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 production estimates for Argentina, Australia, Brazil, Canada, and the United States.

3.1 Overview

As mentioned in Chapter 1, some agroclimatic patterns emerge at the MRU level that are of global relevance. In this Chapter, analyses are more specific, for all countries and in particular for the 30 countries that make up the bulk of food production and trade (especially exports). For those 30 countries, analyses will also cover sub-national situations and agro-ecological zones. (A more detailed analysis for China is provided separately in Chapter 4.)

As a result of global atmospheric dynamics, agroclimatic variables are usually correlated; for instance rainfall and temperature may correlate as a result of normally abundant precipitation in equatorial areas. Other well-known examples include temperature and sunshine (positive correlation) as well rainfall and sunshine (negative correlation). Those "climatological patterns" are mostly zonal, but they are subjected to variations according to the prevailing climate and season; the link between temperature and rainfall, for example, is much weaker in tropical areas than in temperate ones.[1] Despite these frequent correlations, however, it is much less common that *departures* from the reference value (in this case the fifteen-year average used by CropWatch for RAIN, TEMP, and RADPAR) follow coherent patterns at the global scale. For the current July-October 2016 reporting period, however, there is a very significant correlation between rainfall anomalies and RADPAR anomalies across the 439 polygons that make up figures 3.2 (rainfall), 3.3 (temperature), 3.4 (PAR), as well as 3.5 (biomass).

The spatial departure patterns between rainfall and RADPAR are very visible[2] (compare figures 3.2 and 3.4); in fact, the coefficient of correlation reaches r= -0.33 for n=439. The correlation is high (R=0.16) for rainfall anomalies below +40% (including negative ones) but levels off for higher departures (figure 3.1). This mean that, particularly for rainfall deficit areas, the global patterns of anomalies roughly coincide for rainfall and RADPAR.

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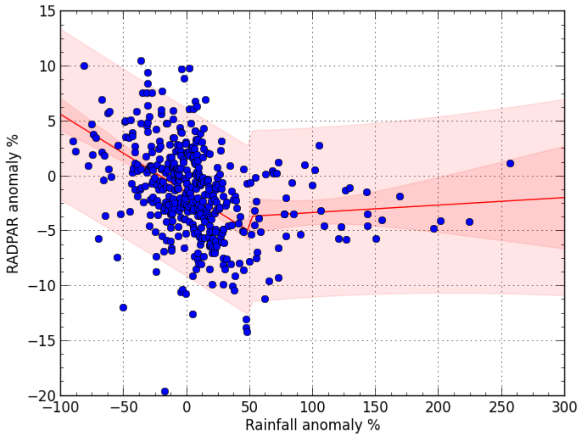
[1] This was discussed in some detail in a recent CropWatch publication: https://link.springer.com/article/10.1007%2Fs00484-016-1199-7.

[2] The same patterns are also very visible for rainfall and BIOMSS, but this is a direct consequence of the methodology used to derive BIOMSS from rainfall and temperature (BIOMSS anomaly % Vs. rain anomaly %: r=0.91; BIOMSS anomaly % Vs. rain anomaly %: r=-0.08).

Figure 3.1. RADPAR anomaly vs rainfall anomaly



Note: The RADPAR anomaly vs rainfall anomaly is best modelled as a piecewise linear regression with DOF=435 (number of points is 439 countries and sub-country units) with a breakpoint at a rainfall anomaly of +50% (r=0.44).

Areas with excess precipitation

Africa: Sahelian region

Abundant precipitation benefited the end of the cropping season in the semi-arid West African Sahel, where Mauritania recorded in excess of 800 mm of rainfall over the reporting period (and thus almost throughout the rainy season), corresponding to 100% excess. Other countries with favorable rainfall include Niger (+39% of well-distributed precipitation), Mali, Burkina Faso, and Senegal, as well as the western Gulf of Guinea from Liberia to Guinea Bissau, which all experienced close to 20% positive rainfall departures. The region experienced radiation moderately below the reference values (RADPAR, -2%) and slight negative temperature departures (TEMP, -0.4°C). The expected potential biomass increase (BIOMSS) is nevertheless depressed by the temperature and reaches +9%.

Asia: Arabian Peninsula

Chad, in the center of the Sahelian area (RAIN, +8%) provides the transition to North Sudan (RAIN, +28%) and the Arabian Peninsula where several countries also recorded unusually favorable rainfall: Jordan (+73%), Saudi Arabia (+100%), and Qatar (+257%). The three countries normally record low rainfall amounts (20 to 50 mm over the reporting period) but, considering prevailing aridity conditions over the Middle-East, the amounts are nevertheless significant ecologically and agronomically, mostly so for Jordan.

Europe: eastern Europe to western Russia

Several regions from western Russia to northern-central Europe and Greece received precipitation amounts that are beneficial to the early crop stages of the beginning winter crop season in the area. Precipitation was 28% above average with both relatively low sunshine and temperature (RADPAR, -5%; TEMP, -0.8°C). The resulting biomass production potential departure is 14%.

The region encompasses the areas between Karelya and the oblast of Pskov (RAIN, +32% to +48%) in the north, extending south to the Belgorod oblast with excesses between 20% and 30% and west as far as Poland (+27%) and Slovakia (+13%) across Belarus (+23%) and Lithuania (+20%). To the south of this area, after skipping Hungary (+4%), more significant positive rainfall departures again occurred in Serbia (+11%), and especially in Albania (+40%), Macedonia (+57%), and Greece (+77%).

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

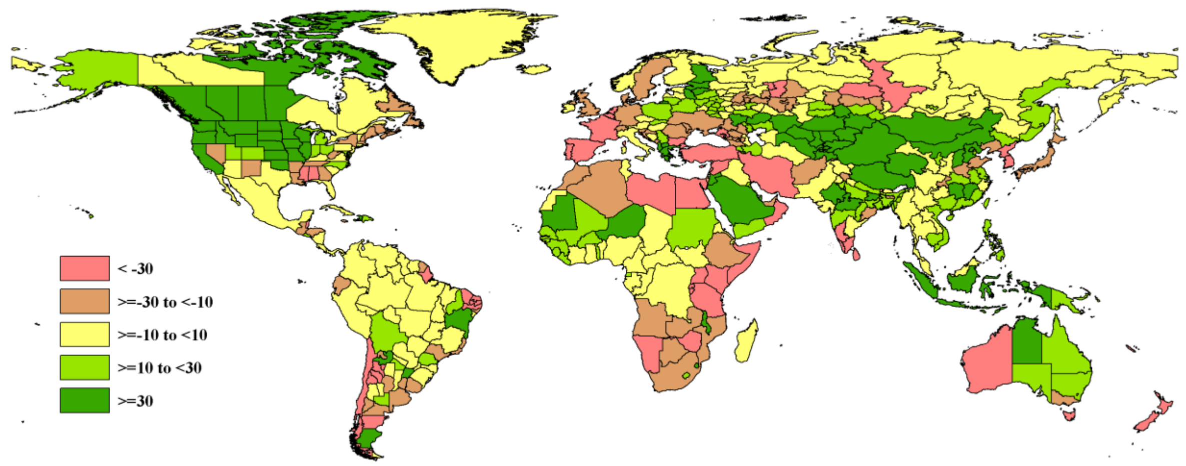


Figure 3.3. Global map of July-October 2016 temperature (TEMP) by country and sub-national areas, departure from 15YA (degrees)

