAR below (-1%), and BIOMSS down 6%. The largest deficits occurred in Cuba (RAIN, -45%) and Jamaica (-40%), followed by parts of Mexico and Florida (-30%). The deficit was mildest in West Virginia, New Hampshire, and Illinois (about 10%).

D02, Western Cono Sul

Dry conditions already affected eastern South America during the previous reporting period (July-October), but recently moved towards the west and south, to affect Chile and several areas in Argentina. The average precipitation deficit (RAIN, -35%), combined with cool temperature (-0.6°C) and RADPAR of 4% above reference values, is projected to result in a 28% drop in potential biomass production (BIOMSS).

D03, Western Europe

Dry conditions over western and north-western Europe started during the summer and currently cover sixteen countries, with a rather homogeneous RAIN deficit of 30% on average (from 14% in Switzerland to 48% in Ireland), with consistently below average temperature (TEMP, -1.8°C on average, ranging from -0.1°C in Estonia to -3.5°C in France) with low radiation departures (RADPAR, -2% on average, but -8% in Germany and Sweden; -5% in Austria). The BIOMSS index departure is -2%.

D04, Eastern Mediterranean

Dry conditions prevailed over the southern and eastern Mediterranean during July to October 2016, but improved thereafter in northwest Africa (west of and including Tunisia). Currently, dry conditions affect eight countries, with an average rainfall (RAIN) deficit of 39%: -15% in Turkey, the main agricultural country in the area, to -54% in both Libya and Cyprus, of which only the latter expects agriculturally useful winter rains. Temperature (TEMP) was -0.7°C below average, while radiation (RADPAR) was up 1%. The drop in biomass production potential (BIOMSS) is significant with -28% on average.

D05, Eastern Africa

Dry conditions prevailed over eastern and southern Africa during the previous reporting period. This situation has now undergone a marked improvement, especially in the south where three countries—currently in their main growing season—report above average rainfall with values of +41% (reaching 418 mm) for Botswana, +31% or 577 mm for Zimbabwe, and +15% or 355 mm for Namibia. Dry conditions continue between Eritrea and Malawi, the East African Highlands, and Madagascar, all in their main agricultural season. The average precipitation deficit is 40%, from -11% in Malawi to -26% in Ethiopia and -76% in Somalia; in Somalia, however, irrigation plays a larger part in food production than in the other countries. Temperature for the area was average and radiation high (RADPAR, +5% over average), with a generally decreased biomass production potential (BIOMSS, -31%).

D06, western Russia

In this area, which extends from north to south from the Komi republic and the oblast of Arkhangelsk to the Adygeya autonomous oblast and the northern Black Sea, only radiation (RADPAR) was average.Rainfall and temperature were below average (RAIN, -21% and TEMP, -2.1° C), which resulted in a drop as well for the BIOMSS index (-17%). Both the largest precipitation deficit and the largest negative temperature anomaly occurred in the Komi-Permyak Okrug (RAIN, -34% and -3.5° C). The cold wave, however, was not associated with the precipitation deficit everywhere; it was most intense (-3.0 to -3.4° C) in the oblasts of Kirov and Perm and in the Udmurt republic. On the Black Sea, Georgia recorded a 12% RAIN deficit and a -2.2° C drop in TEMP.

D07, Southern Siberia to Japan

The area encompasses a west-to-east stretch from Siberia to Japan, starting at the Krai of Krasnoyarsk (the largest Krai in the Russian Federation) to the Krai of Khabarovsk in the Russian Far East, bordering the Atlantic Ocean and Japan. The average rainfall deficit in the region is -28%, with a temperature anomaly of -1.2°C, a slightly positive radiation, and a production potential drop (BIOMSS) of 25%. The largest anomaly for RAIN occurred in Ust-Orda Buryatia (-33%), an autonomous Okrug of Irkutsk Oblast, and Japan (-36%). Temperature anomalies vary from average (Japan) to -2.1°C in the Krai of Khabarovsk. RADPAR departures are mostly average and vary between -2% in Japan to +6% in the Amur oblast.

D08, Southern area of China

This rainfall deficit area (RAIN, -28%) includes the provinces of Guangxi, Guizhou, Hunan, Jiangxi, Yunnan, and Zhejiang, with average winter temperatures varying between 10 and 15°C. During the previous reporting period the same area was mostly wet, and the current relative drought has been developing since October, affecting most severely Guangxi (RAIN, -36%) and Hunan (-32%). On average, temperature in the region was 1.1°C above seasonal values, with a large deficit of solar radiation (RADPAR, -16%), which most typically defines the whole area: with the exception of Yunnan (where RADPAR was average), very large negative RADPAR departures in excess of 11% occur everywhere, reaching -22% in Jiangxi and Zhejiang and as much as -24% in Hunan, which is the absolute record—globally—for the current reporting period. The biomass production potential (BIOMSS) is down -12%.

D09, southern area of Asia

Dry conditions were confined to south-western India during the previous reporting period. From October, they expanded to enclose the northern center (Madhya Pradesh), the east, and northeast of the country, resulting in an almost generalized drought situation avoiding mostly the northwest. The area also includes Bhutan and Sri Lanka. The average rainfall deficit is as large as -46%, with close to average TEMP and positive RADPAR departure (+4%). Logically, the potential biomass production dropped sharply by 36% compared with average. The most severe deficits occur in Karnataka (RAIN, -74%, resulting in 53 mm of precipitation), Andhra Pradesh (-71% or 67 mm), Goa (-69% or 63 mm), Kerala (-62% or 205 mm), Tamil Nadu (-60% or 216 mm), and Jharkhand (-58% or 48 mm). The lowest deficits are those of Chhattisgarh (-25%) and Bihar (-23%). The positive average RADPAR value results from values between 0% in Meghalaya, +8% for Sri Lanka, and +9% in Tami Nadu. Temperature departures are small, in the range of 0.0°C to -0.4°C, with only one positive departure for the 14 CropWatch polygons, namely +1.5°C in Meghalaya, the wettest region in India, where "drought" is more of a blessing than a disaster. Meghalaya is also the only region with positive BIOMSS expectation, while BIOMSS for other parts drops by as much as 64% in Karnataka and the other states with large precipitation shortfalls.

D10, Oceania

The dry area in Oceania currently involves 6 CropWatch polygons, with an average RAIN deficit of 28%, mostly affecting New-Zealand (a decrease in RAIN of 52% compared to average, to 145 mm) as well as Tasmania (-50% to 107 mm) and Victoria (-25% to 148 mm) both in Australia. All three areas had slightly negative RADPAR departures in the range of -2%. The below average temperature (TEMP, -0.5°C on average) results from values between -0.3°C (New Zealand) and -0.9°C in Western Australia, where (in the case of Western Australia) RADPAR departure was positive (+2%). Altogether, the BIOMSS potential dropped -22%.

Figure 3.2. Global map of October 2016-January 2017 rainfall (RAIN) by country and sub-national areas, departure from 15YA (percentage)

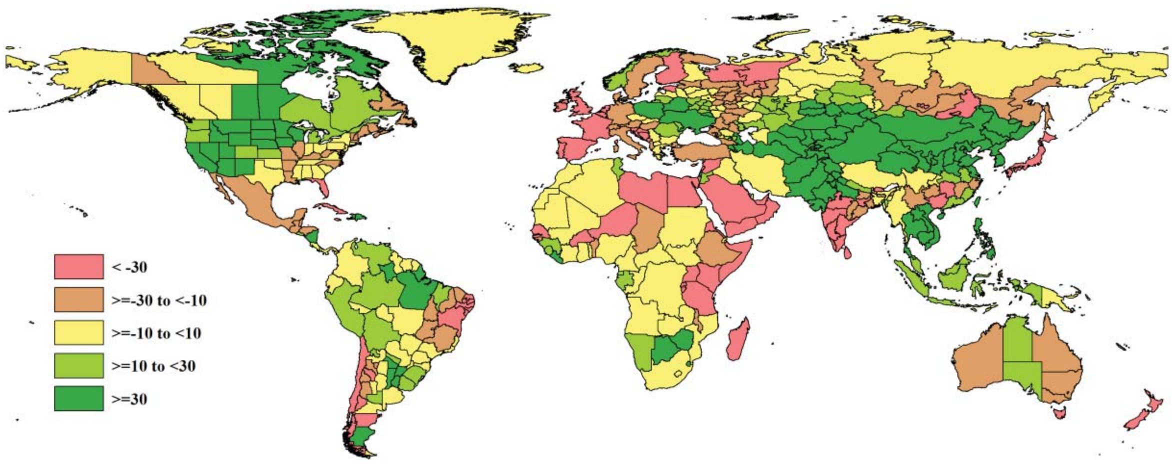


Figure 3.3. Global map of October 2016-January 2017 temperature (TEMP) by country and sub-national areas, departure from 15YA (degrees)

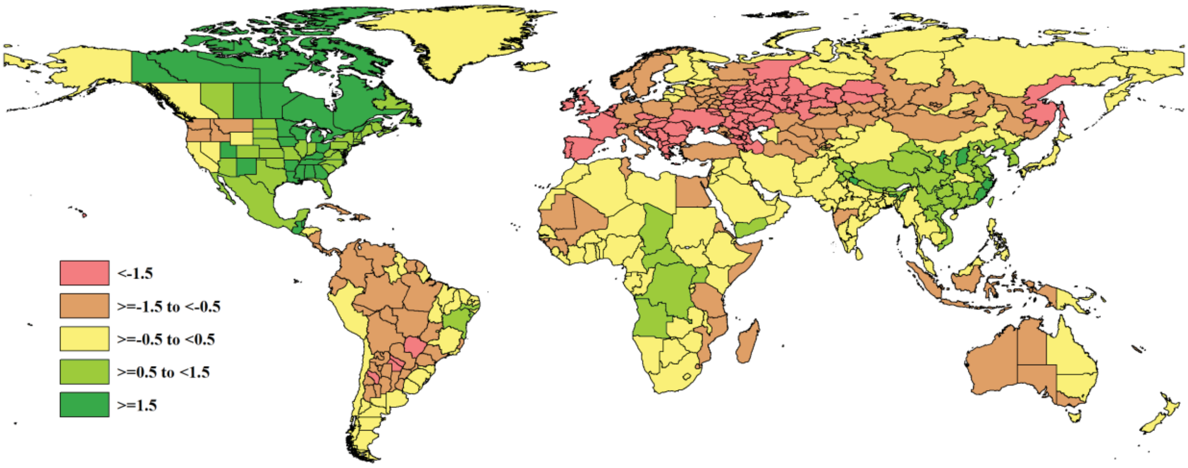


Figure 3.4. Global map of October 2016-January 2017 PAR (RADPAR) by country and sub-national areas, departure from 15YA (percentage)

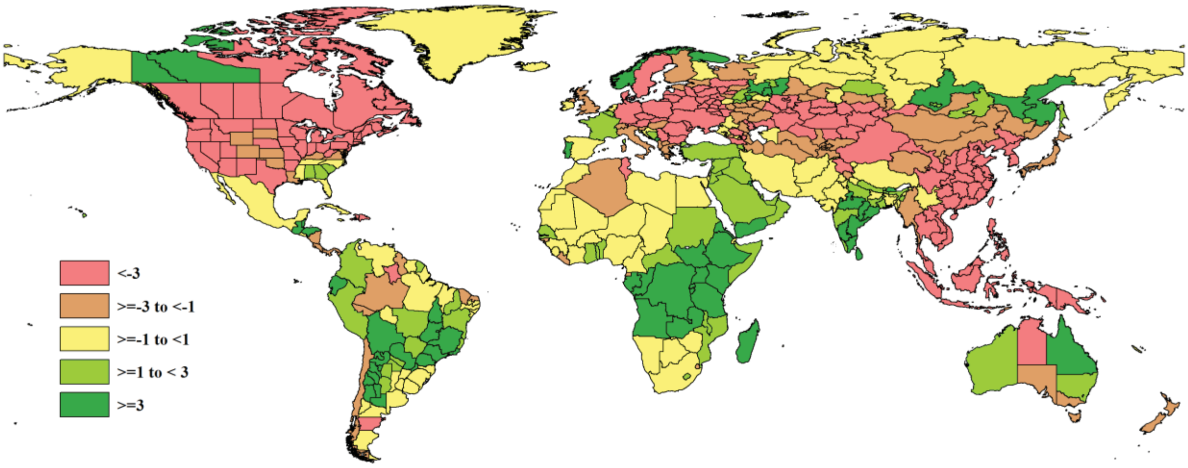
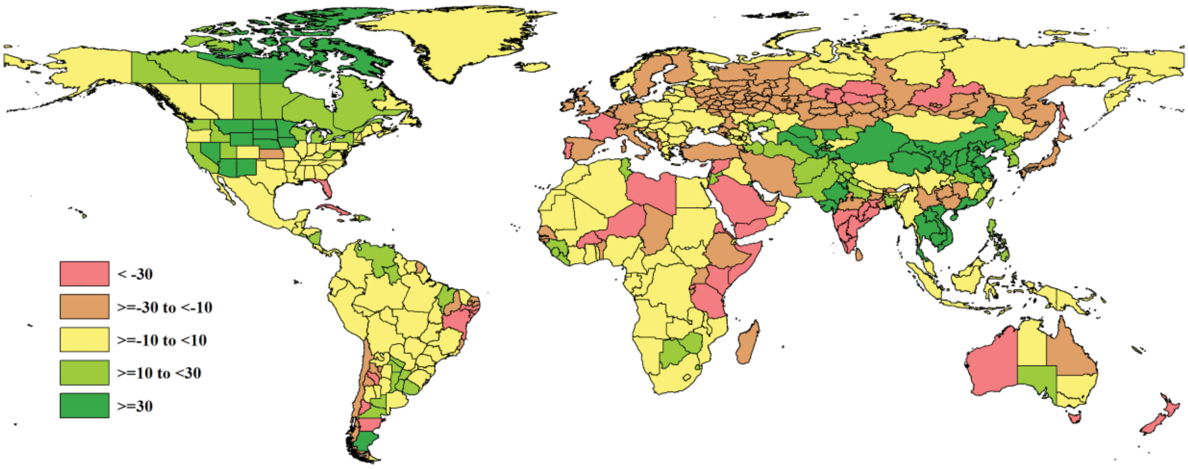


Figure 3.5. Global map of October 2016-January 2017 biomass (BIOMSS) by country and sub-national areas, departure from 15YA (percentage)



3.2 Country analysis

This section presents CropWatch analyses for each of thirty key countries (China is addressed in Chapter 4). The maps refer to crop growing areas only and include (a) Crop condition development graph based on NDVI average over crop areas, comparing the October 2016-January 2017 period to the previous season and the five-year average (5YA) and maximum. (b) Maximum VCI (over arable land mask) for October 2016-January 2017 by pixel; (c) Spatial NDVI patterns up to January 2017 according to local cropping patterns and compared to the 5YA; and (d) NDVI profiles associated with the spatial pattern under(c). See also Annex A, tables A.1-A.11, and Annex B, tables B.1-B.3, for additional information about indicator values and production estimates by country. Country agricultural profiles are posted on **www.cropwatch.com.cn**. Snow cover information for the country analyses was derived from NOAA Snow Cover Maps.[2]

Figures 3.6-3.35. Crop condition for individual countries ([ARG] Argentina- [ZAF] South Africa) October 2016-January 2017

[2] https://www.ncdc.noaa.gov/snow-and-ice/snow-cover/.

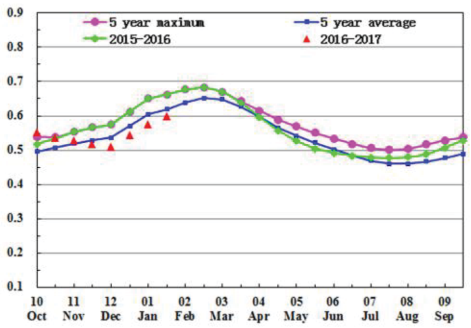
[ARG] Argentina

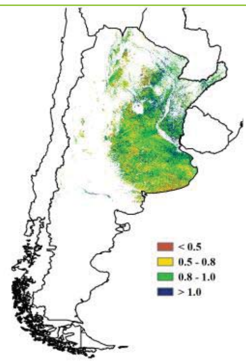
The current monitoring period covers the harvesting of wheat as well as the planting and main growing stages for maize and soybean. Problems were reported in part of the Pampas during this period, with flooding in Cordoba, Santa Fé, and northwest Buenos Aires, and drought in southern Buenos Aires province. Some of CropWatch indicators reflect variations in these areas too. Also reported are changes in crop proportion related to changes in the country's export policies, reducing the planted area of soybean and increasing that of wheat and maize compared to recent years. For the whole country, a large increment of rainfall above average was observed (RAIN, +23%), while temperature (TEMP) dropped 0.7°C and radiation (RADPAR) underwent a small increase (2%), resulting in BIOMSS increasing about 8% over average. Positive temperature anomalies were recorded for December and January, the warmest months of the year, mainly in the major production areas of central and southern Pampas. For the whole country, negative NDVI anomalies have been observed since November 2016.

High positive rainfall departures from average occurred in eastern Argentina including the provinces of Santa Fé (RAIN, +48%), Entre Ríos (+47%), Corrientes (+42%), and Chaco (+37%). The low positive departures observed in Buenos Aires (+7%) and Córdoba (+3%) could be the result of a combination of flooding and drought situations. On the contrary, arid and semi-arid regions of Argentina showed strong negative anomalies: Catamarca (-30%), La Rioja (-37%), and Patagonia (-27%). In general, lower RADPAR values were observed in provinces with the highest RAIN values. Negative NDVI anomalies were observed in the already mentioned "problem areas" of south and northwest Buenos Aires province and part of the province of Córdoba. NDVI anomalies could also be explained by early ripening of winter crops, with crops maturing in December (reflecting more area with reductions in NDVI compared to recent years). The VCI map shows low values in the mentioned problem areas.

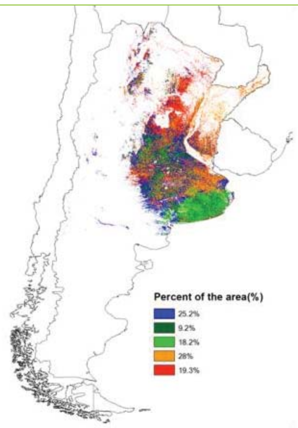
Overall, although this monitoring period recorded above average rainfall, the negative impact of floods and drought in part of the Pampas (confirmed by NDVI and VCI indicators) could result in reduced grain production in Argentina. Wheat production estimates for the country are listed in table B.1 in Annex B.

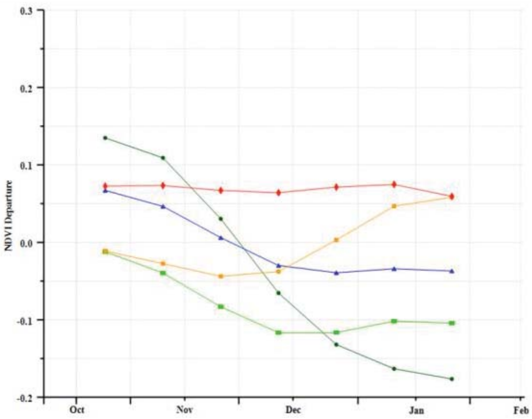
Figure 3.6. Argentina crop condition, October 2016-January 2017





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





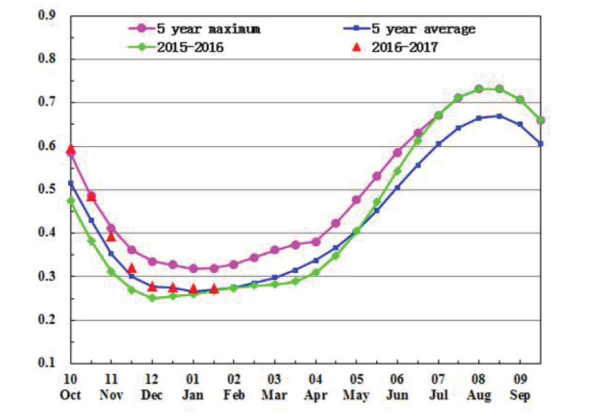
(c) Spatial NDVI patterns compared to 5YA (d) NDVI profiles

[AUS] Australia

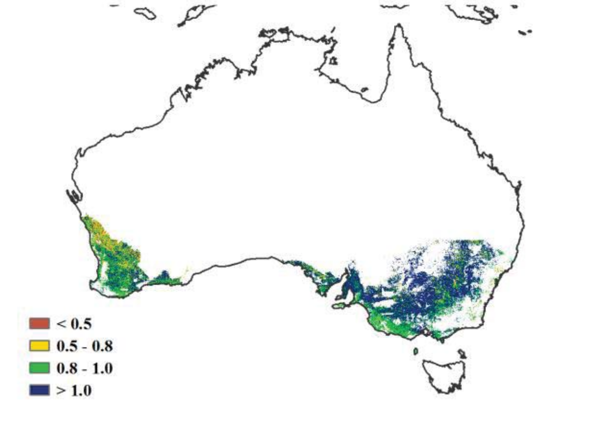
Australian crops show generally above average condition during the monitored period from October to January. This period covers the harvesting of winter crops and planting of summer crops. Although rainfall dropped below average (New South Wales: RAIN, -19%; Victoria, -25%; Western Australia, -10%) irrigation makes up for the inadequacy of precipitation. The NDVI profiles also reflect the above average conditions in almost all cropped regions in the country from October to November, with only 11.1% of the cropped land, covering central and northeastern New South Wales, showing below average values in December and January. The maximum VCI reaches an overall value of 0.7 for Australia's cropped lands.

With the fraction of cropped arable land up 40 percentage points compared to the average of the previous five years, CropWatch estimates that the production of wheat in 2016-17 will increase 24.3% over 2015-16. Table B.2 in Annex B shows CropWatch wheat production estimates for Australia.

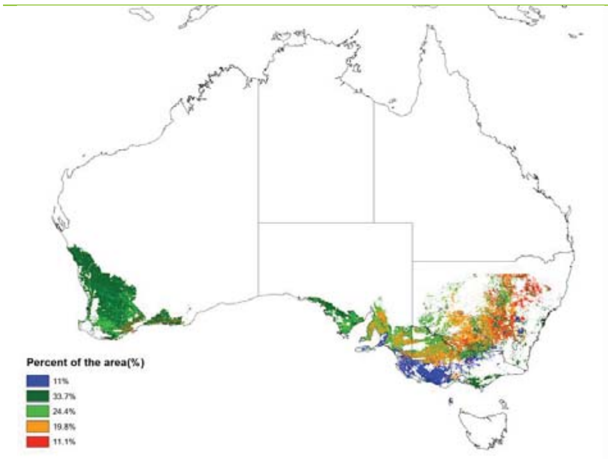
Figure 3.7. Australia crop condition, October 2016-January 2017



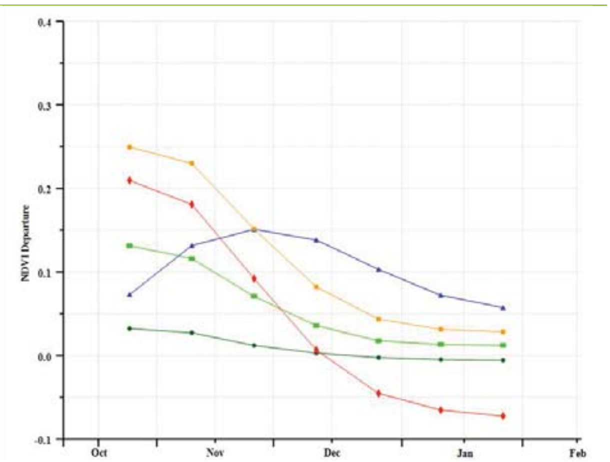
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



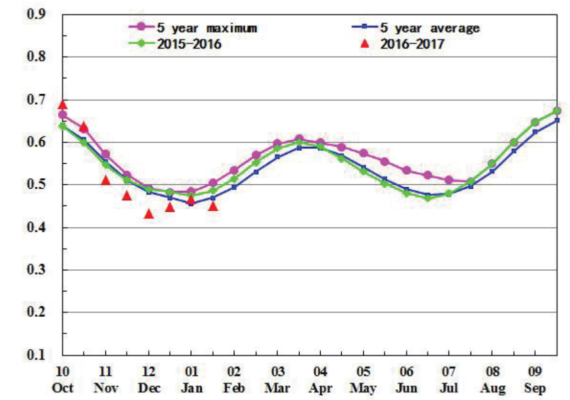
(d) NDVI profiles

[BGD] Bangladesh

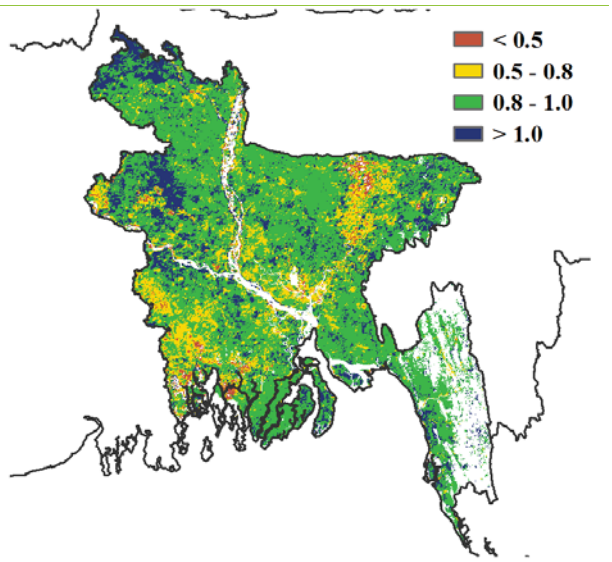
The monitoring period covers the harvesting of late-monsoon Aman and planting of the dry season irrigated Boro rice. Overall, the CropWatch indicators show favorable conditions for the country. Although the previous season monsoon flood damaged the standing Aman rice (as reported in the November 2016 CropWatch bulletin), it also had positive impact on the planting of Boro.

Nationwide, both the fraction of cropped arable land (CALF) and accumulated biomass (BIOMSS) increased, by 1.3 percentage points and 16%, respectively. Temperature (TEMP) and photosynthetically active radiation (RADPAR) were average in the monitoring period. The crop condition development was below average in November and December; however, it turned average from January on forward. The national NDVI profiles and patterns were average, except for Rangpur, Sylhet, and Chittagong, where they (in the case of Chittagong) increased to average after December. The maximum VCI values over the country were above 0.5, pointing to favorable crop condition. Overall, the current increase of cultivated land and biomass as well as good rainfall (RAIN, +5%) contributed to the favorable crop condition for the country.

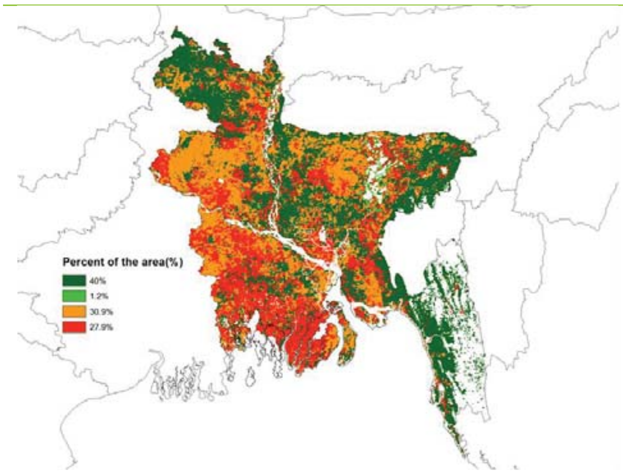
Figure 3.8. Bangladesh crop condition, October 2016-January 2017



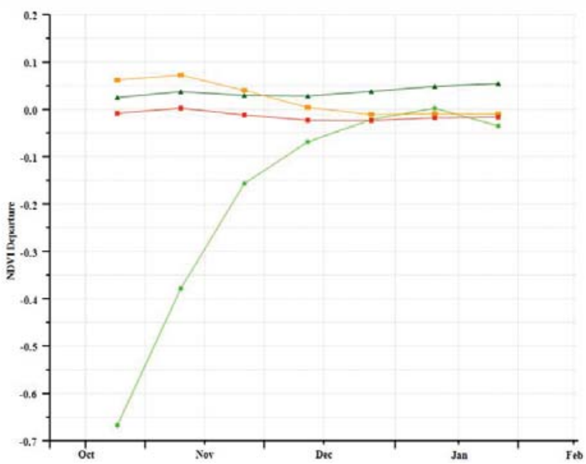
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



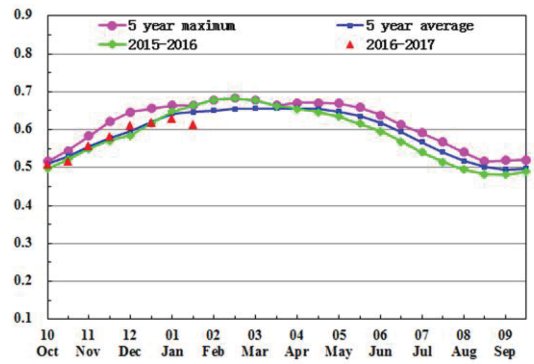
(d) NDVI profiles

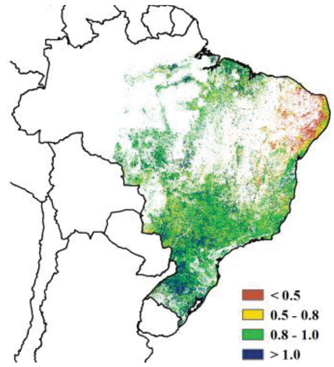
[BRA] Brazil

Generally, crop condition in Brazil was slightly above the average of the previous five years. Harvest of winter wheat was concluded by the end of 2016. The planting of first maize as well as soybean are almost completed by January, while sowing of the second maize is just starting. Overall agroclimatic conditions were "normal" at the national level, with RAIN at 5% above average, TEMP at -0.4°C below, RADPAR 2% above, and BIOMSS 2% below average. As a result of the size of the country, however, agroclimatic conditions vary a lot from state to state. Sufficient rainfall was recorded in the major wheat producing states, as well as in the soybeans and maize producers, especially Rio Grande do Sul (+30% rainfall compared with average). Well below average rainfall occurred in the Nordeste, including Rio Grande do Norte (RAIN, -33%), Paraiba (-49%), Pernambuco (-64%), and Sergipe (-76%). In the states of Mato Grosso do Sul and Mato Grosso, 6% above average rainfall will benefit soybean fields, as well as the second maize to be planted in the coming season. Temperature and radiation were close to average in almost all states.

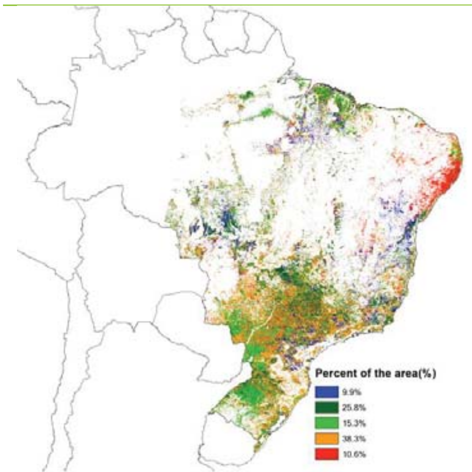
Agronomic indicators consistently show slightly above average crop condition. According to the NDVI-based crop condition development graph, national NDVI was slightly above average and the previous year but decreased to below average by the end of January. The maximum VCI map presents overall favorable condition with the only exception in the Nordeste where VCIx was below 0.5 due to drought. Spatial NDVI patterns and the corresponding NDVI departure profiles also confirm that continuously below average NDVI during the monitoring period mainly occurred in the Nordeste. Above average NDVI mostly occurs in central and southern Brazil and coincides with high VCIx areas. Altogether, CropWatch revised the wheat production to 7,747 ktons, 10% up from the previous harvest season (table B.3 in Annex B).

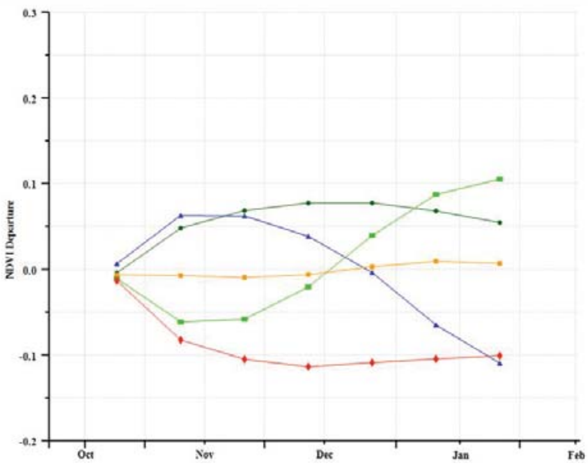
Figure 3.9. Brazil crop condition, October 2016-January 2017





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





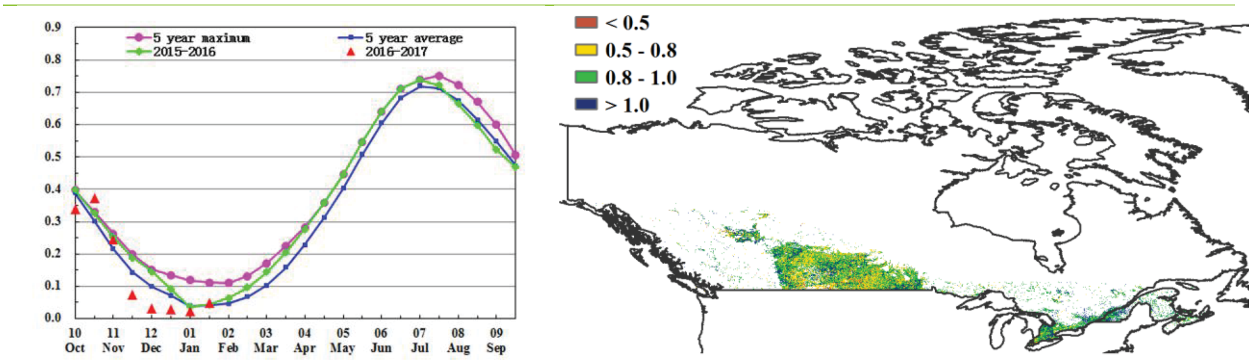
(c) Spatial NDVI patterns compared to 5YA (d) NDVI profiles

[CAN] Canada

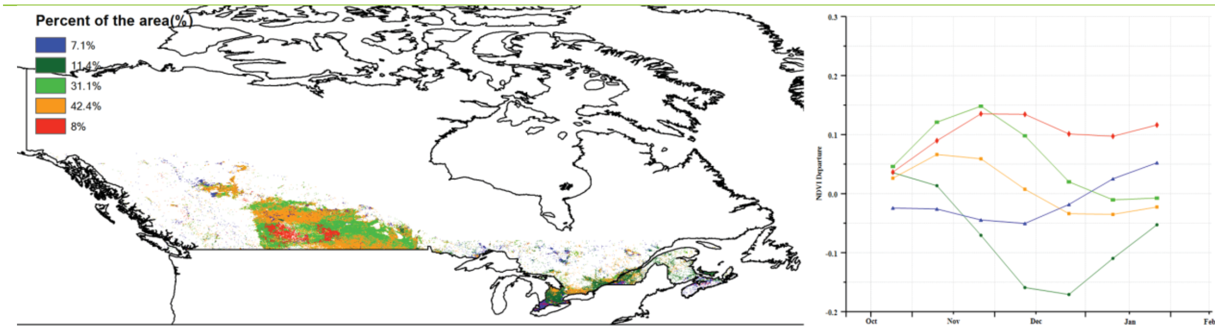
In Canada, only winter crops are grown during the reporting period, during which rainfall was 12% above average, temperature exceeded seasonal values by 1.5°C, and RADPAR was very significantly below average (-9%). Saskatchewan, Manitoba, Alberta, and Ontario together account for 98% of Canadian wheat production, and abundant rain fell in Manitoba (+63%), Saskatchewan (+50%), and Ontario (+24%), while Alberta recorded 5% below average rainfall. As last summer Ontario suffered a serious drought, the current above average rainfall will help avoid future water stress by replenishing soil water, benefitting both winter crops after over-wintering and future summer crops. Contrary to Ontario (TEMP, -0.9°C), other main grain provinces observed above average temperature, including Alberta (+0.9°C), Manitoba (+2.6°C), and Saskatchewan (+1.7°C). The growth of winter crops will be favored by warm weather.

Compared to the five-year average, the cropped arable land fraction (CALF) appeared to have increased by 2.2 percentage points, which may result from the delay in the harvesting period. Overall, crop prospects are currently favorable in Canada.

Figure 3.10. Canada crop condition, October 2016-January 2017



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



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

ARG AUS BGD BRA CAN **DEU** EGY ETH FRA GBR IDN IND IRN KAZ KHM MEX MMR NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF

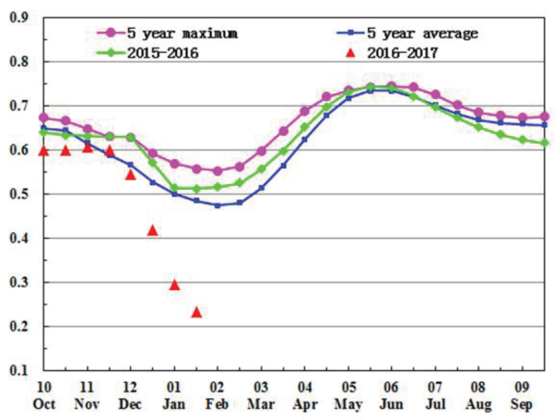
[DEU] Germany

Over the reporting period, the nationwide crop condition, as illustrated by the NDVI development graph, was first below average until early December, close to average until the end of that month, and then very significantly below average. The period (October 2016-January 2017) covers the late stages of sugar beets (October harvest) and early vegetative stages of winter wheat and winter barley (planted in October). Cold and dry agroclimatic conditions prevailed, with indicators showing significant negative departures at the national level for rainfall and temperature (RAIN, -24% and TEMP, -1.4°C), and an 8% decrease in radiation (RADPAR). As a result, the biomass production potential BIOMSS dropped 11% nationwide compared to the five-year average.