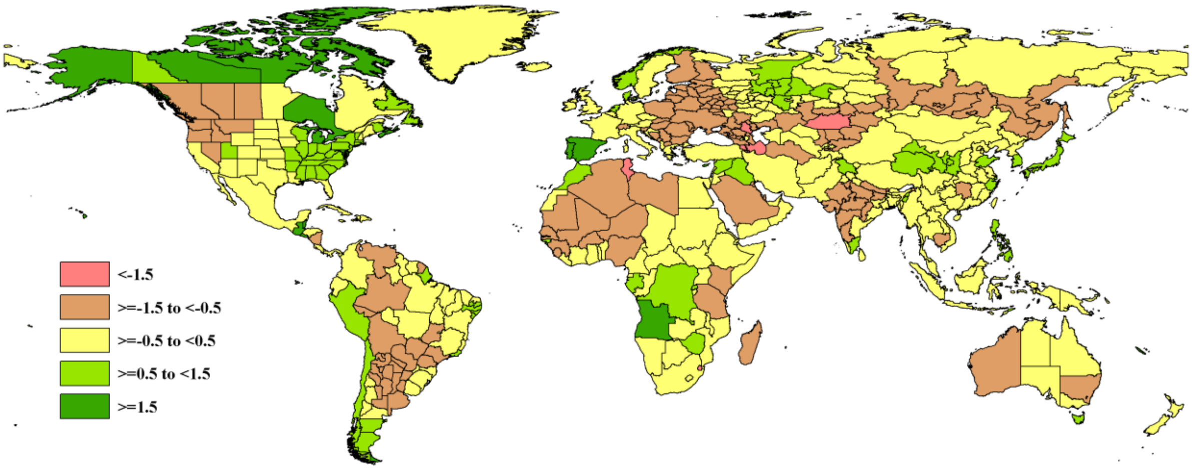


Figure 3.4. Global map of July-October 2016 PAR (RADPAR) by country and sub-national areas, departure from 15YA (percentage)

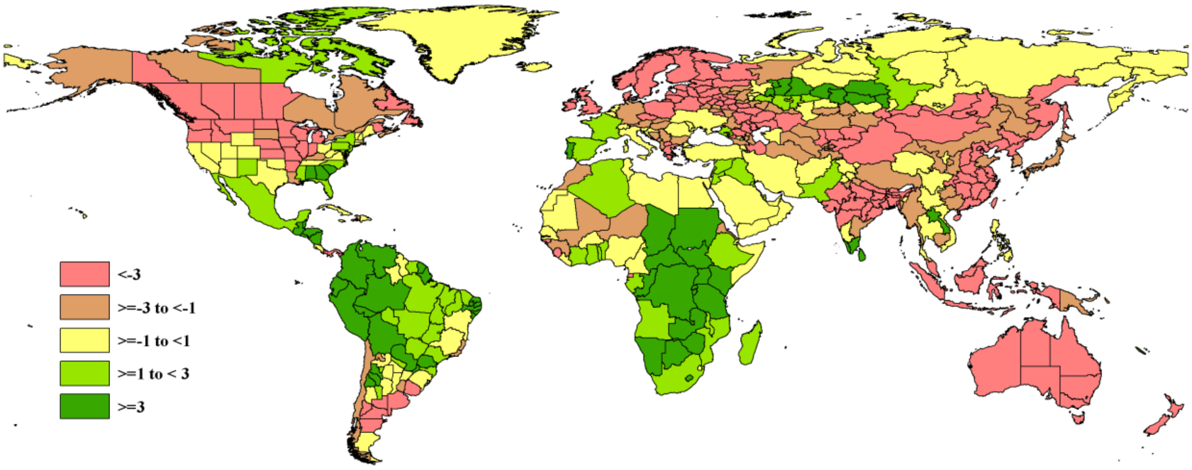
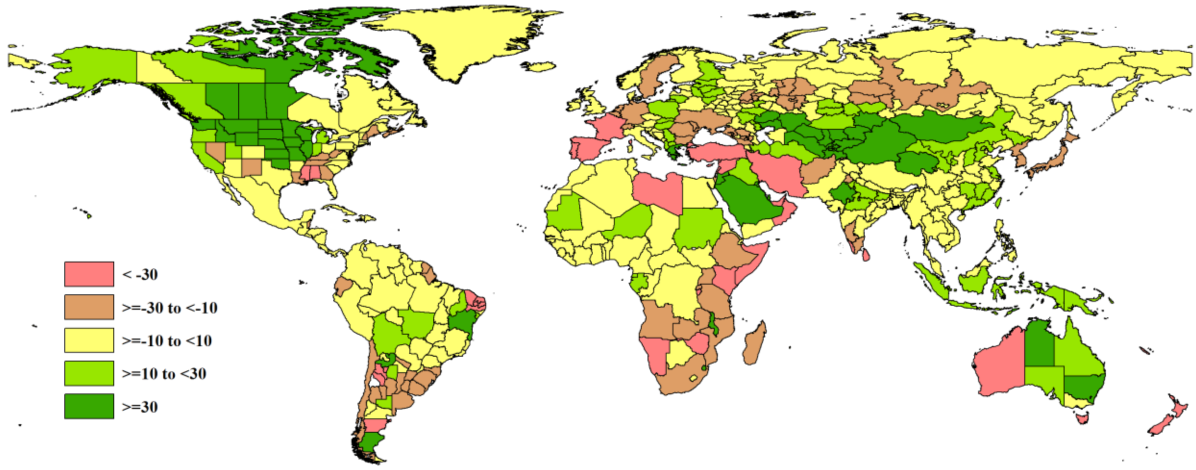


Figure 3.5. Global map of July-October 2016 biomass (BIOMSS) by country and sub-national areas, departure from 15YA (percentage)



Europe to Asia: southern Russia to China

Not unlike the previous season, vast expanses of land in and around central and southern Asia recorded abundant precipitation when expressed against the average of the recent fifteen years (+67%). The area includes more than 30 countries and sub-national units illustrated in figure 3.2 (rainfall by national and subnational boundaries). With very few exceptions (Nagaland and Qinghai), temperature was systematically below average (-0.4°C) and so was radiation (-5%). The BIOMSS indicator increased by 41%. Radiation was particularly low in the southern part of the northern-central Indian peninsula. Overall, this large area with abundant precipitation is bounded by the following regions:

- In the west: the southern Russian oblasts of Volgograd (+33% rainfall) and Saratov (+29%), as well as the western region in Kazakhstan (Zapadno-Kazakhstanskaya oblast, +51%). All experienced a drop in RADPAR in the order of 5%. Temperatures were 0.5°C to 1.0°C below average.
- In the north: the Pavlodar region of northeast Kazakhstan with +39% precipitation, about average RADPAR, and below average temperature (-0.8°C).
- In the east: Mongolia and the Chinese region of Inner Mongolia with +53% and +37% precipitation, respectively, and average TEMP and RADPAR.
- In the southeast: the Chinese provinces of Qinghai (+84%) and Xizang (+36%).
- In the south: the Indian states of Bihar (+38%), Madhya Pradesh (+62%), and Rajasthan (+79%). The drop in sunshine was significant and reaches -10%, -11%, and -5%, respectively.
- In the southwest: Uzbekistan with +169% of precipitation but otherwise average conditions.