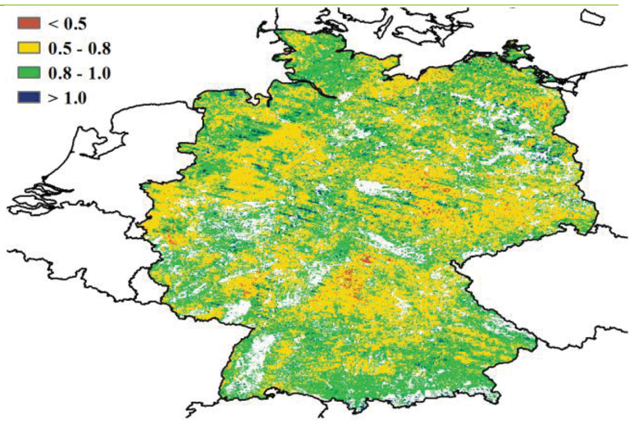
As shown by the spatial NDVI profiles, values were below average from October to early November due to a lack of rainfall in the north, west, and south of Germany. Substantially drier-than-usual conditions in early October in western Germany hampered the sowing of winter crops. In mid-November, most parts of the country enjoyed favorable temperature and precipitation. This then developed into water stress from early November to January, with cold weather and heavy snow sweeping across the country in January. The spatial NDVI patterns also indicate that NDVI was below average from early December to January in 90% of arable land. This spatial pattern is also reflected by the maximum VCI, with a VCIx of 0.83 for Germany overall.

Generally, due to the cold temperature and water stress after early November, and the fact that NDVI plunged before the lasting snow set in in January, CropWatch assesses the current situation of most winter crop areas of Germany as unfavorable.

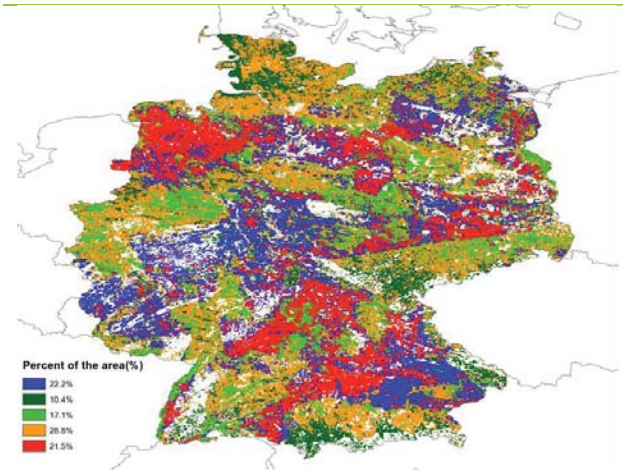
Figure 3.11. Germany crop condition, October 2016-January 2017



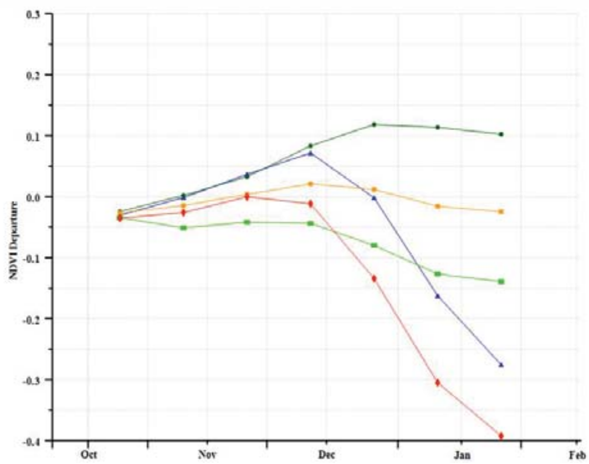
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

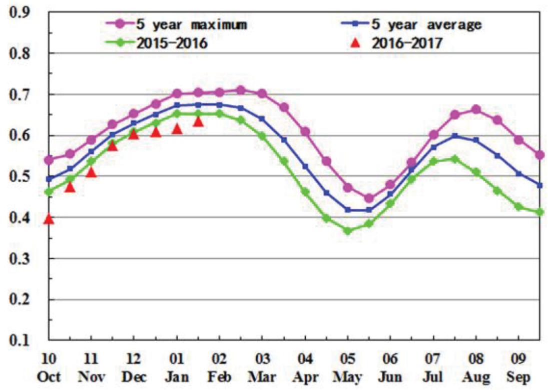
ARG AUS BGD BRA CAN DEU **EGY** ETH FRA GBR IDN IND IRN KAZ KHM MEX MMR NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF

[EGY] Egypt

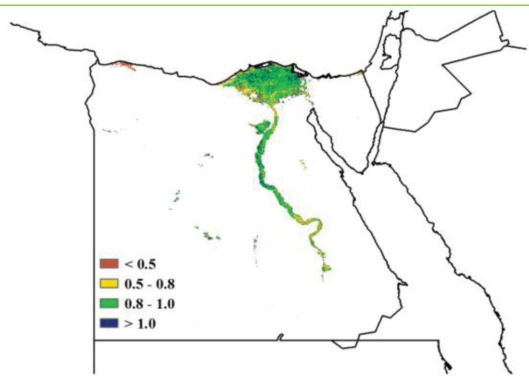
In Egypt, the monitoring period covers the harvesting season of maize and rice, as well as the growing season of winter wheat and barley. The CropWatch agroclimatic indicators show that the period was characterized by a decrease of rainfall below average (RAIN, -35%) and a slight reduction in biomass production potential (BIOMASS, -3%), while temperature and RADPAR were about average (-0.6°C and 0% departures, respectively).

Apart from the sunshine, however, weather plays a minor part in a country where almost all crops are irrigated. The national crop condition development graph based on NDVI shows that crops were significantly below the average of the past five years and below that of the similar monitoring period (October-January) in 2015-2016. The maximum VCI and the spatial NDVI profiles show relatively good crop condition in the delta, while conditions are mixed in the Nile valley, especially in the south, together covering about 50% of the arable land. In general, for this monitoring period, winter crops in Egypt are assessed as below average.

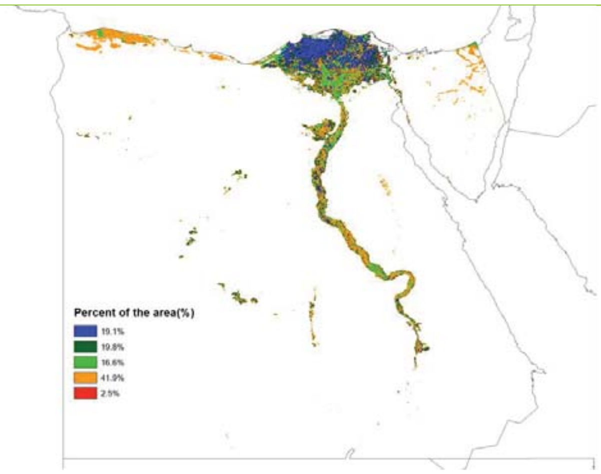
Figure 3.12. Egypt crop condition, October 2016-January 2017



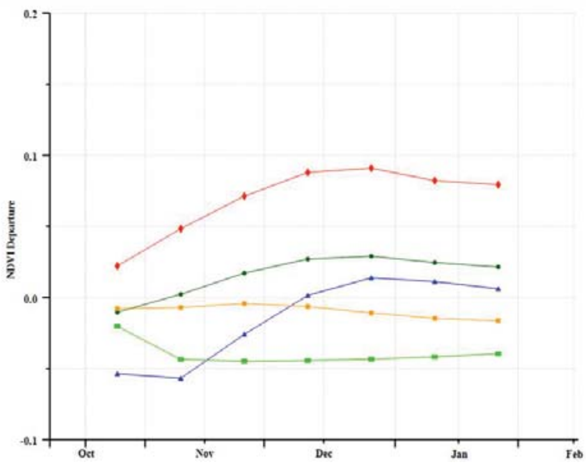
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



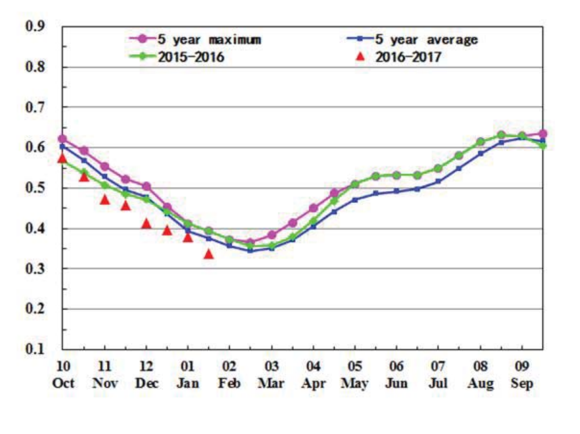
(d) NDVI profiles

[ETH] Ethiopia

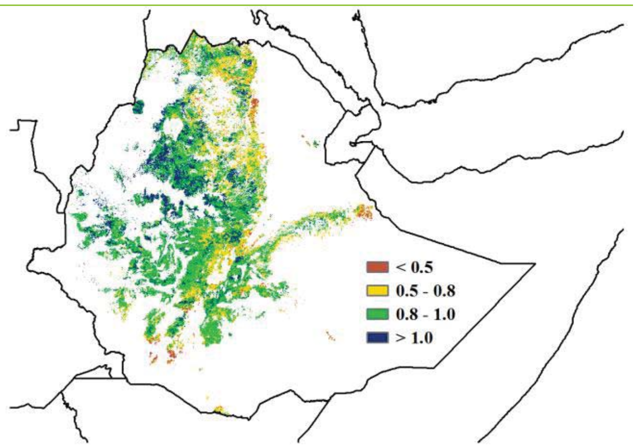
Crop condition was below average during the reporting period for most parts of the country. Rainfall (RAIN) was reduced by about 25% compared to average and only a marginal 116 mm was recorded, whereas radiation (RADPAR) increased by 8%. The southeastern maize belt was the most devastated with about a 44% reduction in rainfall compared to the average. Temperature only increased by a slight 0.2°C, which combined with the prevailing water deficit resulted in a 20% reduction of the biomass production potential (BIOMSS). This affects most crops, such as teff, maize, and barley, that are harvested around December. The maximum VCI was highest (0.9) in the central and northern parts of the country, which include Amhara, Oromia, and North Wollo, as well as parts of northeast SNPP and the far east of Oromia.

The spatial NDVI clusters and profiles revealed trends comparable to those of the previous growing season. Additionally, the fraction of cropped arable land (CALF) increased by 6.8 percentage points, while throughout the monitoring period crop development was below average. Central Amhara, the main teff and wheat producing area, shows high NDVI values of more than 0.8, depicting a generally favorable situation and good production output. About 2% of the country experienced poor conditions, especially in southern parts of SNPP and Oromia. Overall, up to December, below average crop conditions occurred in about 20% of the country, which is likely to affect the Meher harvest. This is particularly true if water shortage occurred at critical phenological stages of the crops. In addition, the current shortage of rain, except in the northwest, will unfavorably affect Belg crops.

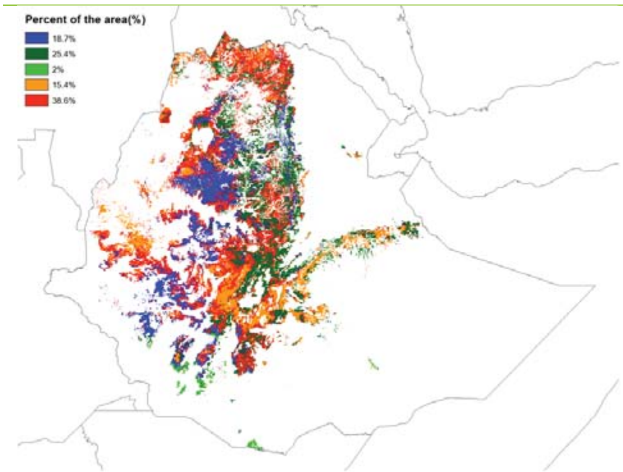
Figure 3.13. Ethiopia crop condition, October 2016-January 2017



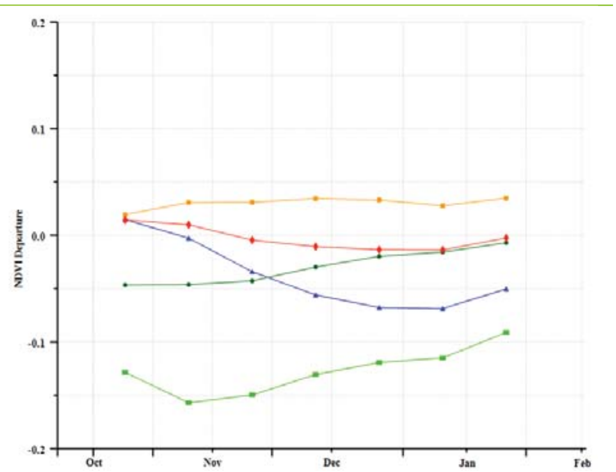
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

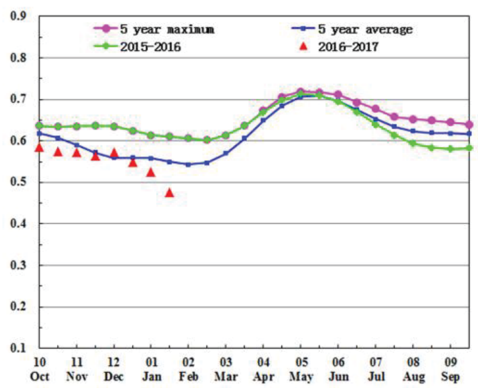
ARG AUS BGD BRA CAN DEU EGY ETH **FRA** GBR IDN IND IRN KAZ KHM MEX MMR NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF

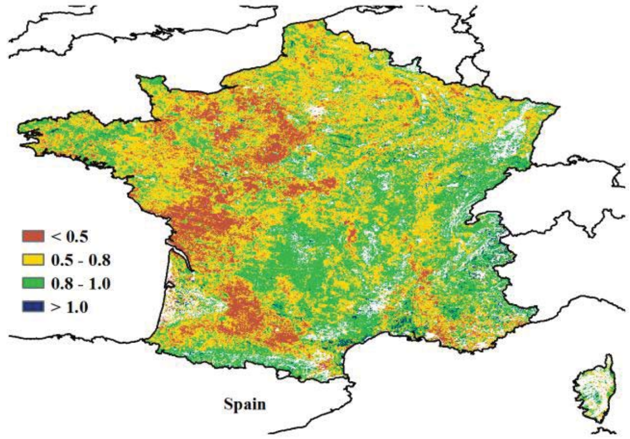
[FRA] France

This monitoring period includes the late stages of sugar beets (October harvest) and the early vegetative stages of soft wheat and winter barley (planted in October). At the national scale, the CropWatch RADPAR indicator for radiation was slightly above average (+3%), but rainfall (RAIN) and temperature (TEMP) were 36% and -3.5°C below average, resulting in a biomass production potential (BIOMSS) drop of 35% below the recent five-year average.

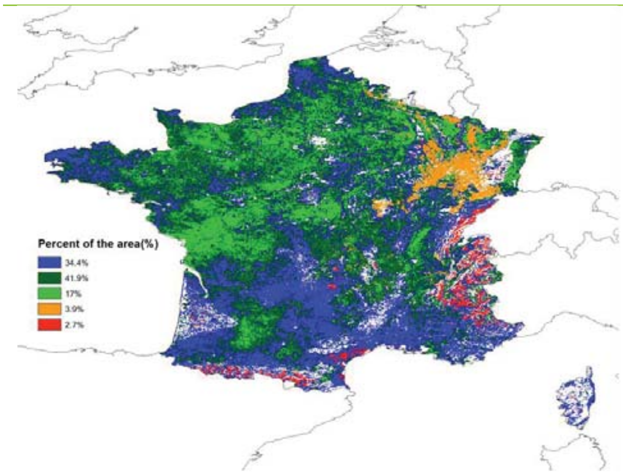
As shown by the crop condition development graph, national NDVI values were basically below average during the whole monitoring period due to drier-than-usual and colder-than-usual conditions, consistent with a maximum VCI of 0.73 for France overall. Maximum VCI in the west, southwest, and southeast of France was low compared to other regions. The country's spatial NDVI patterns indicate a situation that on the whole is worse than the five-year average (especially in the northeast of the country (3.9% of the area) after December), with the exception of 2.7% of agricultural areas, which includes the southern Midi-Pyrénées, southeast of Languedoc-Roussillon, northeast of Rhone-Alpes, and northeast of Riviera. Generally, the CropWatch indicators point at unfavorable condition for most winter crop areas of France, especially in the north-east (Bourgogne to Lorraine and Alsace).

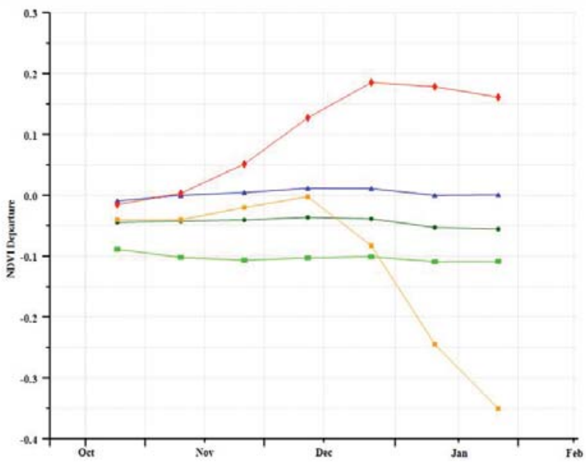
Figure 3.14. France crop condition, October 2016-January 2017





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





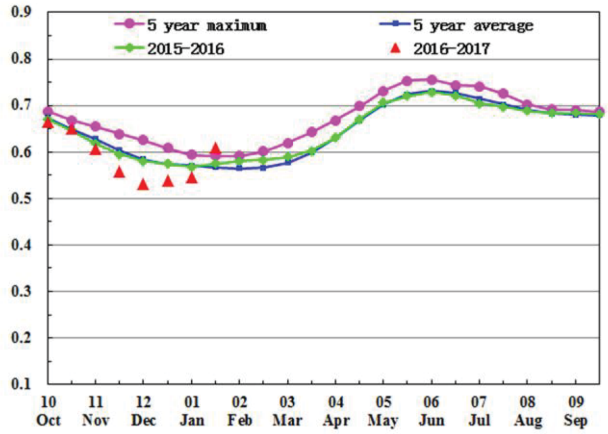
(c) Spatial NDVI patterns compared to 5YA (d) NDVI profiles

ARG AUS BGD BRA CAN DEU EGY ETH FRA **GBR** IDN IND IRN KAZ KHM MEX MMR NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF

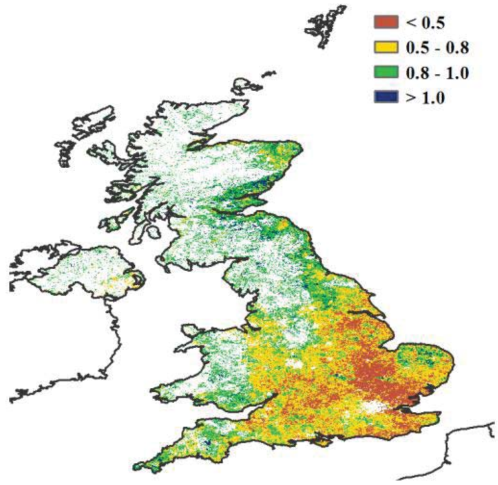
[GBR] United Kingdom

Summer crops (sugar beets) in the United Kingdom have been harvested, and winter crops (winter wheat, winter barley, and rapeseed) have been planted. In the monitoring period, negative departures from average were recorded for both agroclimatic and the agronomic indicators. As shown by the NDVI profiles, national NDVI values were lower than average from November to early January, but above to average by late January. According to the crop condition map based on NDVI, close to 62.1% of the country recorded lower than average NDVI from October to January, while for the remainder (37.9% of the region) crop condition was higher than average, including Norfolk, Suffolk, Yorkshire, Durham, Northumberland, Berwickshire, East Lothian, Midlothian, Fife, Kinross-shire, and Perthshire). This spatial pattern is also reflected by the maximum VCI in the different areas, with a VCIx of 0.87 for the country overall. At the national scale, precipitation totals were 31% below average, and temperature (TEMP, -2.3°C) and radiation (RADPAR, -1.2%) were below the average. Prospects for winter crops are currently unfavorable.

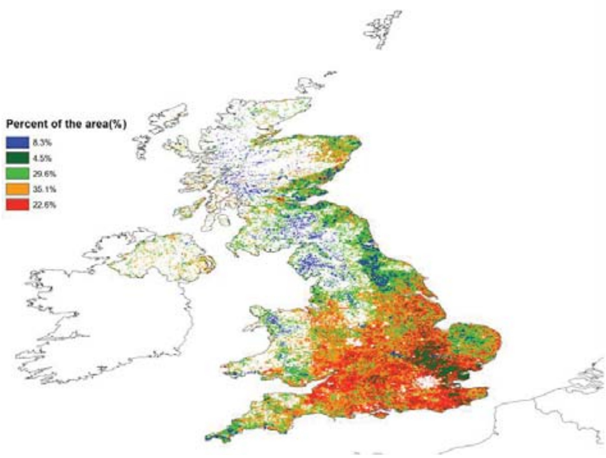
Figure 3.15. United Kingdom crop condition, October 2016-January 2017



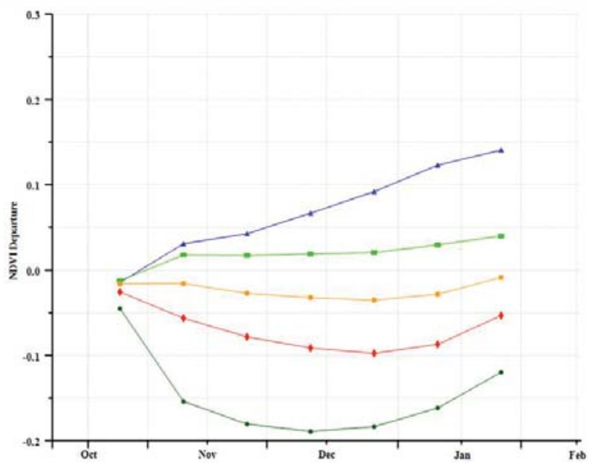
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

ARG AUS BGD BRA CAN DEU EGY ETH FRA GBR **IDN** IND IRN KAZ KHM MEX MMR NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF

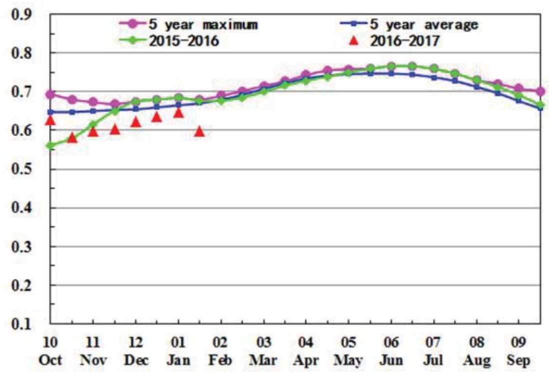
[IDN] Indonesia

The crops in Indonesia generally showed poor condition between November and January. The period covers the harvesting stage of the dry season maize and rice, while wet season crops are currently in the field. Compared with the recent average, precipitation was significantly above average (RAIN, +13%), while temperature was below average (TEMP, -0.6°C) with cloudiness causing a significant drop in sunshine (RADPAR, -7%). BIOMSS increased by 6% compared to the recent five-year average. The area of cropped arable land (CALF) was comparable to the five-year average; VCIx was moderate.

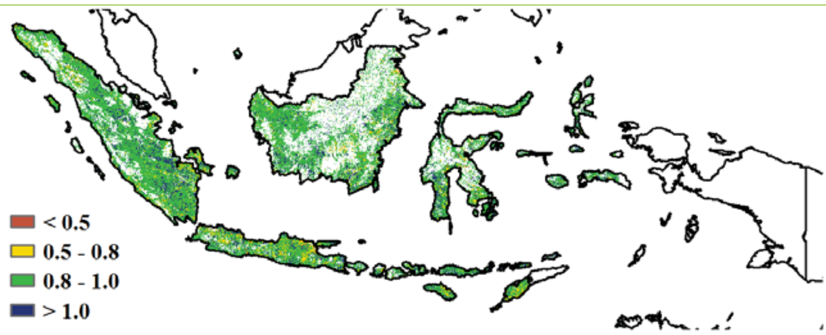
Nationwide, the NDVI development curve was below both normal and last year's values from November. In November and December, crops in over 25% of the country were in poor condition, especially on the island of Sumatra. According to the spatial patterns of NDVI profiles, in the southern and eastern part of Kalimantan, rice was below average condition from mid-December to January.

Altogether, although the NDVI profiles showed poor crop growth condition, the abundant rainfall during the reporting period benefited the wet season crops and fair production can be expected.

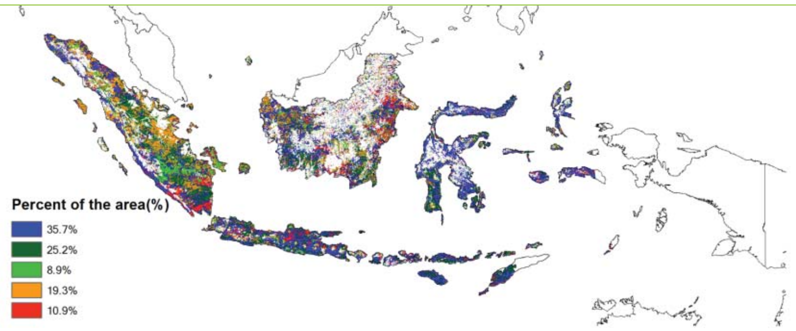
Figure 3.16. Indonesia crop condition, October 2016-January 2017

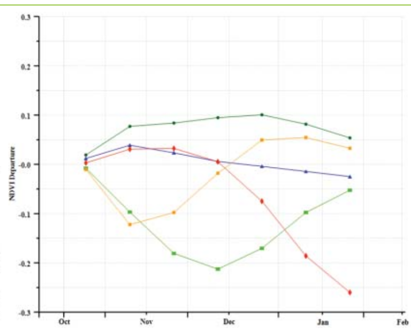


(a) Crop condition development graph based on NDVI



(b) Maximum VCI





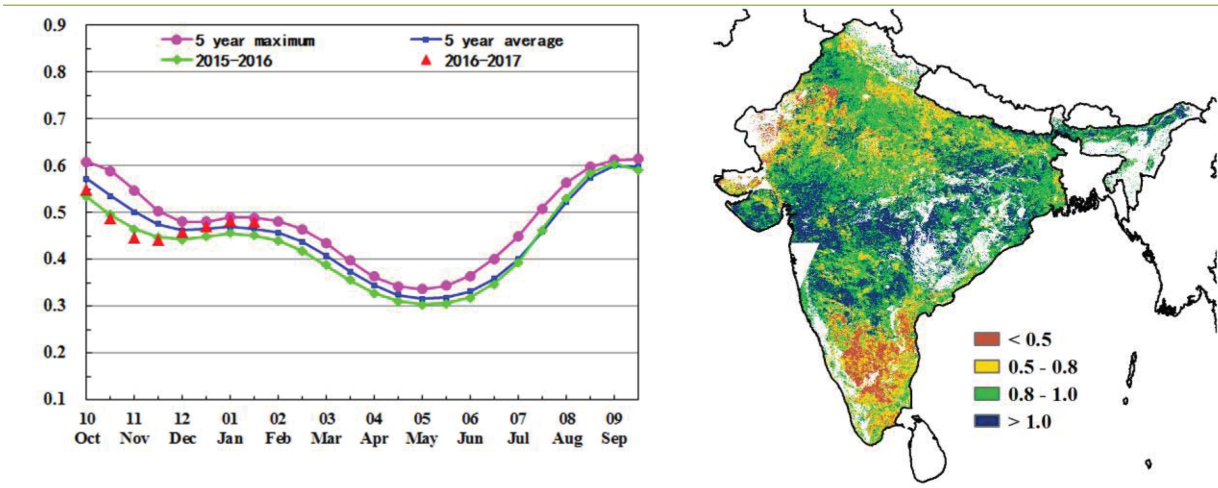
(c) Spatial NDVI patterns compared to 5YA

(d) NDVI profiles

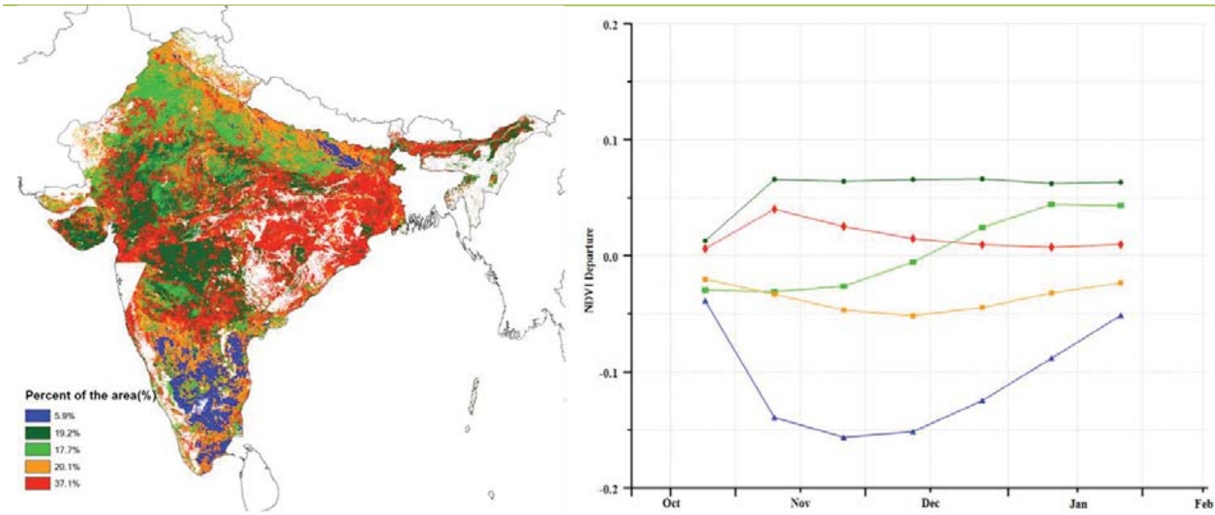
[IND] India

The monitoring period corresponds to the harvest of Kharif crops. The assessed crop condition is poor, and reduced output is expected primarily due to the below average rainfall and decreased area of cultivated land. Noticeably, crops in the south Indian states are in poor condition. During the monitoring period the country experienced 30% less rainfall (RAIN) than expected, including Andhra Pradesh (RAIN, -71%), Assam (-7%), Bihar (-23%), Chhattisgarh (-25%), Goa (-69), Jharkhand (-58%), Kerala (-62%), Karnataka (-74%), Maharashtra (-42%), Madhya Pradesh (-34%), Nagaland (-15%), Odisha (-28%), Tamil Nadu (-60%), and West Bengal (-18%). The national biomass accumulation potential (BIOMSS) is -20% below the previous five-year average and linked to the poor performance of rainfall. All of the mentioned rainfall deficit states experienced low BIOMSS ranging between -17% and -64%. Crop condition development was below average during October to November, but turned average starting in early December. The NDVI values and spatial NDVI patterns were average over the country except in the south Indian regions. Again, the maximum VCI values were below 0.5 in south Indian regions, confirming poor crop condition. The crop arable land fraction (CALF) dropped by -0.56 percentage points compared to the previous five-year average. Temperature (TEMP) was average, while photosynthetically active radiation (RADPAR) was +3% above average. Damage caused by floods in previous months (reported in the November 2016 bulletin) along with the present condition of deficit rainfall altogether result in poor crop condition for the country. Reduced output is expected.

Figure 3.17. India crop condition, October 2016-January 2017



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



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

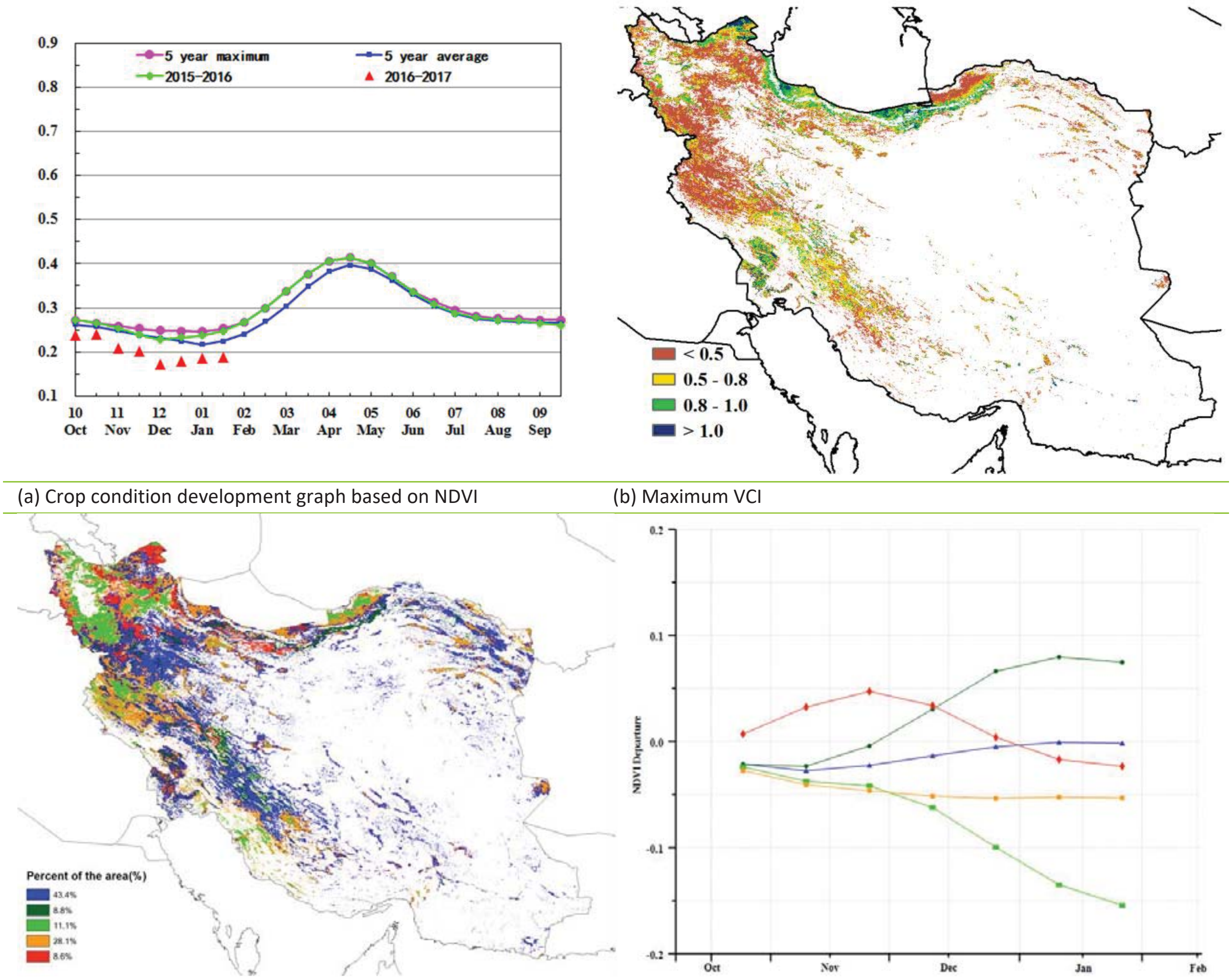
[IRN] Iran

Crop condition was generally below average from October 2016 to January 2017 in Iran. The planting of winter wheat has been completed, while it was still underway for barley in late January. Accumulated rainfall (RAIN, -1%) and temperature (TEMP, -0.3°C) were below average during the monitoring period, while radiation (RADPAR, +1%) was close to average. The unfavorable weather conditions resulted in the decrease of the potential biomass indicator (BIOMSS) by 15%. The national average of VCIx (0.42) was below average and rather low for a national value.

According to the national NDVI development graphs, crop condition was below average for the entire monitoring period in most of Iran. Above average crop condition from October to early December was mainly distributed in the Ardabil province of the northwest region. Some areas of Mazandaran and Golestan provinces of the central-north region, and Fars province of the southwest region, experienced favorable crop conditions over the reporting period.

Overall, the outcome for the winter crop season is estimated to be unfavorable.