The large area also includes the following administrative units, which all experienced precipitation close to or in excess of +45%: Shanxi and Hebei provinces in China (+44% and +46%), Tajikistan and Kyrgyzstan (+143% and +196%, with about normal TEMP and RADPAR), and several regions in Kazakhstan. They include the Aktubinsk oblast (RAIN, +54%), the eastern region—Vostochno-kkazachstanskaya oblast—with +79% precipitation, the Kyzylorda region at +129% precipitation, Yujno Kazakhstanskaya oblast at +143%, and the Jambyl region with precipitation up 201% and a 1.2°C drop in temperature. The largest excess over average was recorded in the Xinjiang Uygur region of western China with 410 mm of rain, corresponding to an increase of 224% over the average of the recent years. Sunshine (RADPAR) fell below average significantly or very significantly in southern Asia (Maharashtra and Chhattisgarh (-8%), Uttar Pradesh (-7%), and Nepal and Bangladesh (-6%).

The contiguous regions of Jambyl in southern-central Kazakhstan, Kyrgyzstan, and the Xinjiang Uygur autonomous region of China are at the core of the high precipitation area. Kazakhstan increased the cropped arable land fraction by a spectacular 23 percentage points, followed by Uzbekistan with +20 percentage points.

Asia and Oceania: eastern Asia to central-eastern Australia

In this region, the excess precipitation is minor compared with the previous one, but nevertheless useful for the winter crop areas in southeastern China and Southeast Asia, and the spring crops in Oceania. The region approximately reaches from Jiangxu, Anhui, and Hubei provinces in China to all of maritime Southeast Asia and the eastern half of Australia except Victoria and Tasmania. The average precipitation excess in the region is 36% with a correlated drop in RADPAR of 4% and close to average temperature. The largest precipitation increases over average occurs in Indonesia (+36%), Hunan, and Jiangxi provinces in China (+42 and +45%, respectively), the Northern Territory in Australia where 114 mm represents more than a doubling of average rainfall amounts (+123%), and Timor Leste (+144%).

America: northern United States and Canada

A large contiguous area of above-average precipitation extends from British Columbia to Manitoba to Ohio to California, excluding Nevada. The average precipitation excess amounts to 67% with below average sunshine (RADPAR, -4%) and a biomass production potential increase of 42% above average. Rainfall was particularly abundant over Nebraska (+85%) and Wisconsin (+90%), with other states even recording rainfall more than double the average, from 107% in Kansas to 150% in North Dakota, with values increasing from Iowa (+109%) through Minnesota and South Dakota to Montana (+127%). The lowest precipitation excesses in Ohio (+11%), Michigan (+19%), and Indiana (+27%) were associated with the largest positive temperature anomalies (1.4°C, 1.5°C and 1.0°C, respectively). The largest RADPAR deficits occurred in Illinois (-7%), Washington State (-8%), British Colombia, and Manitoba (both provinces at -9%).

Deficit precipitation areas

Europe, the Mediterranean and western Asia

The large rainfall deficit area (-34% on average) covers 30 countries from Sweden and Germany to Great Britain to Morocco, Iran and Afghanistan, and the Black Sea countries. Other variables were average but the BIOMSS potential dropped 26% below average. The largest deficits occur in the eastern Mediterranean (Lebanon -87%, Syria -65%, and Turkey -42%, where precipitation is normally low over the reporting period) while northern and north-western Europe is less affected. Nevertheless, both France and Germany list a decrease in cropping intensity (-8% and -16%, respectively) that can be due to reduced rainfall. The same applies to Ukraine (cropping intensity down 18%) and Morocco, which suffered a bad drought in 2014/15 and recorded 66 mm, a weak -16% departure from average. Winter crops have now been planted in the region and prospects remain generally favorable.

Russia

The area under consideration includes the oblasts of Perm and Tomsk, the Komi-Permyak okrug, and the Krasnodar kray as the area with the largest precipitation deficit (RAIN, -34%, -31%, -31%, and -32%, respectively). It extends west to the Nizhni Novgorod oblast and the Republic of Mordovia where the deficit decreases to about 15%. The deficits need to be compared against actual values, which were close to 200 mm—sufficient for farm operations and early stages of winter crops. The region had average temperature (+0.2°C), +3% RADPAR, and a BIOMSS expectation departure of -16%.

Eastern Asia

This particular rain deficit area encompasses three Chinese provinces (Henan, Chongqing, and Shandong), Japan, the Republic of Korea, and the Democratic People's Republic of Korea. The average rainfall deficit is moderate (-19%) with a +3% increase in radiation (RADPAR). The area deserves mentioning because the most severe deficit occurs in the Korean DPR with RAIN at -45%, a drop from 650 mm to 350 mm or about 3 mm/day. This is very close to the evaporation values in the local lowlands and thus potentially the beginning of another drought year.

Southern India

The Indian states of Tamil Nadu, Kerala, and Karnataka, as well as Sri Lanka suffered an average precipitation deficit of 50% (-31% in Tamil Nadu to -62% in Kerala). It is likely that, due to high potential evapotranspiration (PET) values, the rainfall deficit has created some stress for rainfed crops in the presence of above-average sunshine (+4%).

Southern Oceania and Western Australia

The average rainfall deficit was 50% on average in Tasmania (-69%), New-Zealand (-55%), and Western Australia (-52%), and Victoria (-24%). The region also had a marked reduction in RADPAR (-6%).

Eastern and Southern Africa

The area under consideration covers fourteen countries south of Ethiopia and Uganda, Zambia, and Namibia. Crops are currently growing at the higher elevations in eastern Africa while southern Africa is just planting after a severe drought year that affected much of the region. The average rainfall deficit reaches 33% with just above average temperature and RADPAR up 4% compared with average. The resulting biomass production potential is down 30%. The driest countries in relative terms include Somalia (-78%) and Kenya (-43%), while the situation is more favorable in Zambia (-15%) and South Africa (-12%). The latter country reduces the cropped arable land fraction by 10% over the average of the previous five years. It is worth mentioning that Tanzania, which suffered very little compared with the drought areas to its north and south in 2015/16, is now recording a RAIN deficit of 31% with +4% RADPAR. Several countries in the region report large positive sunshine anomalies of 8% (Uganda and Rwanda) and 11% (Burundi).

Southern United States

The area includes a group of states in the west (Mississippi, Alabama, Tennessee, Georgia, Louisiana, and Arkansas), as well as two isolated states: Nevada and New Mexico. The average precipitation deficit reaches 24% with a slight positive temperature anomaly (TEMP, +0.5°C) but close to average sunshine (-1%). The deficit is most severe in Mississippi (-41%) and Alabama (-36%), while it does not exceed 30% in the remaining states. The largest sunshine anomalies occurred in Alabama (+5%) and Georgia (+8%).

South America: Southern cone

The drought (RAIN, -41%) in this region affected an area that includes Chile and Uruguay as well as nine provinces in Argentina, especially Chubut (-64%), Tucuman (-54%), and La Rioja (-48%). Both temperature and radiation were slightly below average.

Other areas of concern

Some small or isolated areas are listed in this section, starting with part of the Brazilian Nordeste where Paraiba, Ceará, and Rio Grande do Norte all report a RAIN deficit between 70% and 75%. However, considering their very low average precipitation and the time of the year, this is not alarming.

Figure 3.3 shows that few areas with below average TEMP experienced abnormally low temperatures (< 1.5°C). These include:

- The region between the Black and the Caspian Sea: Armenia (-2.5°C), the Adyghe Autonomous Oblast (-1.8°C), Azerbaijan (-1.8°C), and the Kalmyk republic (-1.6°C).
- Tunisia (-1.7°C)
- The Karaganda region in Kazakhstan (-1.5°C)
- Sikkim (-1.5°C)

Table 3.1. CropWatch agroclimatic and agronomic indicators for July-October 2016, departure from 5YA and 15YA

Country	Agroclimatic Indicators			Agronomic Indicators			
	Departure from 15YA (2001-2015)			Departure from 5YA (2011-2015)			Current
	RAIN (%)	TEMP (°C)	RADPAR (%)	BIOMSS (%)	CALF (%)	Cropping Intensity (%)	Maximum VCI
Argentina	-7	-0.8	-1	-14	16	-15	0.9
Australia	-2	-0.5	-7	7	13	-4	1.0
Bangladesh	19	-0.5	-6	6	1	2	0.9
Brazil	1	-0.2	2	0	-3	3	0.8
Cambodia	30	-0.6	-2	8	0	-7	0.9
Canada	24	0.1	-6	25	1	3	1.0
China	14	0.0	-4	11	0	-5	0.9
Egypt	-31	-0.4	0	-6	-1	-2	0.7
Ethiopia	-21	-0.3	2	-13	0	-1	0.9
France	-41	-0.2	3	-35	0	-8	0.7
Germany	-23	0.2	-2	-16	0		0.9
India	12	-0.4	-6	3	1	-5	0.9
Indonesia	36	0.2	-5	21	0	0	1.0
Iran	-39	-0.5	1	-42	3	4	0.6
Kazakhstan	56	-0.8	-2	34	23	-1	1.0
Mexico	-9	-0.2	2	-6	5	3	0.9
Myanmar	-1	-0.1	-2	0	0	5	1.0
Nigeria	8	-0.6	0	4	1	-2	0.9
Pakistan	6	-0.3	2	3	0	-11	0.7
Philippines	11	0.8	-1	2	0	-4	1.0
Poland	28	-0.6	-6	21	0	-6	0.9
Romania	-27	-0.8	-1	-17	-1	0	0.9
Russia	-1	-0.4	-2	-3	3	-1	0.9
S. Africa	-12	0.3	2	-13	-10	-1	0.7
Thailand	9	-0.2	0	7	0	-12	1.0
Turkey	-43	0.1	0	-37	2	2	0.7
United Kingdom	-12	0.4	-4	-9	0	15	0.9
Ukraine	-14	-0.6	0	-12	2	-18	0.9
United States	23	0.5	-1	18	2	2	0.9
Uzbekistan	169	-0.5	-2	133	20	0	0.9
Vietnam	13	0.3	0	1	0	3	0.9

3.2 Country analysis

This section presents CropWatch results 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 July-October 2016 period to the previous season and the five-year average (5YA) and maximum; (b) Maximum VCI (over arable land mask) for July-October 2016 by pixel; (c) Spatial NDVI patterns up to October 2016 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.2-A.11, and Annex B, tables B.1-B.5, for additional information about indicator values and production estimates by country. Country agricultural profiles are posted on **www.cropwatch.com.cn**.

Figures 3.6-3.35. Crop condition for individual countries July-October 2016

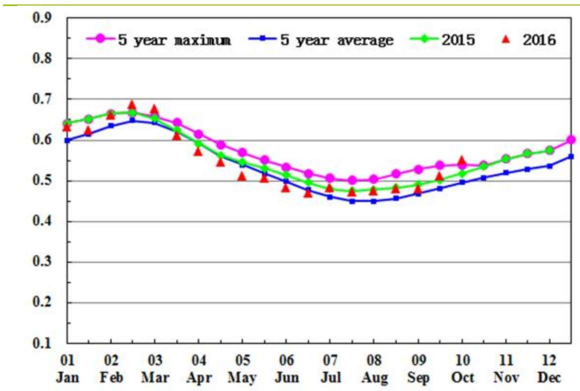
[ARG] Argentina

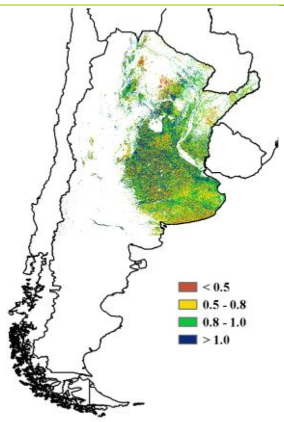
At the end of current reporting period (July-October), wheat is beginning to be harvested in the north of the country; the planting of early maize is almost completed and soybean planting is beginning. Predictions of harvested areas show an increment for wheat and maize and a slight reduction in soybean associated with reductions in both export taxes and regulations for maize and wheat.

For RAIN, a moderate decrease (-7% compared to the 15YA) was observed, while in general TEMP and RADPAR were close to average. Reductions in the RAIN indicator could be due to neutral or La Niña conditions, in a change from the strong El Niño that affected the southern hemisphere summer; this can also explain the 14% reduction in potential biomass (BIOMSS), a reduction that was stronger in the Pampas than in north Argentina. The top three agricultural producing provinces—Buenos Aires, Cordoba, and Santa Fe—experienced rainfall shortages that reached 29%, 27%, and 9%, respectively. NDVI profiles for the reporting period are higher than average, and for the last month (the maize planting period) they are also higher than last year's in spite of the poorer RAIN conditions. Abundant soil water retention from the last campaign could explain this behavior. In addition, changes in crop proportions could generate or add to NDVI anomalies because of the different planting dates of wheat, maize, and soybean in the Pampas. Maximum VCI showed high values (larger than 0.8) for most of the area, possibly reflecting the soil water retention and the higher proportion of wheat and maize crops in especially the central Pampas.

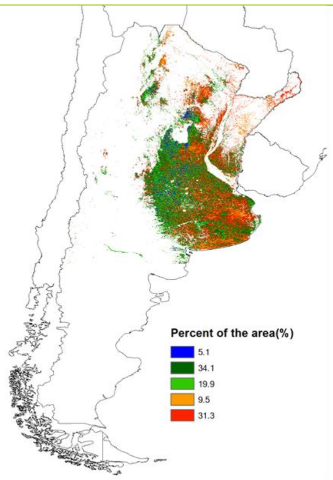
Overall, the agro-climatic conditions in Argentina are average; more rainfall is needed for the crops that have just been sown and those at their early growing stages, especially in the major agricultural regions. (See also section 5.1 and table B.1 in Annex B for production estimates for maize and soybean.)

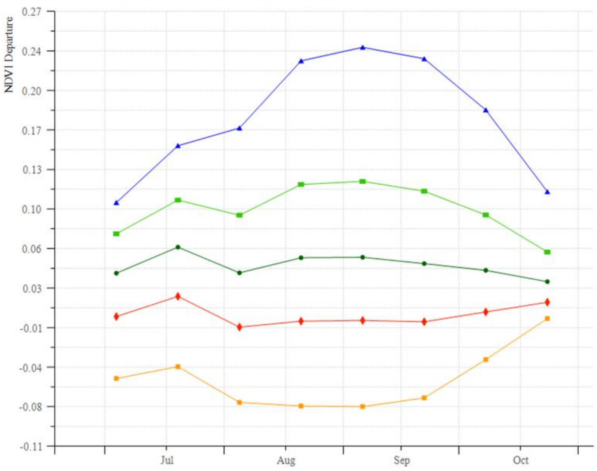
Figure 3.6. Argentina crop condition, July-October 2016





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





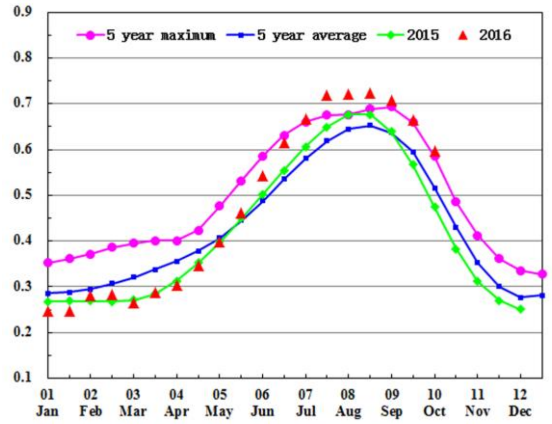
(c) Spatial NDVI patterns compared to 5YA (d) NDVI profiles