Figure 3.18. Iran crop condition, October 2016-January 2017



(a) Crop condition development graph based on NDVI

(b) Maximum VCI

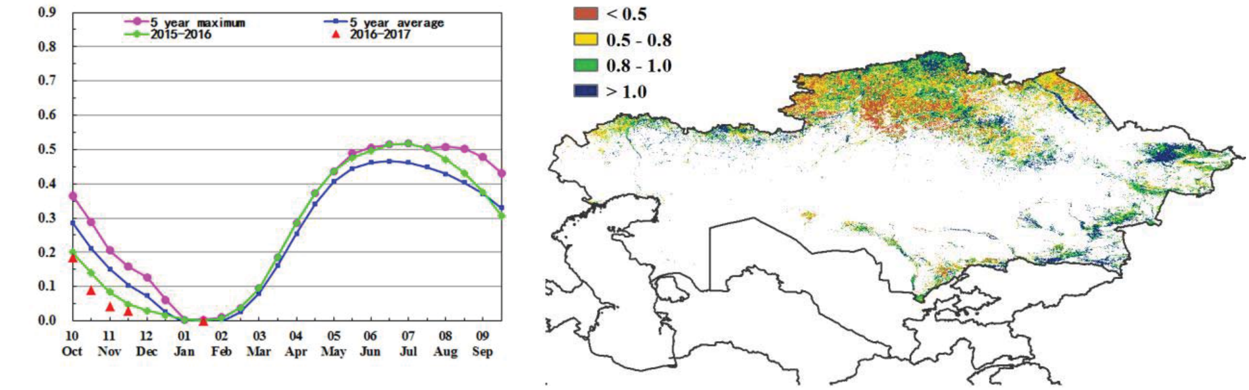
(c) Spatial NDVI patterns compared to 5YA

(d) NDVI profiles

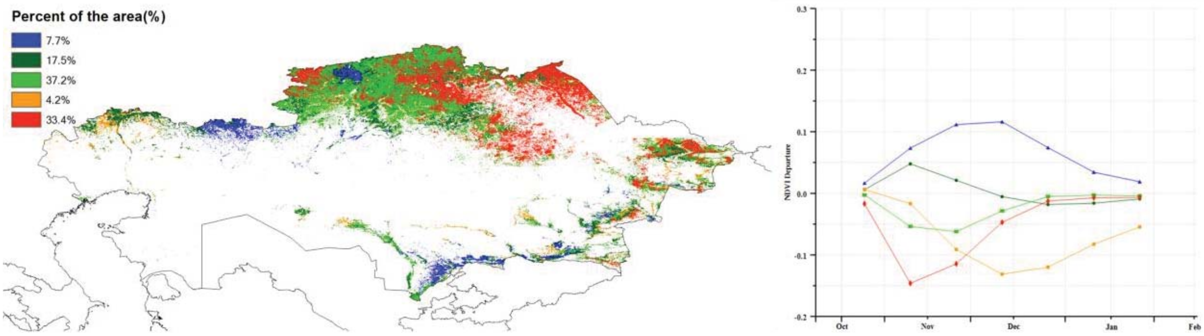
[KAZ] Kazakhstan

This analysis covers the harvesting period of last year's summer crops (cereals, spring barley, and wheat) from October 2016 to late January of this year. Among the nationwide CropWatch agroclimatic indicators, compared with average, rainfall showed and increase (RAIN, +40.8%), temperature a decrease (TEMP, -1.3°C), and RADPAR a sharp decrease (RADPAR, -8.4%); the biomass production potential (BIOMSS) is expected to drop by 6.8%. The only region where rainfall decreased (RAIN, -2%) is the northeastern Zapadno-Kazakhstanskaya Oblast. NDVI clusters indicate that crops were in poor condition from October to December in the Oblasts of Severo-Kazakhstanskaya (north Kazakhstan) and Akmolinskaya (central region of Akmola). No crop was planted since November, and from December the NDVI index has been close to zero. The crop condition development graph also showed that crops were worse off than last year and the average of the last five years, but favorable rainfall has provided the appropriate soil moisture for the initial stages of the forthcoming crops.

Figure 3.19. Kazakhstan crop condition, October 2016-January 2017



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



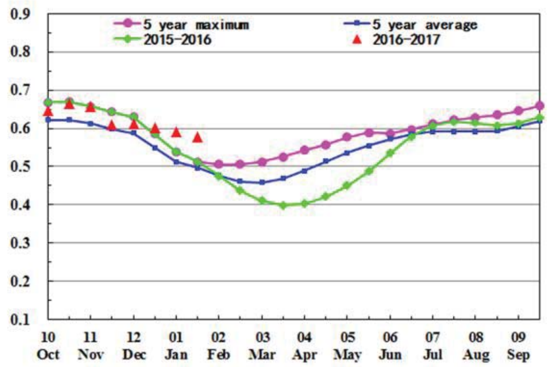
(c) Spatial NDVI patterns compared to 5YA (d) NDVI profiles

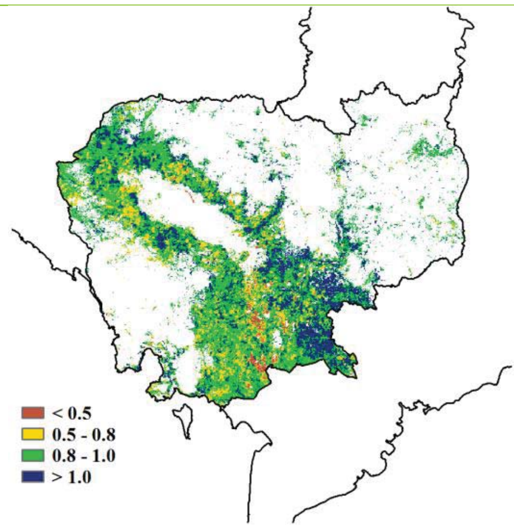
[KHM] Cambodia

October to January covers the growing period of the main (wet season) rice crop, and the early stage of the second (dry season) rice in Cambodia. The fraction of cropped arable land was a little lower than the average of the previous five years (-4 percentage points). Compared to average, the CropWatch agroclimatic indicators show a sharp decrease in radiation (RADPAR, -10%) and a slight temperature decrease (TEMP, -0.3°C) with a more than doubling of rainfall (RAIN, +120%), causing a 62% increase in the biomass production potential (BIOMSS).

Favorable conditions resulted in NDVI exceeding the five-year average in over 90 percent of cropland in the country. Sufficient rainfall was beneficial for the sowing and emergence of second rice. Vegetation condition indices (VCIx) are high (>0.8) in most parts of the country. The condition of crops in the country is better than average.

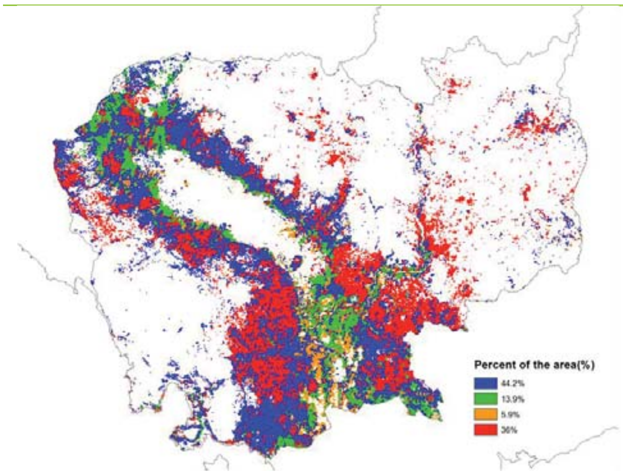
Figure 3.20. Cambodia crop condition, October 2016-January 2017

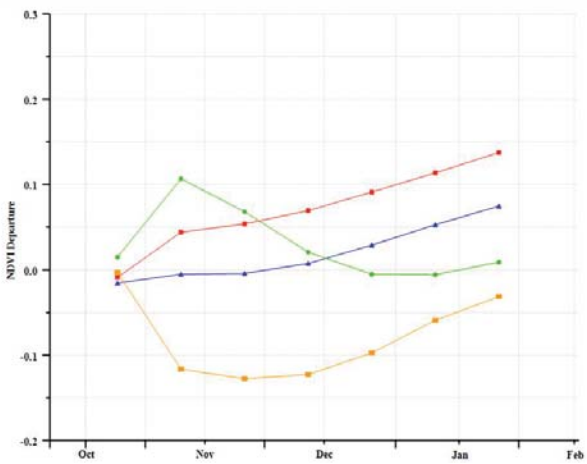




(a) Crop condition development graph based on NDVI

(b) Maximum VCI





(c) Spatial NDVI patterns compared to 5YA

(d) NDVI profiles

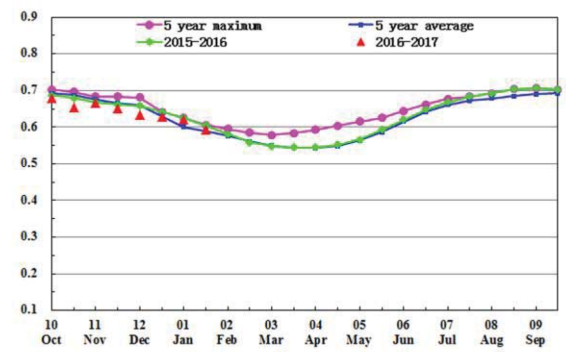
[MEX] Mexico

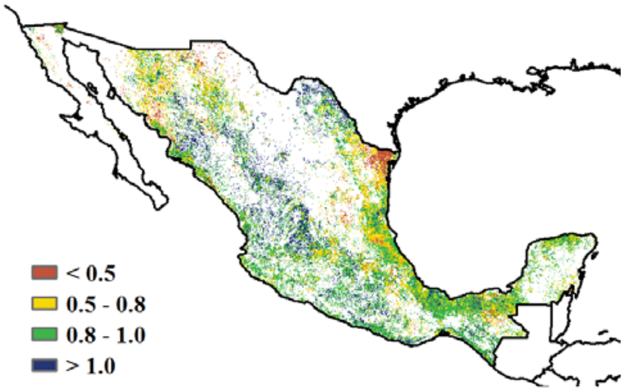
During the monitoring period, maize, sorghum and rice grown during the spring through summer period had been already been harvested, while autumn maize, sorghum and wheat were being planted. Overall, the condition of crops was average, as shown by the national NDVI development graph.

The CropWatch agroclimatic indicators show that rainfall significantly decreased by 24% compared to average, whereas temperature and RADPAR rose respectively by 0.6°C and 1%. Consequently, the biomass production potential (BIOMSS) was below average, with a decrease of 9%. The maximum VCI at the national level was 0.88, with high values being located in Sinaloa, Durango, Nayarit, Zacatecas, Jalisco, and Guerrero, while low values appear in Tamaulipas, Sonora, and Chihuahua. According to the map of spatial NDVI patterns compared to the five-year average and the corresponding NDVI departure profiles, 31% of crop areas in Mexico were continuously below average, mainly situated in Sonora, Sinaloa, Yucatan, Quintana Roo, Oaxaca, and Chiapas. Crops in favorable condition are widely distributed throughout the country: with crops above average in 25.7% of planted areas and average in 43.3% of cropland.

Considering the cropped arable land fraction (CALF) was 8.48 percentage points over average, the crop yields of the current season are estimated to be above average.

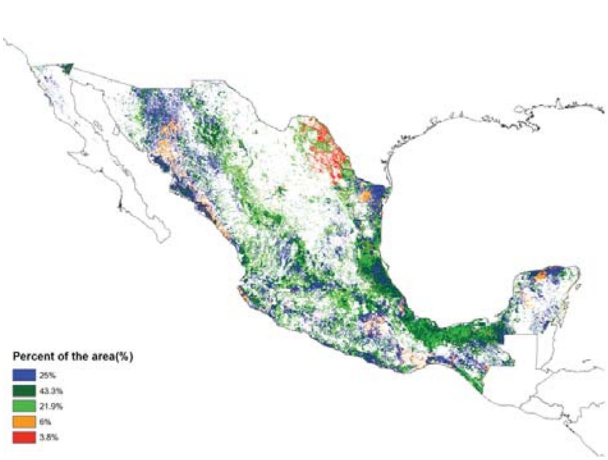
Figure 3.21. Mexico crop condition, October 2016-January 2017

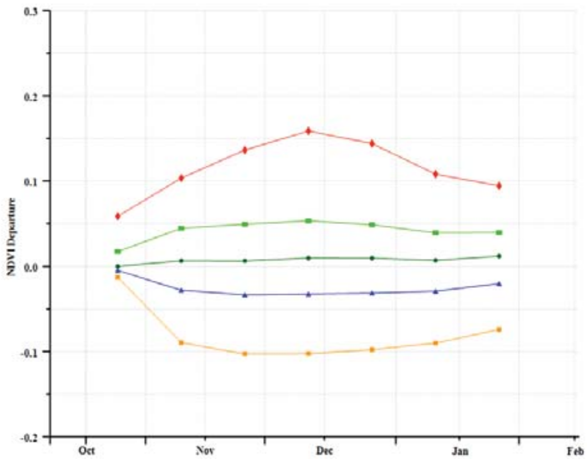




(a) Crop condition development graph based on NDVI

(b) Maximum VCI





(c) Spatial NDVI patterns compared to 5YA

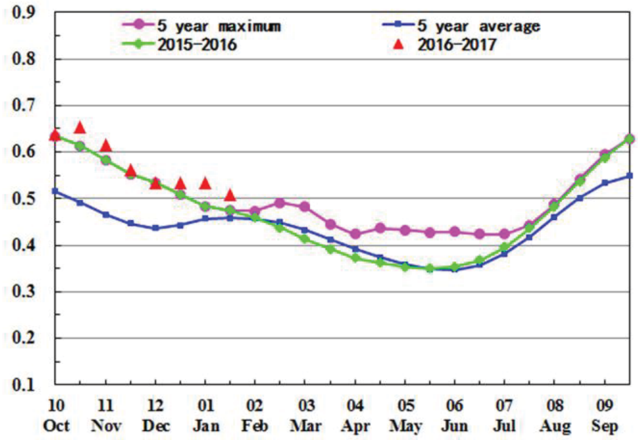
(d) NDVI profiles

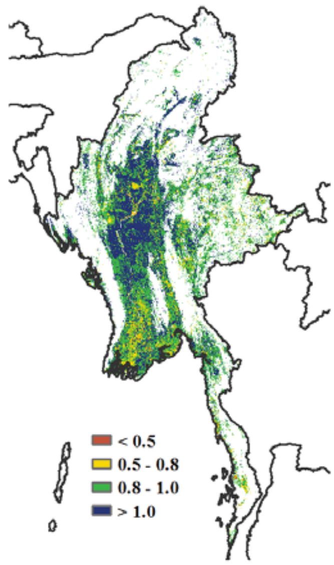
[MMR] Myanmar

The reporting period corresponds to the harvesting season of rice and the planting season of maize and wheat in Myanmar. As shown by the CropWatch agro-climatic, rainfall increased by 9%; temperature remained almost average (TEMP, +0.2°C), while radiation showed a slight decrease (RADPAR, -3%). The fraction of cropped arable land (CALF) showed no change and the biomass accumulation potential (BIOMSS) increased by 10% compared to its five-year average value. The indicators suggest that sufficient precipitation promoted crop condition, while the area of cultivated farmland remained average.

National crop condition development profiles were above the five-year maximum and exceeded the previous five-year average during the whole period. The spatial NDVI profile values were below average from October to January in some scattered areas of Yangon, while the rest of the country performed well, which is consistent with the maximum VCI map. According to CropWatch indicators and a high maximum VCI value, overall crop condition in Myanmar is good.

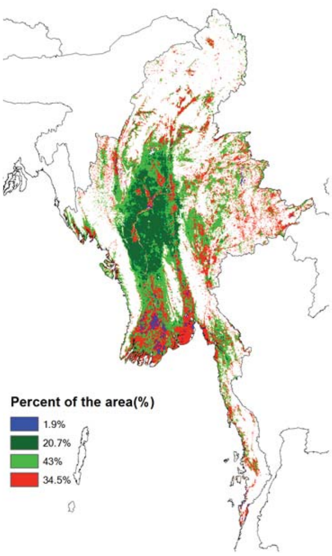
Figure 3.22. Myanmar crop condition, October 2016-January 2017

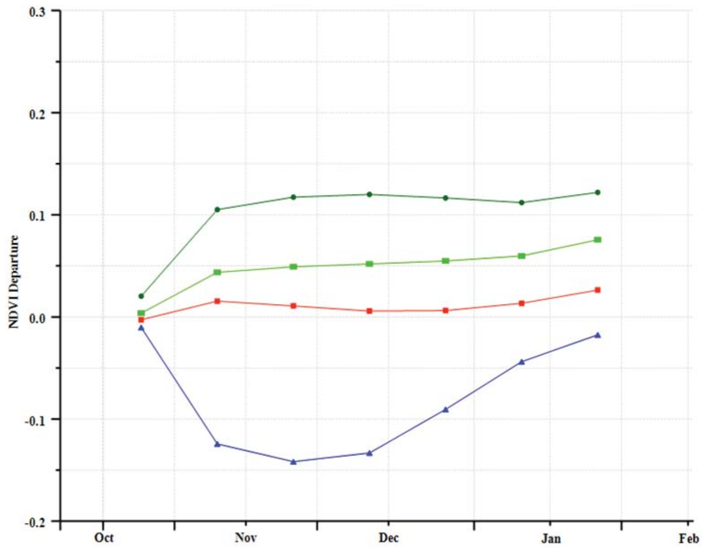




(a) Crop condition development graph based on NDVI

(b) Maximum VCI





(c) Spatial NDVI patterns compared to 5YA

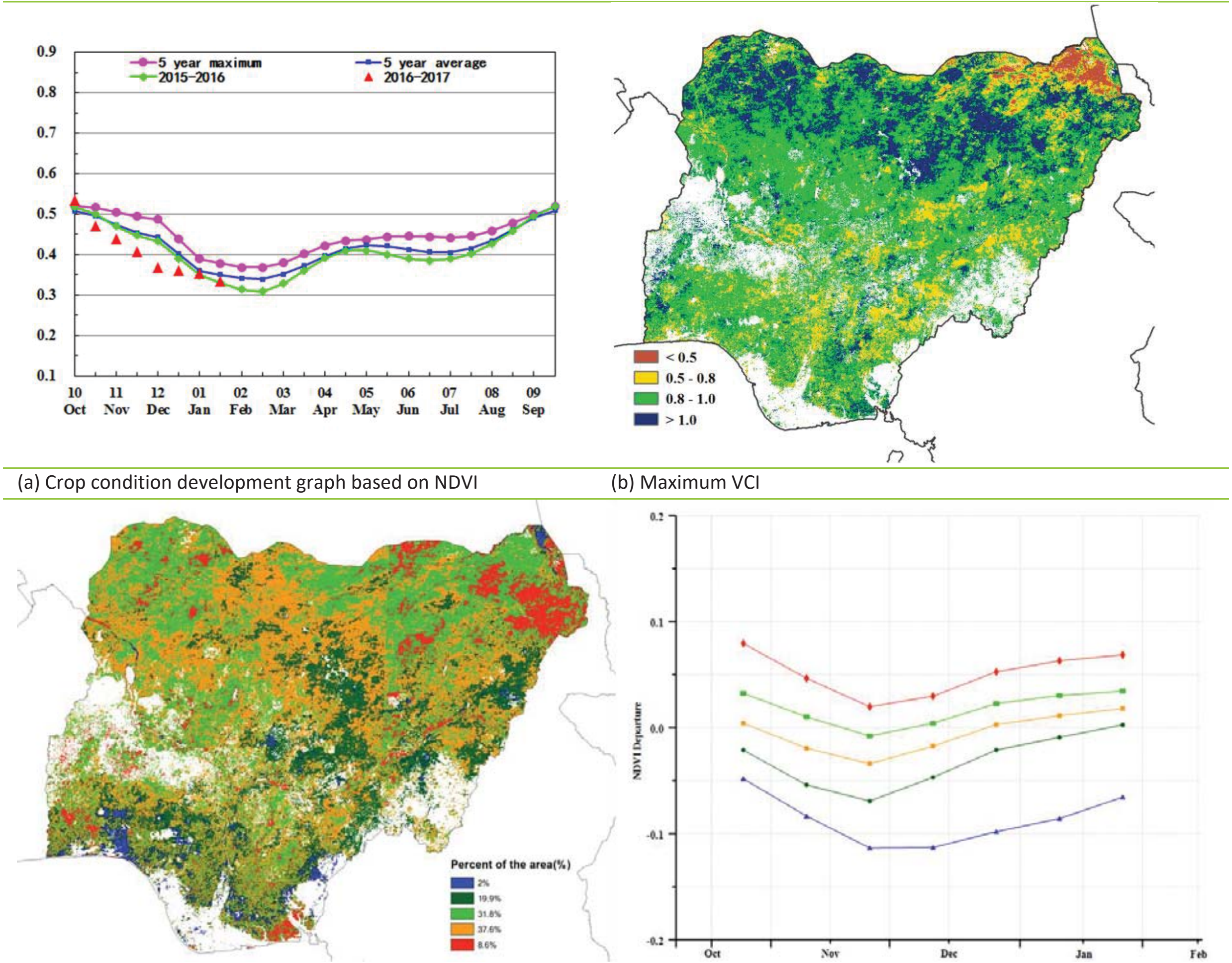
(d) NDVI profiles

[NGA] Nigeria

During the monitoring period, Nigeria has been harvesting the second maize crop, rice, cotton, peanuts, and potatoes, while it was the sowing period for rice (the second crop for the north and south regions). Furthermore, according to the crop calendar, cassava has been planted. Compared to average, the agroclimatic indicators show a slight reduction in precipitation (RAIN, -5%), which results in a reduction of 9% of biomass production potential (BIOMSS). The Soudano-sahelian region experiences the worst rainfall decrease (RAIN, -51%) linked to a 50% decrease in BIOMSS. Temperature and radiation were generally average. Nationwide, an increase occurred in the fraction of cropped arable land (CALF, +2.40 percentage points) compared to the five-year average.

The NDVI development profiles indicate that crop condition generally was less favorable than the five-year average and also less favorable than conditions for the same monitoring period last year (November 2015-January 2016). Maximum VCI reveals a poor crop condition in the Borno region in the north of the country. Better crop condition occurs in a broad strip from Kebbi state in the west to Yobe state in the east, with VCIx values from 0.8 to 1 and values higher than 1. The spatial NDVI patterns and clusters indicate that crop condition was generally above average over the northern region of the country (8.6% of the total agricultural area) and poor in some patches in the southern regions (2.0% of area).

Figure 3.23. Nigeria crop condition, October 2016-January 2017



(a) Crop condition development graph based on NDVI

(b) Maximum VCI

(c) Spatial NDVI patterns compared to 5YA

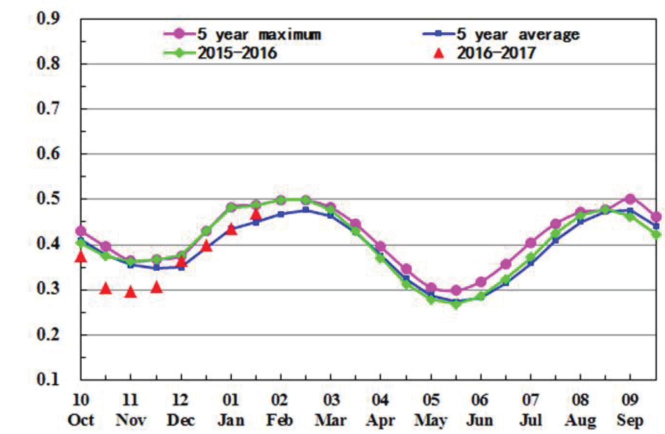
(d) NDVI profiles

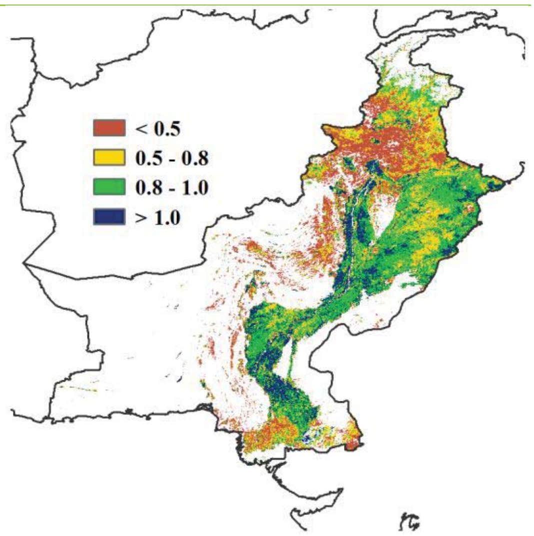
[PAK] Pakistan

The main crops in the field during the reporting period are winter wheat and winter barley, as well as maize and some patches of rice nearing maturity. Agroclimatic and agronomic conditions for the reporting period were about average or above: RAIN, +30%; RADPAR, -1%; TEMP, +0.4°C; and CALF, +5%. For the different sub-zones in the country, the most variable factor was rainfall (RAIN), noting: (i) +6% in the northern highlands of FATA and NWFP, with VCIx values mostly below 0.5; (ii) +16% in North Punjab, with VCIx usually above 0.5 and no low values; (iii) +60% in the main irrigated areas of the Lower Indus Basin, where most of the above-average NDVI values and high VCIx occur; and (iv) +127% in Baluchistan where the supplementary water will no doubt boost irrigated crops.

At the national level maximum VCI was 0.82 on average, while the biomass production potential (BIOMSS) increased 20%, with spatial variations from -1% in the northernmost areas, due to above-average temperature (+0.8°C) to 48% in the lower Indus basin. Most positive values are probably exaggerated, as rainfall mostly supplements irrigation in many areas. Even considering that the cropped arable land fraction (CALF) did not change significantly compared with previous years, crop prospects are at least average in Pakistan.

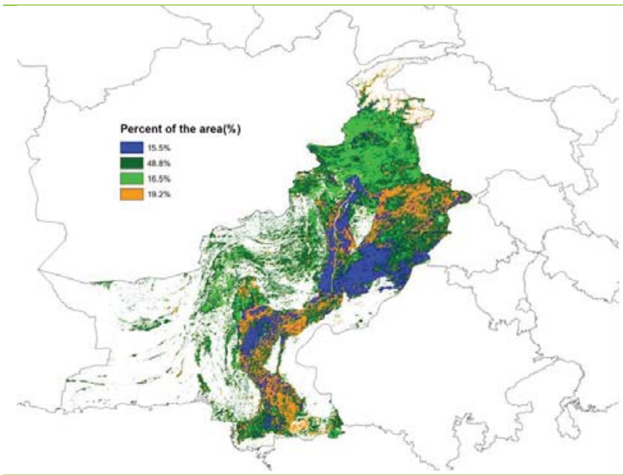
Figure 3.24. Pakistan crop condition, October 2016-January 2017

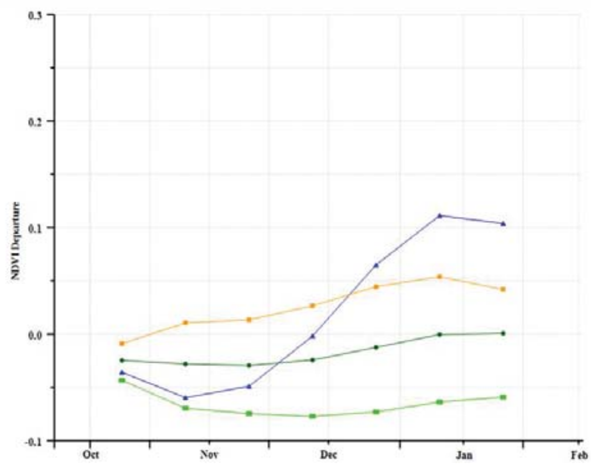




(a) Crop condition development graph based on NDVI

(b) Maximum VCI





(c) Spatial NDVI patterns compared to 5YA

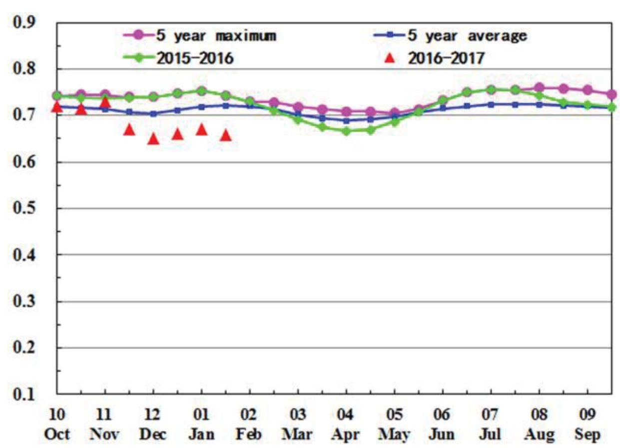
(d) NDVI profiles

[PHL] The Philippines

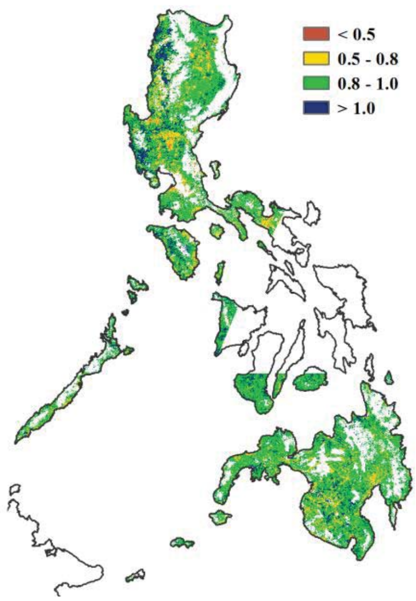
The monitoring period covers the harvesting stage of last year's main rice, as well as the sowing and growing stage of secondary rice and maize. Nationwide, precipitation (RAIN) presents a positive departure of 50% over average, accompanied by decreased temperature (TEMP, -0.5°C) and below average radiation (RADPAR, -6%). The biomass accumulation potential (BIOMSS) shows an increase of 20%. The fraction of cropped arable land (CALF) for the Philippines is comparable to the five-year average, while the VCIx during the monitoring period is 0.9.

As shown in the NDVI condition development graph, the NDVI curve was below both the five-year average and last year's values from December. In January, storms brought some heavy and short duration rain (see section 5.2 on disasters), causing flash floods in northern Mindanao and the Visayas; secondary rice suffered badly in some areas, which is confirmed in the spatial patterns of NDVI profiles. Crop condition in Calabarzon and Western Visayas (accounting for about 17% of the country's area), dropped below average from January. The adverse weather was subscribed to limited areas and lasted only a short time. As a result, the nationwide output of crops can be expected to be fair.

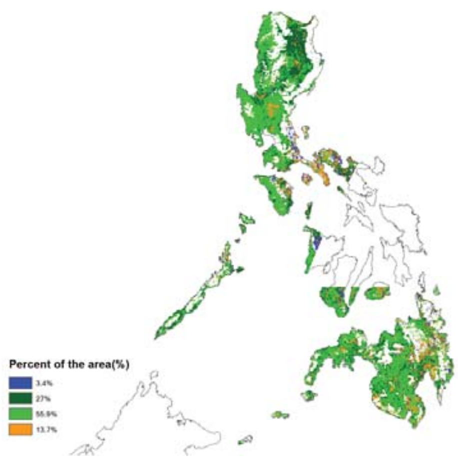
Figure 3.25. Philippines crop condition, October 2016-January 2017



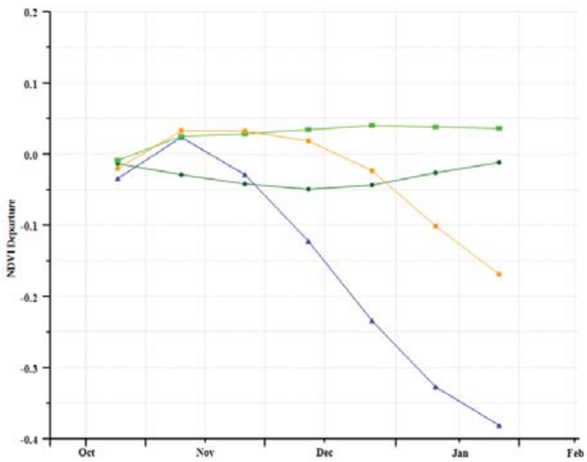
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

ARG AUS BGD BRA CAN DEU EGY ETH FRA GBR IDN IND IRN KAZ KHM MEX MMR NGA PAK PHL **POL** ROU RUS THA TUR UKR USA UZB VNM ZAF

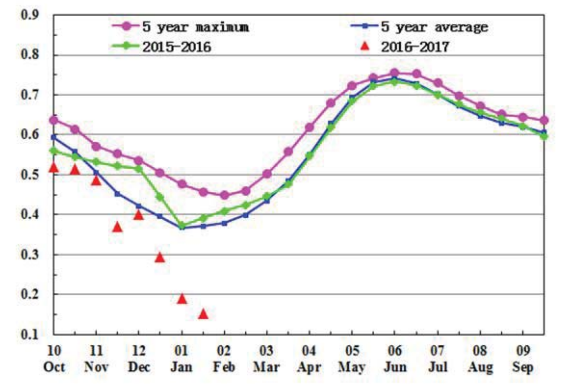
[POL] Poland

In Poland, this monitoring period witnessed the harvest of maize (before October) and the sowing of winter wheat. The cropped arable land fraction (CALF) was close to average. From October to January, weather conditions were wetter and colder than average: rainfall departure was +31%, while temperature decreased 1.0°C. RADPAR decreased 14%, and the potential biomass production potential (BIOMSS) was below average due to the cold weather conditions.

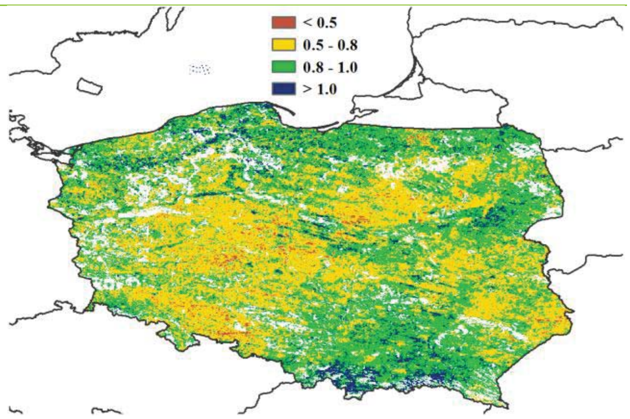
As shown in the national crop condition development graph and the NDVI profiles, NDVI values were below average at the end of January in all but 20% of the croplands, which are located in the south around the Lesser Poland Voivedeship, the area with the warmest climate in Poland (Malopolske, Slaskie, and Opolskie). It is not clear to what extent this is due to snow, which covered the country from January 5 on forward: NDVI started dropping in November, when there was limited and only transient snow cover.

The VCIx in Poland during this monitoring period was 0.88. The snow has probably protected crops from cold weather and will provide enough soil moisture. The outlook of winter crops is mixed to average.

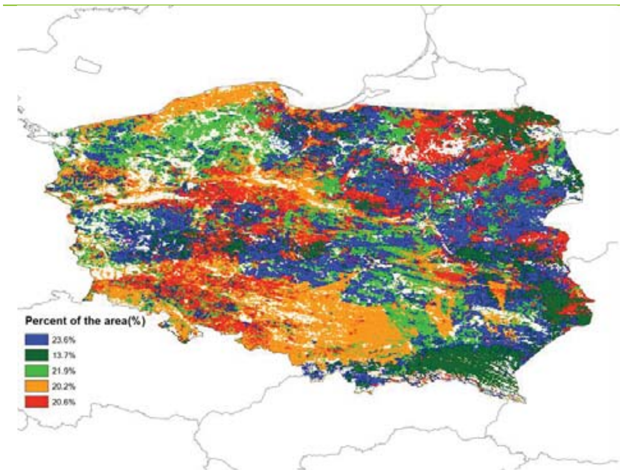
Figure 3.26. Poland crop condition, October 2016-January 2017



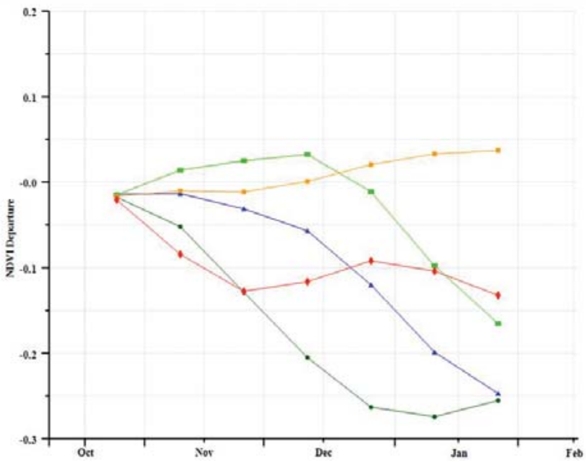
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

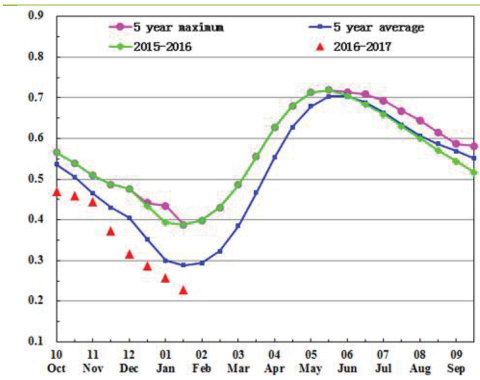
[ROU] Romania

Over the reporting period, the main crops in Romania are maize (harvested in 2016) and early stages of winter wheat. Nationwide, rainfall exceeded average by 11% and CALF increased 2.19%, with other indicators mostly below average (RADPAR, -6%; TEMP, -2.2°C; and maximum VCI, 0.73, with a lot of spatial variability). The spatial distribution of NDVI profiles clearly shows the effect of snow that typically depresses NDVI: Early snow was sporadically recorded over the Transylvanian plateau (and the neighboring highlands) from mid-November, in an area that makes up about 16.5% of arable land and where NDVI decreased throughout the reporting period. This is, nevertheless, the area where most high VCIx values are concentrated.

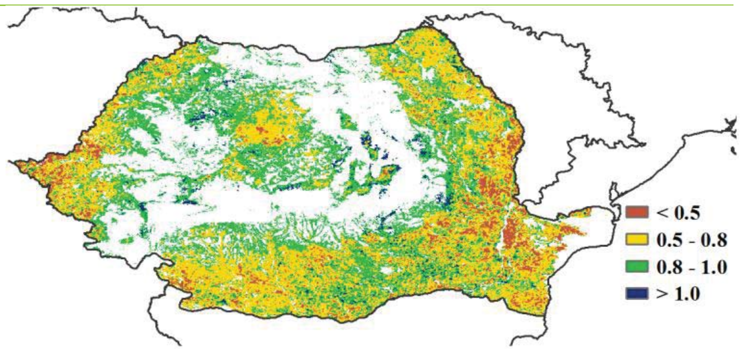
Snow eventually spread to the northern half of the country in December, which is when NDVI started dropping in the eastern Danube valley and the Delta (12.2% of arable lands). The Delta is also where most low VCIx values occur. From early January, the whole country was covered with snow, up until the end of the month and beyond. Most areas retained about average NDVI (53.5% of the territory), with moderate negative anomalies in the area west of Carpathians, as well as the Getic plateau in the west and the Budjak steppe in the east. Moderate positive departures, which varied during the season between 0 and 0.1 NDVI units, occur in 17.9% of the country, mostly concentrated between the eastern Carpathian and the Moldavian border.

Due to the presence of snow, the interpretation of NDVI can be problematic. However, considering that temperature was not excessively low and that crops were protected by snow, there is no specific reason to consider that crops will not be fair.