[AUS] Australia

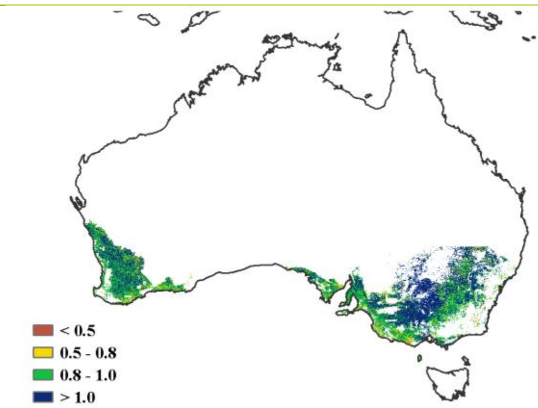
Compared to the average of the last five years, Australia showed very favorable condition during this monitoring period, which was the main growing season for winter wheat and barley. The agroclimatic conditions were about average (RAIN, -1.5%; TEMP, -0.5°C) except for a significant drop in sunshine (RADPAR, -7%). The spatial NDVI patterns show that in New South Wales, most of Victoria, South Australia, and Western Australia (together covering 84% of the arable land), winter wheat and barley condition was above average throughout the reporting period with a maximum VCI in the range of 0.8 to 1.0 and above. Crop condition was slightly below average only in some parts of southern Victoria, southeastern South Australia, and southern and western West Australia (16% of the arable land). This analysis is consistent with the national crop condition development graphs that show that winter wheat and barley, on the whole, grew well in July, exceeding the five year maximum value in July and August and staying close to it in September and October.

With also an increase in CALF (13 percentage points), CropWatch estimates that the production of summer crops in Australia will increase by 25%. For global production estimates, see section 5.1. CropWatch estimates for wheat production in Australia are listed in table B.2 in Annex B.

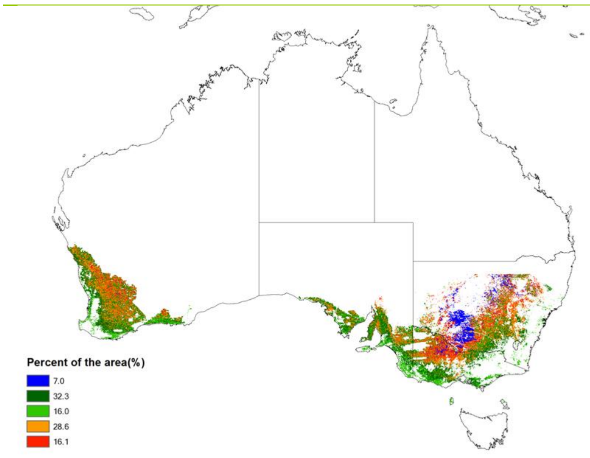
Figure 3.7. Australia crop condition, July-October 2016



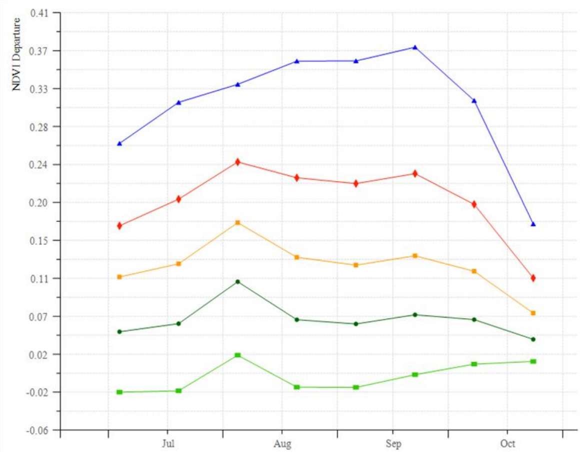
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA

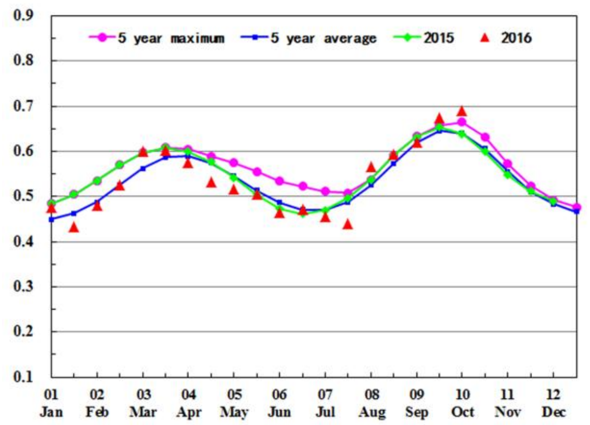


(d) NDVI profiles

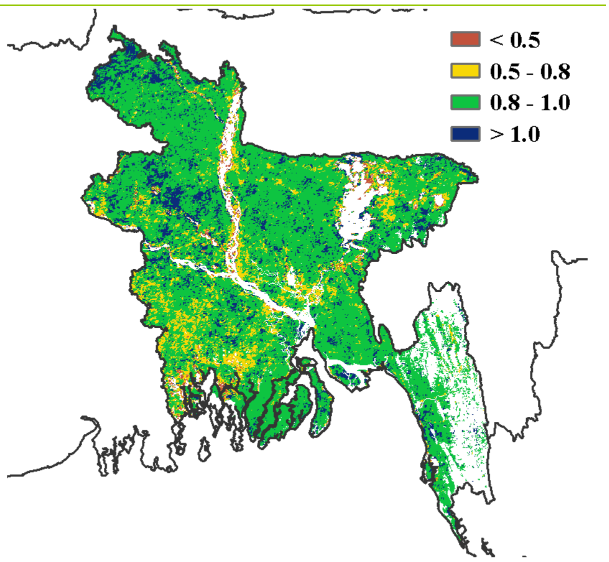
[BGD] Bangladesh

The reporting period corresponds to the growing of Aus and planting of Aman rice. As per CropWatch indicators, overall crop condition was above average during the reporting period. However, excess rainfall (19% above average) caused flooding in Madaripur, Rangpur, Rajbari, Manikganj, Kurigram, Faridpur and Tangali districts and damaged the standing crops. The overall biomass accumulation potential (BIOMSS) increased by 6% above the five-year average while photosynthetically active radiation (RADPAR) remained low (-6%) and temperature (TEMP) was average. Compared to the previous five-year average, the crop arable land fraction (CALF) increased by 1 percentage point. The national NDVI profile remained comparable with the previous five-year average values. Over the whole country the maximum VCI ranged from 0.5 to 0.9, indicating average crop condition. Spatial NDVI profiles of the country steadily progressed during the monitoring period except in the Sylhet region where a sharp drop was noticed in August. Overall, above average output is expected due to favorable conditions of rainfall, biomass accumulation, arable land fraction, as well as temperature.