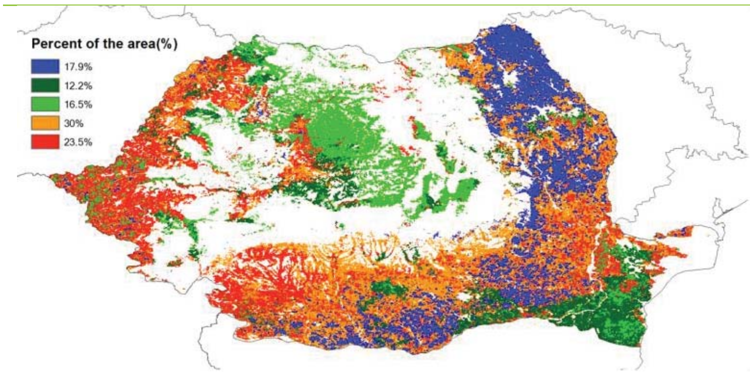
Figure 3.27. Romania crop condition, October 2016-January 2017



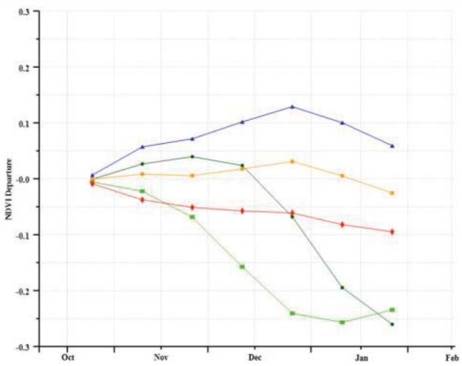
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

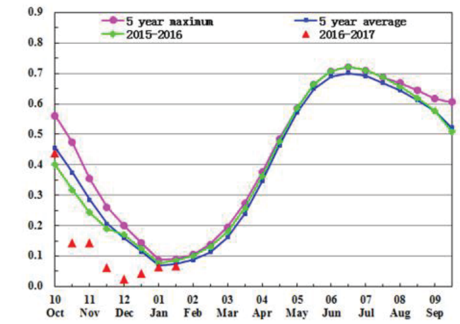
[RUS] Russia

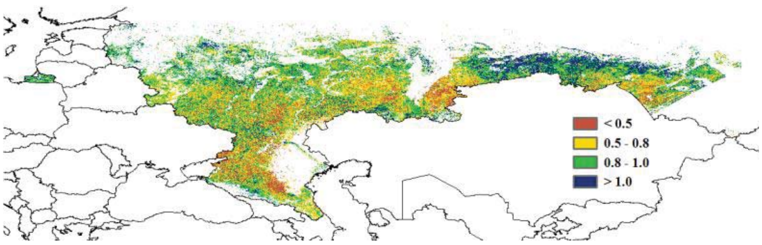
During the monitoring period, the sowing of winter wheat was delayed but nevertheless completed before November, while maize and spring wheat were harvested up to October. Cropped arable land (CALF) increased by a spectacular 16 percentage points compared to the five-year average. Like parts of the Central Europe to Western Russia MPZ, the weather in Russia was colder than average. Rainfall was average (RAIN, -0.7%), but temperature decreased 1.8°C below seasonal values. The biomass production potential indicator (BIOMSS) also decreased 18.3% due to the poor weather condition. Specifically, in Kostromskaya oblast, rainfall and temperature were well below average (RAIN, -21% and TEMP, -2.0°C). The largest precipitation deficit and the largest negative temperature anomaly occurred in the Komi-Permyak okrug (-32% and -3.5°C).

NDVI is normally low during the Russian winter (0.05 in January, see NDVI development graph) due to the snow. This year, however, NDVI was even below average as snow started early. The whole country, with the exception of the western Caspian area (the least continental part of Russia), was snow covered from mid-November until even the western Caspian was affected starting in early January. At the time of reporting, the western Caspian is the only area with below average NDVI (11.3% of croplands), while remaining areas recovered from about 0.2 units below average. As shown in the spatial NDVI cluster pattern graph, NDVI was slightly above average in November in the Volga Federal District, while in parts of the Ural and Siberia NDVI is close to average. In the Caucasus Federal District and Southern Federal District, NDVI is below average.

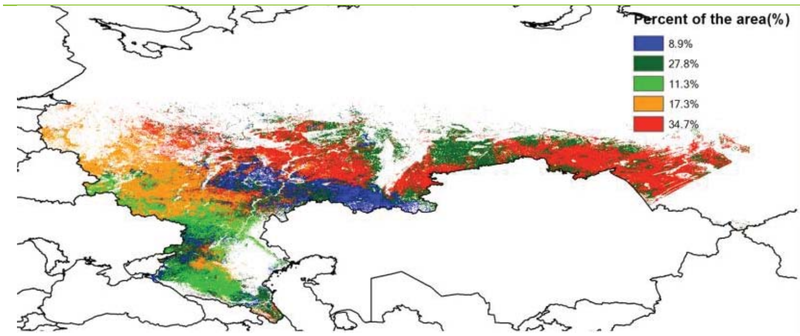
The VCIx in Russia during this monitoring period was 0.87. The outlook for Russian winter crops remains average to above average.

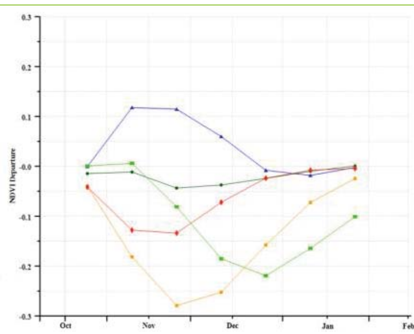
Figure 3.28. Russia crop condition, October 2016-January 2017





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





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

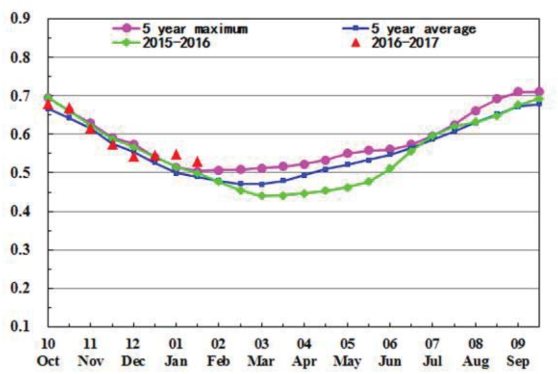
ARG AUS BGD BRA CAN DEU EGY ETH FRA GBR IDN IND IRN KAZ KHM MEX MMR NGA PAK PHL POL ROU RUS **THA** TUR UKR USA UZB VNM ZAF

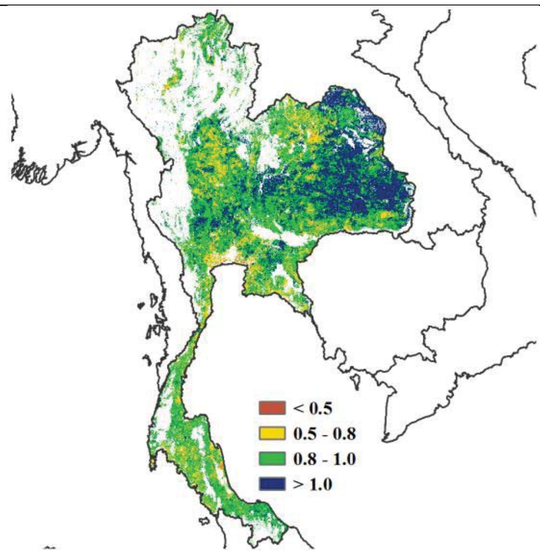
[THA] Thailand

During the monitoring period, the harvest of the main rice crop in Thailand was completed, while the planting of the second rice crop started in early January. According to CropWatch indicators, radiation was below average (RADPAR, -7%) and temperature was just average, while rainfall (RAIN, +82%) was significantly above the seasonal norm. On the national level, crop condition was above average, which is confirmed by an increase of BIOMSS by 38%. Similar to the agroclimatic indicators for the national level, RAIN and BIOMSS in the single as well as double and triple-cropped rice, horticulture, and mountain areas are above average, while radiation was below average.

Nationwide, from October to December, crop condition was close to the five-year average, while in January—according to NDVI—condition was above. As shown by the NDVI profiles, more than half the crop areas (blue and bright green) in Thailand (areas located in the northeast, center, west and east) experienced above average condition. Other areas, accounting for 28.4% of the total agricultural land and located mostly in the northeast, began with below average condition, which subsequently improved to above average crop condition in January. At the end of January, crop condition was below average (and thus unfavorable) in only 3.5% of croplands, situated mostly in the center-west, centered around Chainat, and in the south, in East Surat Thani and Nakhon Si Thammarat. Overall, crop condition in Thailand is favorable.

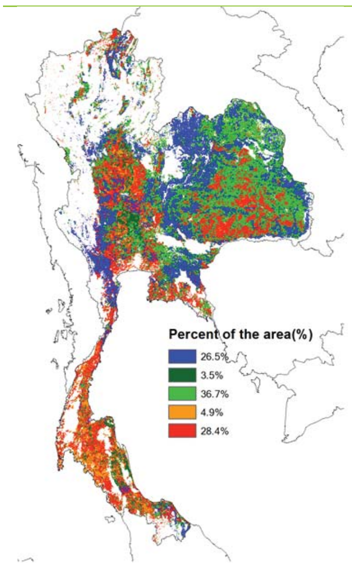
Figure 3.29. Thailand crop condition, October 2016-January 2017

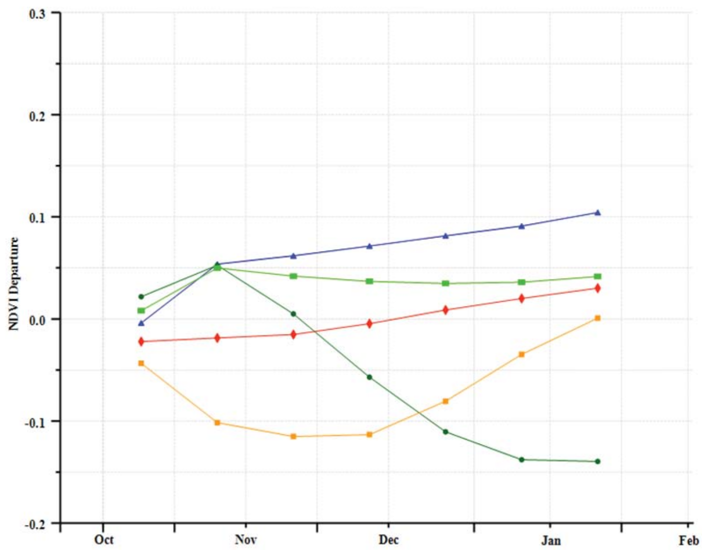




(a) Crop condition development graph based on NDVI

(b) Maximum VCI





(c) Spatial NDVI patterns compared to 5YA

(d) NDVI profiles

ARG AUS BGD BRA CAN DEU EGY ETH FRA GBR IDN IND IRN KAZ KHM MEX MMR NGA PAK PHL POL ROU RUS THA **TUR** UKR USA UZB VNM ZAF

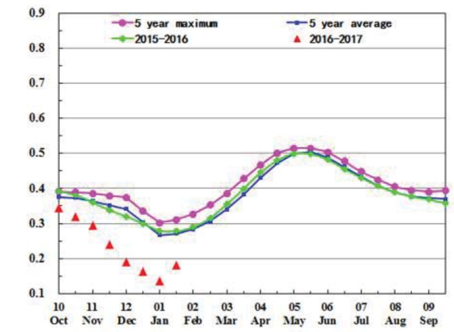
[TUR] Turkey

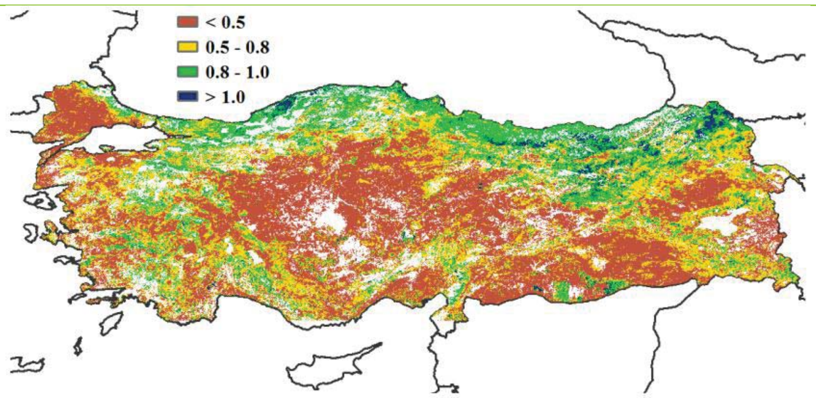
Crop condition was generally below average in Turkey over the reporting period, during which the planting of winter grains was completed. Accumulated rainfall (RAIN, -15%) and temperature (TEMP, -1.3°C) were below average, while radiation (RADPAR, +2%) was above. The agroclimatic indices concur to indicate unfavorable conditions for crop growth, which is confirmed by the decrease of the biomass production potential (BIOMSS) by 16%. Compared to the five-year average, the national maximum VCI (VCIx=0.55) was average. The significant decrease in the fraction of cropped arable land (CALF, -20 percentage points) indicates low land utilization for winter crops.

According to the NDVI profiles, crop condition in Turkey was below average during the whole monitoring period. Compared to the recent five-year average, for three regions—the Central Anatolia, Black Sea, and Marmara regions—the NDVI departure value was below 0.2 from December 2016 to January 2017. This could, however, be largely attributed to the rainfall deficit and precipitation of mostly snow in the three regions, with BIOMSS decreases in the three regions of 31%, 15%, and 16%, respectively. The snow, however, will greatly improve soil moisture and benefit crop growth after the winter period.

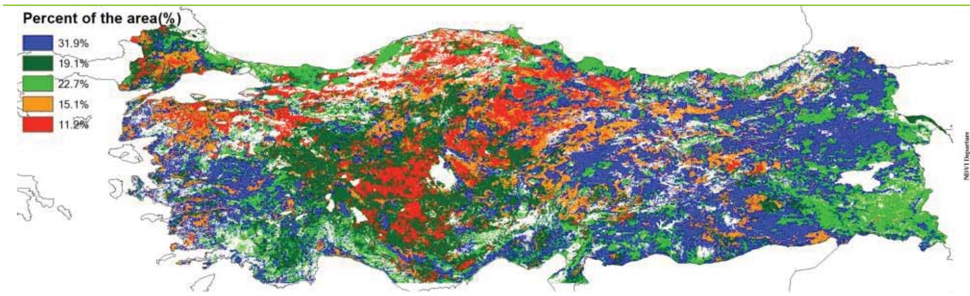
Overall, the crop condition of winter crops for this season seems unfavorable due to the continual rainfall deficit from the last monitoring period, but the interpretation of the NDVI-based indicators is difficult due to snow. The final outcome of the season will be largely determined by the change in CALF and soil moisture from March to May.

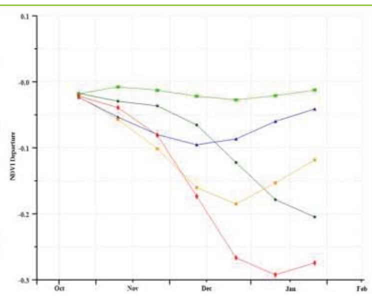
Figure 3.30. Turkey crop condition, October 2016-January 2017





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





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

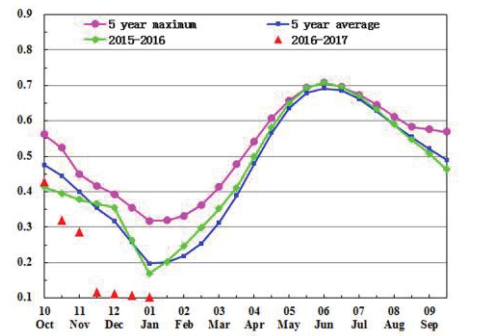
ARG AUS BGD BRA CAN DEU EGY ETH FRA GBR IDN IND IRN KAZ KHM MEX MMR NGA PAK PHL POL ROU RUS THA TUR **UKR** USA UZB VNM ZAF

[UKR] Ukraine

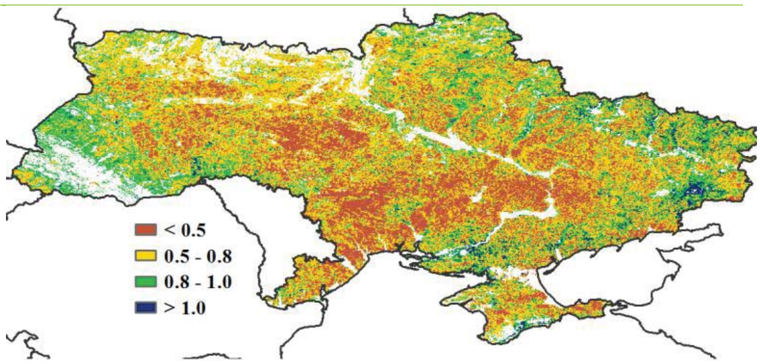
From October to January in Ukraine, the main crops in the field are maize, ready for harvest in October, and winter cereals in their early stages. On a national level, agroclimatic and agronomic conditions other than RAIN were below average over the reporting period (RAIN, +33.0%; RADPAR, -7%; TEMP, -1.7°C, CALF, -11.74 percentage points; and maximum VCI, 0.67). As illustrated in the section on the Central Europe to Western Russia MPZ (chapter 2.7), the increase in biomass production potential is large (BIOMSS >20%) in the southern part of the country. A major decrease in BIOMSS (up to 20%), however, is observed in the northern, eastern, and western parts of Ukraine, along the borders of Russia, Belarus, Poland, and Slovakia.

The NDVI departure trends show that over the reporting period, 17% of the country's agricultural land undergoes a decline in NDVI from October to December, with an increase starting after that. Another 58.9% show a decline from October to mid-December, and also an increase after. For another 9.7% of the country, the initial decrease in NDVI only happened up to mid-November, again followed by an increase. Finally, 14.4% of cropland experienced stable NDVI from October to mid-November, with also an increase after that. Maximum VCI varies widely over the reporting period. What looks like unfavorable crop conditions at the national level (BIOMSS down 4%) is misleading: the country experienced early snow from the end of October, followed by a short lasting snow cover in November and almost permanent and nationwide presence of snow throughout December and January. The snow cover accounts for low NDVI and, considering also abundant water supply in the form of rain and snow, it is likely that the crop prospects in Ukraine are at least average at the time of reporting.