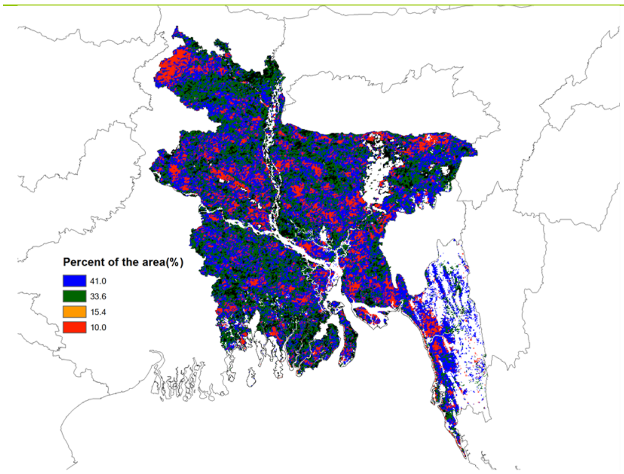
Figure 3.8. Bangladesh crop condition, July-October 2016



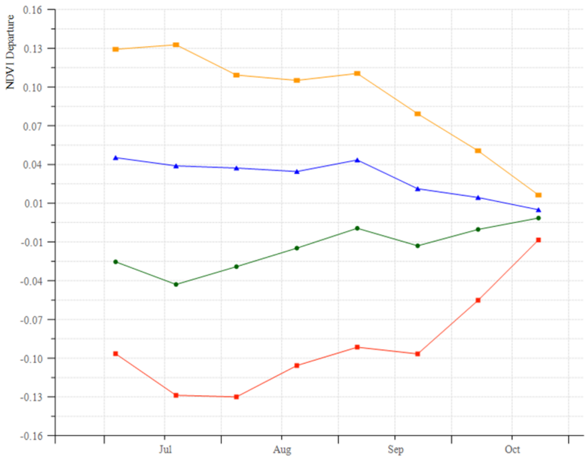
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



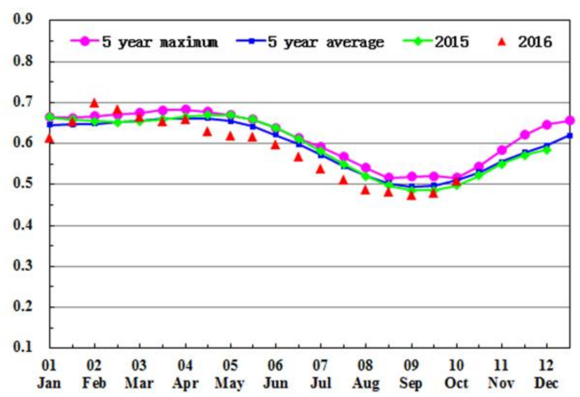
(d) NDVI profiles

[BRA] Brazil

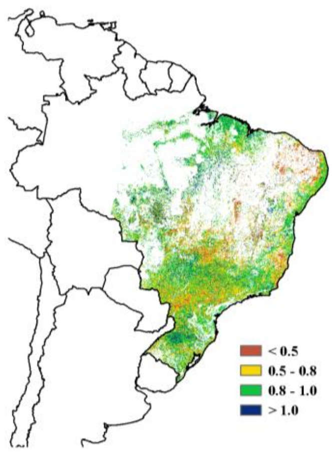
Generally, crop condition in Brazil was comparable to the five-year average. Over the reporting period, winter wheat has reached maturity and harvesting will be concluded by the end of November. The harvest of the second maize crop was completed and maize in central-east Brazil was approaching maturity. "Normal" agro-climatic conditions were observed for the nation as a whole according to the CWAIs: RAIN (+1%), TEMP (+0°C) and RADPAR (+2%). However, climatic condition varied greatly from state to state. As shown in figure a, below average rainfall mainly occurred in Rio Grande do Sul and central Brazil. Statistically, among the major agricultural states, Mato Grosso and Parana are the only two states that received above average rainfall (+6% and +12% respectively). Rainfall in Mato Grosso do Sul and Santa Catarina was average, while other major agricultural states suffered from 10% or more water shortage. Considering that temperature and radiation were generally average, the below average BIOMSS mainly resulted from water deficit.

Agronomic indicators consistently show average crop condition. As indicated by the maximum VCI map, the indicator was below 0.5 in central Brazil due to unfavorable rainfall. Spatial NDVI patterns and the corresponding NDVI departure profiles also confirm that below average NDVI mainly occurred in Goias and Central Brazil where almost no rainfall was observed for two months before early August. Above average NDVI in southern Brazil from August to October indicates a favorable outlook for wheat production. CropWatch revised the wheat production to 7545 ktons, 8% up from the previous harvest season. Since this latest monitoring period is out of the soybean, rice, and maize growing season for most parts of Brazil, CropWatch keeps the production estimates for those three crops at the same level as the previous forecast. See also section 5.1 for production estimates, as well as table B.3 in Annex B.

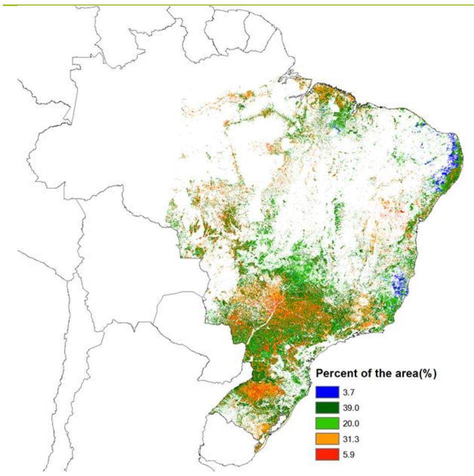
Figure 3.9. Brazil crop condition, July-October 2016



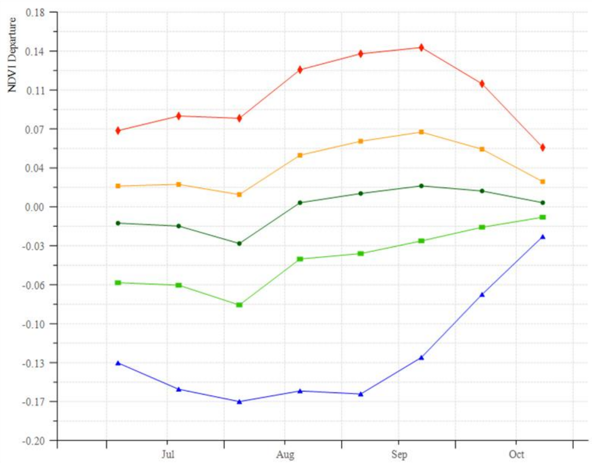
(a) Crop condition development graph based on NDVI



(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

[CAN] Canada

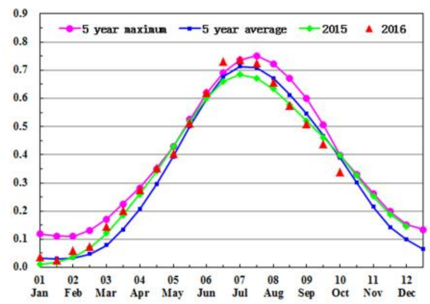
In Canada, the monitoring period covered the harvesting stages of winter wheat, barley, oats, and spring wheat, as well as the growth and harvest stages of maize and soybeans. In general, the condition of crops was above the average of the previous five year period.

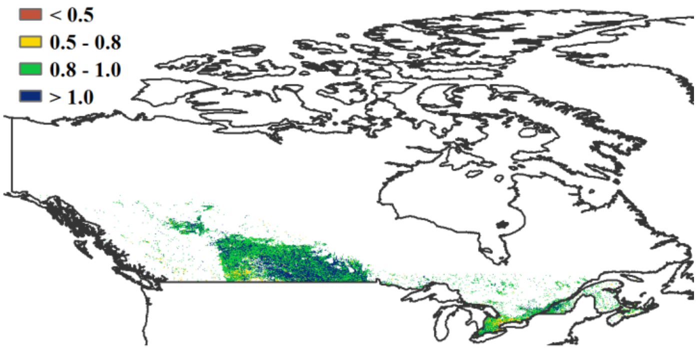
The dry weather of 2015 gave way to wet conditions this year. Compared to average, rainfall (RAIN) was up 23.8%, temperature (TEMP) was about normal, while sunshine (RADPAR) exhibited a 6% negative departure. Abundant rainfall was recorded in Alberta (+50%), Manitoba (+73%), and Saskatchewan (+66%), benefiting greatly the growth of wheat and other crops. While close to normal rainfall fell in the maize producing provinces, including Ontario (+5%) and Quebec (-4%), moderate to severe droughts were recorded in July to September from Toronto to Ottawa.

Good crop condition is confirmed by the NDVI profiles and related spatial NDVI patterns in the key growing period from the end of June to September: 80% to 90% of the agricultural regions of Canada showed a positive departure compared with the previous five years. Favorable crop condition as identified by VCIx (0.9) occurred especially in the southern part of Saskatchewan and Manitoba, where the indicator even rose above 1. The significant increase of accumulated biomass potential (BIOMASS) also identified good crop condition in Alberta (+37%), Manitoba (+47%), and Saskatchewan (+48%), while average crop condition was recorded in Ontario (+6%) and Quebec (-3%). The cropped arable land fraction (CALF) indicator and cropping intensity also showed a positive trend, with slightly above average conditions (+1% and + 3%, respectively).

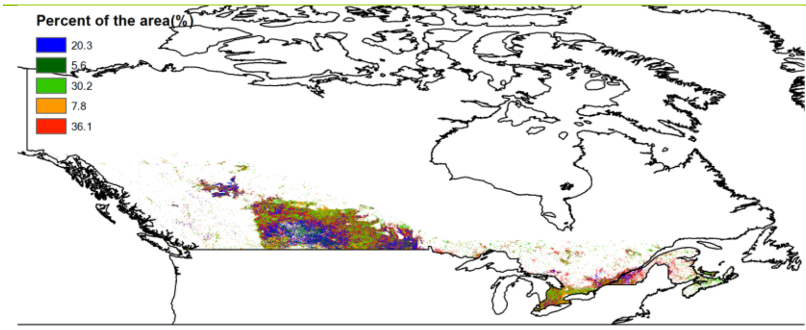
CropWatch currently projects wheat production in Canada for 2016 to be up 8% over last year (see section 5.1 and table B.4 in Annex B).

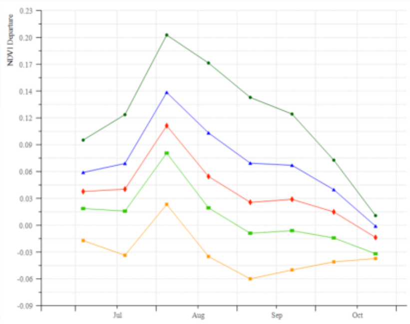
Figure 3.10. Canada crop condition, July-October 2016





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





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

[DEU] Germany

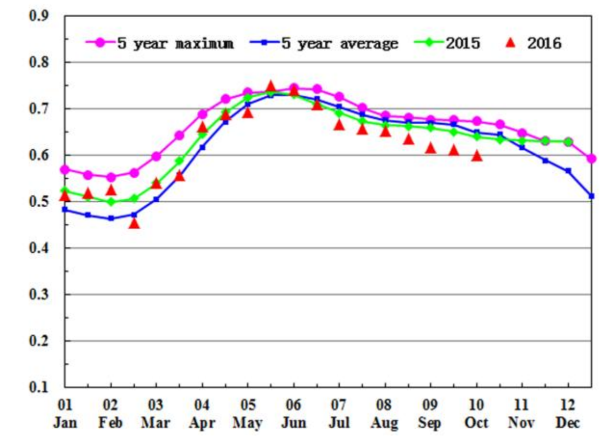
In Germany total precipitation was 23% below average over the period of analysis. From the middle of August rainfall (RAIN) deficits were recorded all over the country. Temperature and radiation were close to average (TEMP, 0.1°C and RADPAR, -2%) but biomass (BIOMSSS) was 16% below the recent five-year average.

Nationwide, the NDVI development curve was below both normal and last year's values. In August and September, crops in over 35% of the country were in poor condition, with the notable exceptions of the northern regions. Dry conditions especially affected the central area from Nordrhein-Westfalen in the west to Saxony-Anhalt (where conditions were particularly poor) and southern regions of the country. Crop conditions assessed on the basis of NDVI are confirmed by VCIx values, which in the same regions did not exceed 0.5.

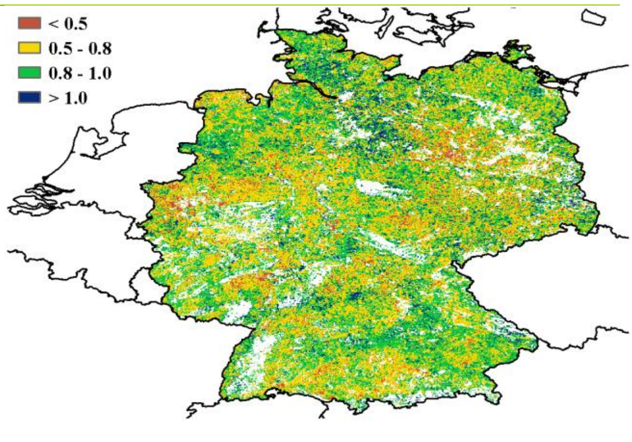
All over the country in October precipitation totals were close to average and well distributed. They boosted winter crop emergence and early development, especially in regions with scarce rainfalls in September. The NDVI spatial profiles indicate current crop condition slightly below average at this point.

Long lasting rainfall deficits during the reporting period benefited the ripening of summer crops but hampered sowing activities and the emergence of winter crops.

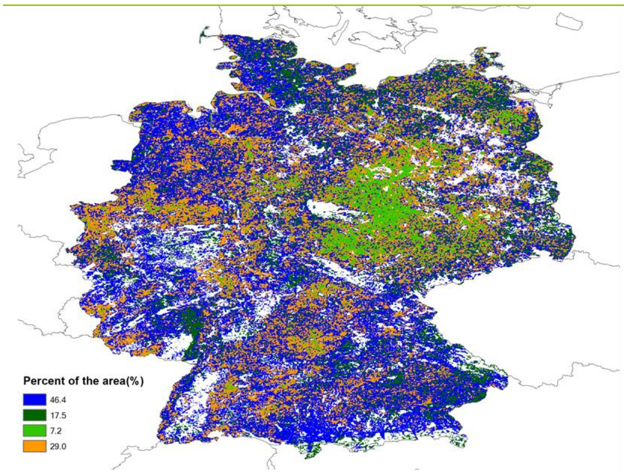
Figure 3.11. Germany crop condition, July-October 2016



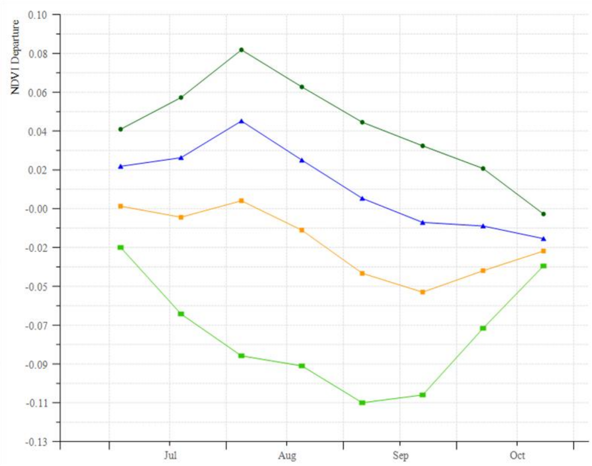
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