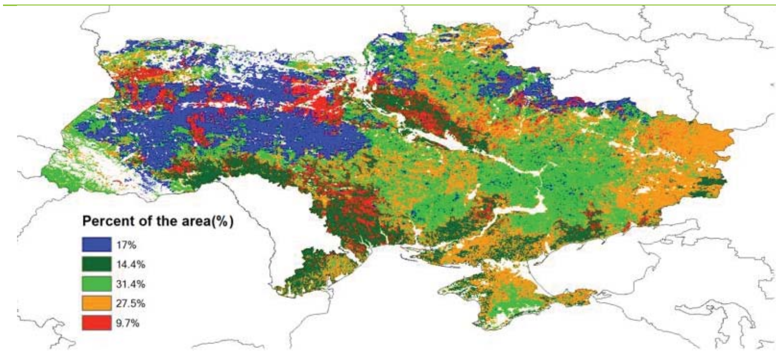
Figure 3.31. Ukraine crop condition, October 2016-January 2017



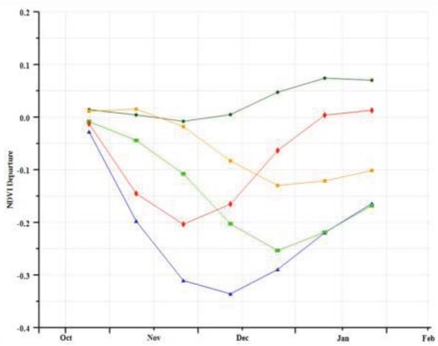
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

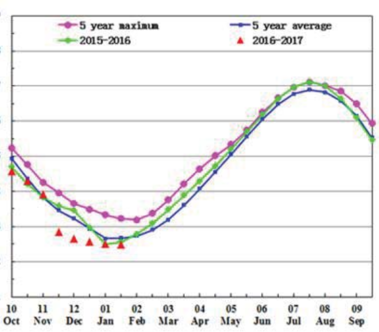
[USA] United States

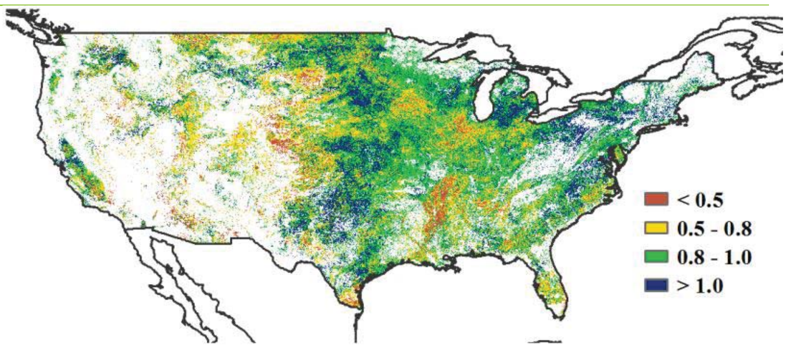
This monitoring period covers the planting and early growth of winter crops. The national NDVI development profile illustrates initially below average crop condition, which then grows closer to average in January. With 317 mm of rainfall, rainfall was 5% above average, temperature (6.7°C) was above average as well (+1.1°C), while radiation (RADPAR) was 3% below.

The Great Plains, Northwest, and lower Mississippi are the main winter wheat areas for the country. Among these, the lower Mississippi area experienced dry and warm weather in the important winter wheat production states of Arkansas (RAIN, -20% and TEMP, +1.6°C), Missouri and Louisiana (both -14% for rain but TEMP at +1.4°C and 1.8°C， respectively), and Mississippi (RAIN, -6% and TEMP +2.1°C). This resulted in unfavorable crop condition that is supported by low VCIx values and negative NDVI departure profiles. On the contrary, abundant rainfall was recorded in states of the Great Plains and Northwest, including Kansas (RAIN, +11%), South Dakota (+86%), Montana (+115%), Washington (+13%), Oregon (+22%), and California (+45%), which provides a needed soil water supply for winter wheat growth. The northwest and western states suffered from ice storms in December and January, including Washington (TEMP, -0.9°C), Oregon (-1.1°C), Idaho (-2.9°C), and California (-0.2°C). Above average rainfall also benefited the growth of winter wheat in the Great Plains; this is supported by positive NDVI anomalies in Kansas, South Dakota, and California. The cold wave in northwest states is well illustrated by the negative NDVI departures after December.

The warm and wet condition in winter wheat areas resulted in an increase of the fraction of cropped arable land (CALF) by as much as 10.15 percentage points compared with the five-year average. Crop condition in the United States is currently average, while conditions in the lower Mississippi area need continued close monitoring.

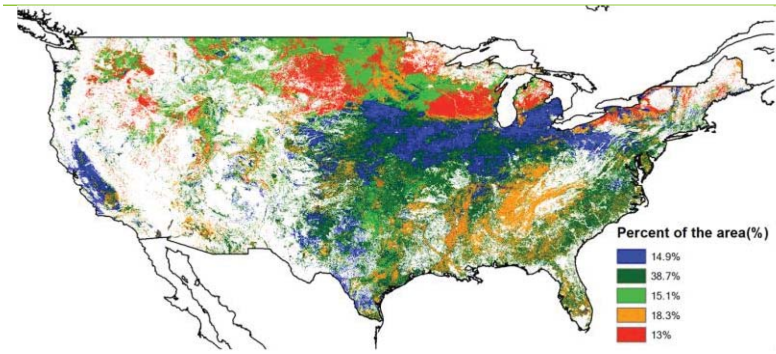
Figure 3.32. United States crop condition, October 2016-January 2017

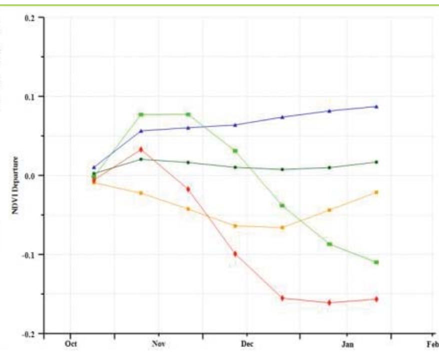




(a) Crop condition development graph based on NDVI

(b) Maximum VCI





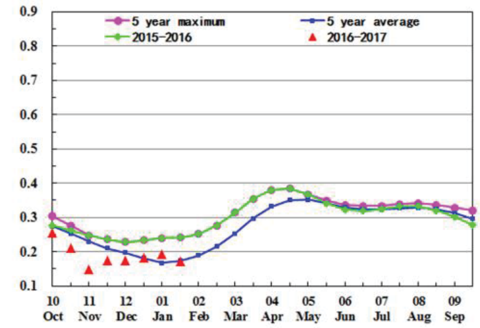
(c) Spatial NDVI patterns compared to 5YA

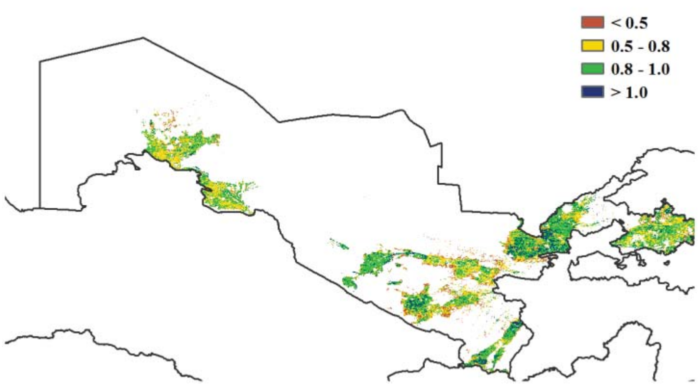
(d) NDVI profiles

[UZB] Uzbekistan

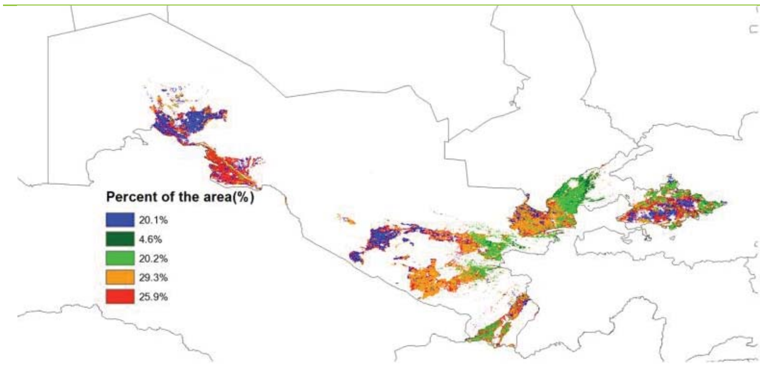
The reporting period covers the sowing and early growing stages of winter barley as well as wheat, the most important cereal crop in Uzbekistan. Crop condition was generally below average, but returned to normal in January. The national average VCIx was 0.84, and the arable land fraction (CALF) increased by 19.8 percentage points compared to the five-year average. Among the CropWatch agroclimatic indicators, RAIN was very significantly above average (almost double), and TEMP and RADPAR were below average by -0.8°C and 2% respectively. This combination of factors results in a high increase in biomass potential (BIOMSS, +51%) compared to the five-year average. At the end of January, NDVI was below average in 20% of croplands, mainly in parts of Qunghirot, Altynkul, Chimbay, and Takhtakupyr provinces, as well as part of Bukhoro and Gazli provinces. NDVI was below average in parts of Quqon, Farghoma, and Namangan. Conditions were normal or above average in other regions, especially in parts of Almalyk, Angren, Samargand, Qarshi, Andijon, Namangan, and Termiz, which make up about 80% of croplands. Altogether, CropWatch assessment is that the current crop prospects for the country are optimistic.

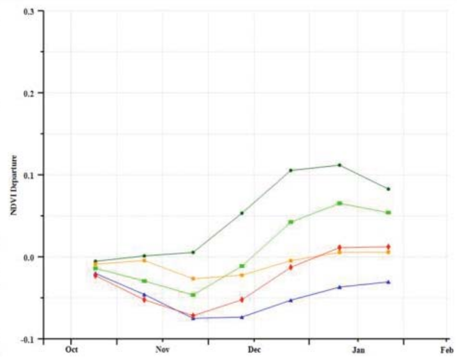
Figure 3.33. Uzbekistan crop condition, October 2016-January 2017





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





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

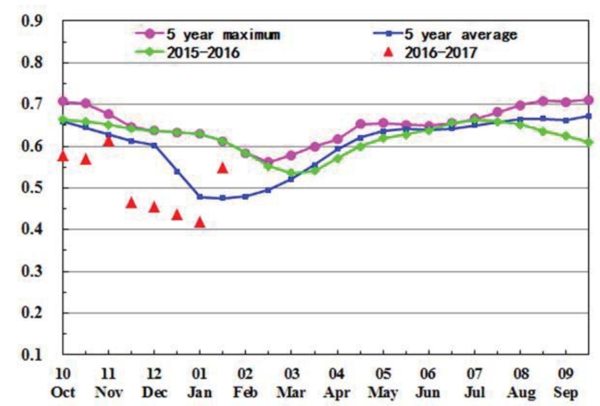
[VNM] Vietnam

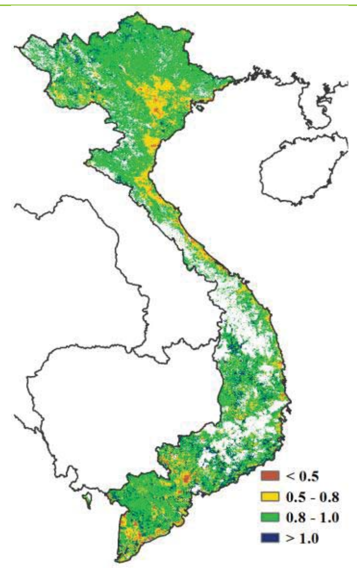
This monitoring period from October 2016 to January 2017 covers the growing stages of the 10th month rice, as well as the sowing of winter and spring rice in Vietnam. Most of the rice cultivation regions are distributed in the northern Red River delta and the Mekong River delta in the south.

The fraction of cropped arable land (CALF) for the reporting period is similar to the five-year average (-2.29 percentage points). Vegetation condition indices (maximum VCI) are favorable (>0.8), accompanied by an increase in BIOMSS (+37.5%) because of the good water condition (RAIN, +74%) along with a decrease in radiation (RADPAR, -10.77%) and average temperature (TEMP, +0.70°C). Crop condition is below the five-year average, but above starting in 2017.

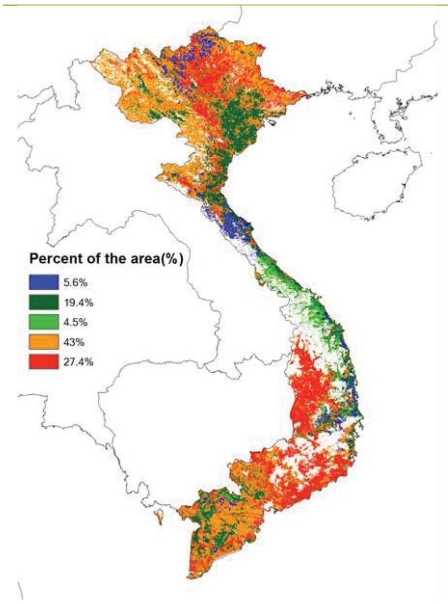
Over 70% of the crop lands show average or better than average crop condition, with unfavorable crops in the middle mountain area such as Ha Nam, Hoang Mai, and Hung Yen. Overall, crop condition is assessed as average or better than average.

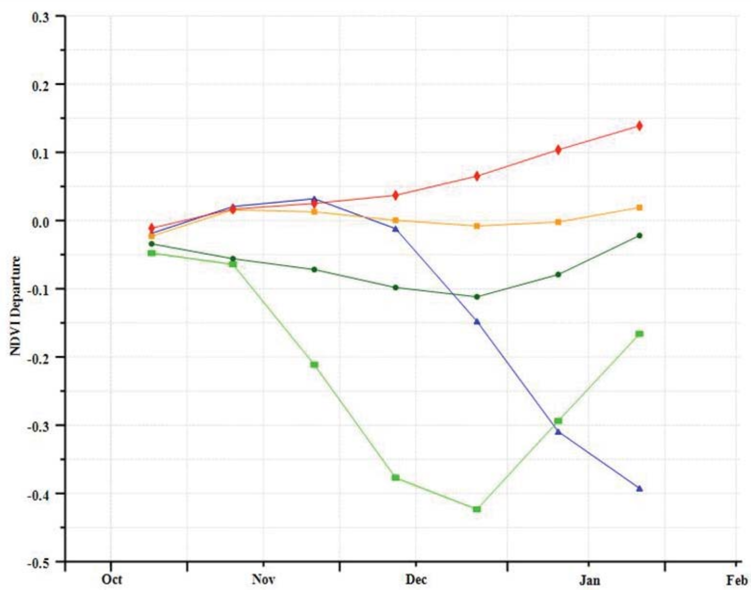
Figure 3.34. Vietnam crop condition, October 2016-January 2017





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





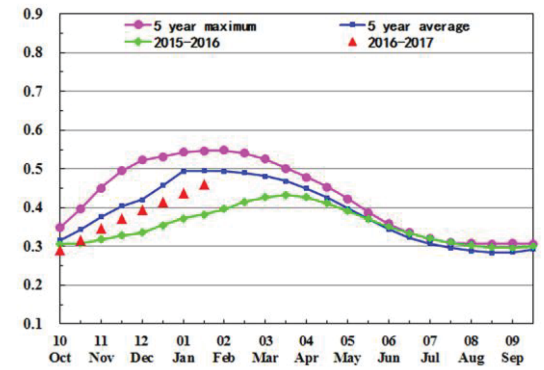
(c) Spatial NDVI patterns compared to 5YA (d) NDVI profiles

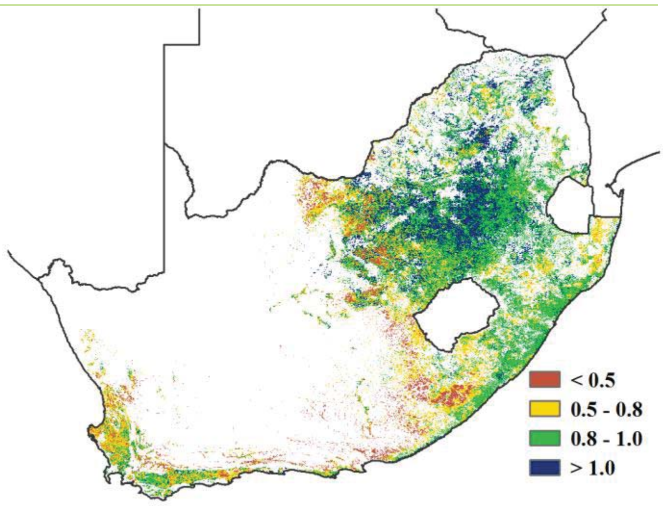
[ZAF] South Africa

The reporting period coincides with the planting and vegetative stages of the main crop in South-Africa: maize. The crop is grown from October over most of the eastern half of the country, together with other coarse grains. November and December is also the planting season for vegetables, fruits, and herbs in the southwestern Mediterranean Cape, as well as the harvesting period for barley and wheat, crops that have been consistently declining in the country over the last decade. Overall, the nationwide condition of crops was better than last year's for the same reporting period. In the Mediterranean area, rainfall was well below average (RAIN, -61%) but largely compensated by irrigation. Nevertheless, the most unfavorable conditions were observed in the southwestern cape, covering about 11% of cropped areas. The overall rainfall increase for the country (RAIN, +9%) is mostly relevant for the main rainfed maize growing areas where temperature was also very slightly below average and radiation showed an increase of 1%, altogether yielding an average biomass production potential.

Nationwide (thus including the southwest), VCIx reaches a fair value of 0.79, but generally favorable values (up to 1 and above) occur in most of Orange Free State and North West Province. For more than 75% of cropped areas, NDVI was average or above at the end of January. High NDVI values also occur in the irrigated citrus producing areas of southern Kwa-Zulu Natal. Altogether, the condition of cereals harvested at the end of 2016 in the Mediterranean areas was below average. For the current maize crop in the east and north, prospects are favorable. The final outcome of the season will depend on February rainfall, which is a crucial variable at the time when maize flowers throughout the southern-African region.

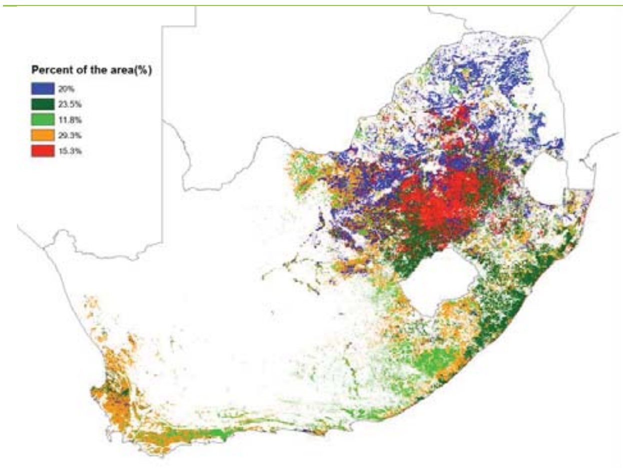
Figure 3.35. South Africa crop condition, October 2016-January 2017

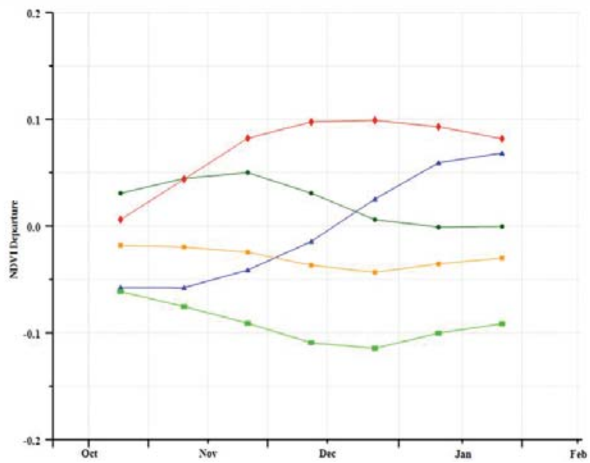




(a) Crop condition development graph based on NDVI

(b) Maximum VCI





(c) Spatial NDVI patterns compared to 5YA

(d) NDVI profiles