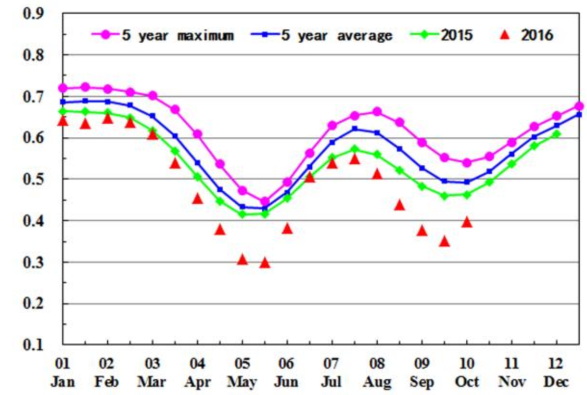
[EGY] Egypt

The July-October monitoring period covers the growing stage of rice and maize and the harvest of wheat and barley crops. Generally, crop condition was unfavorable when compared with the previous five-year average. Compared to average, all agroclimatic indicators were about average (rainfall was -31% below average, but since the expected amount is less than 10 mm, the shortage is meaningless), as were temperature (-0.5°C) and biomass (-6%). It is stressed that, since the bulk of crops is irrigated, rainfall is not a crucial variable in Egypt. Among the agronomic indicators, CALF was 1 percentage point below average and the cropping intensity decreased 2%; VCIx was moderate.

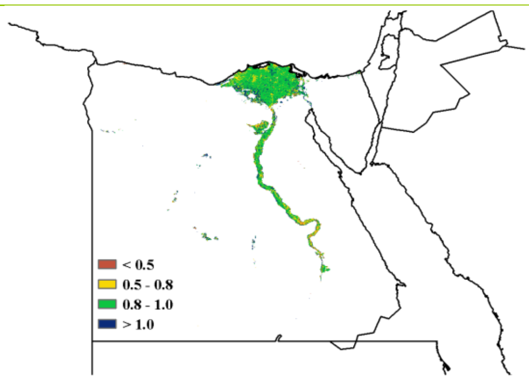
The spatial NDVI pattern and clusters indicate that crop growth was generally below the recent five-year average. Only 7.2% of the cropped area, located in the southern Beheira provinces, displayed relatively good growing condition, while 13.6% (located in northern Beheira, Kafrel-Sheikh, Gharbia, and Monufia provinces in the north of the country) showed decidedly inferior condition.

In general, crop condition is assessed as below average.

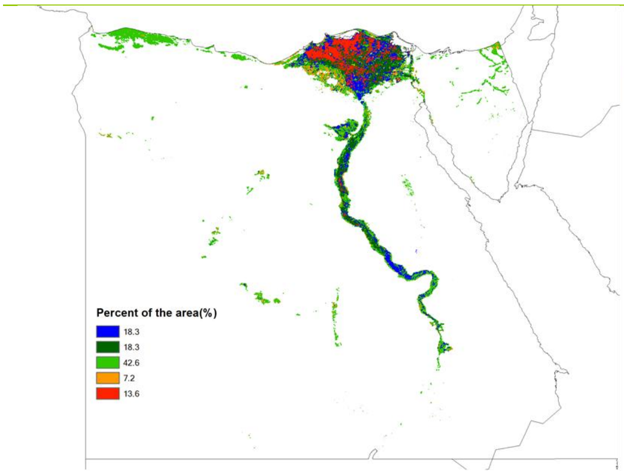
Figure 3.12. Egypt crop condition, July-October 2016



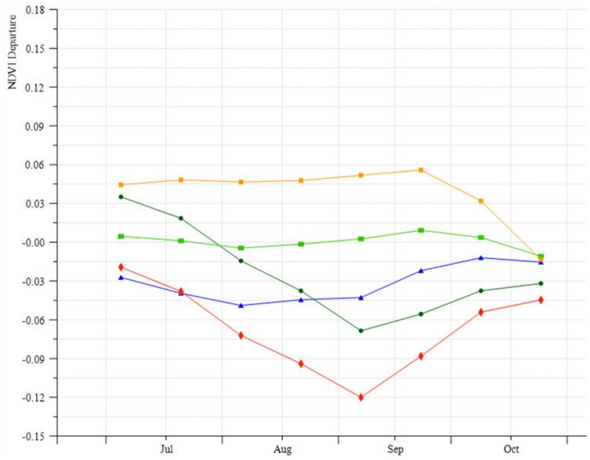
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



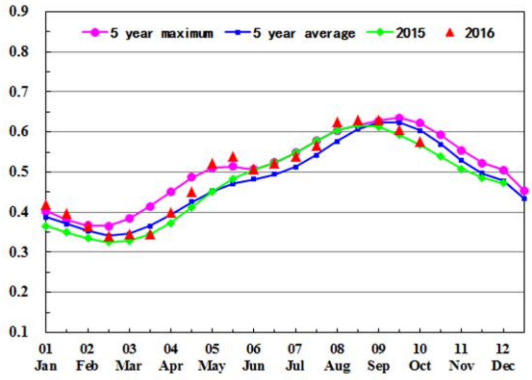
(d) NDVI profiles

[ETH] Ethiopia

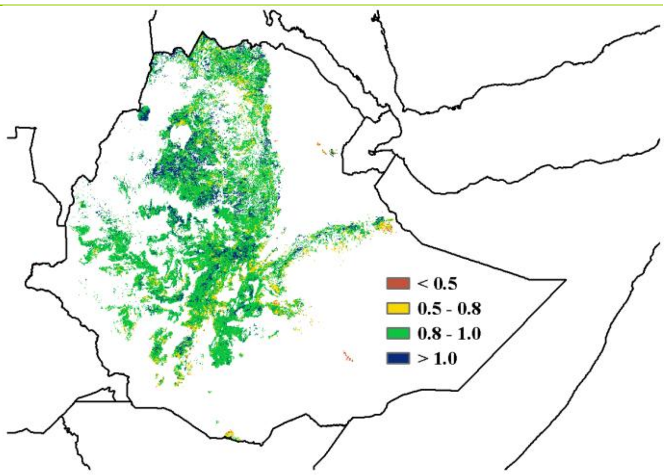
During the period from July to October, the condition of crops in the country was generally favorable, with temperatures not differing much from the average. The prevailing RADPAR slightly (though not significantly) increased by 2%, while rainfall (RAIN) dropped 21% below average. For crops to be harvested in December, this coincides with a reduction of 13% in the biomass production potential BIOMSS. Crops, such as wheat, harvested around August may not have been affected much by these conditions in most parts of Tigray, Amhara, and Oromia. The maximum VCI was generally fair in the central and northern parts of the country, which include Amhara, Oromia, and North Wollo. Only few areas such as northeast SNPP and far-east Oromia showed high maximum VCI.

The spatial NDVI clusters and profiles reflected a pattern similar to the previous growing season. Crop development was slow and slightly below average between September and October in Tigray, where the growing season ends around September. Because Amhara, the major teff and wheat producing area, has a growing season up to October, an average production output is anticipated there. About 4.5% of the country (in in southern parts of SNPP and Oromia) experienced unfavorable conditions, which lead to locally poor crop condition. Overall, average crop conditions are prevailing in the country.

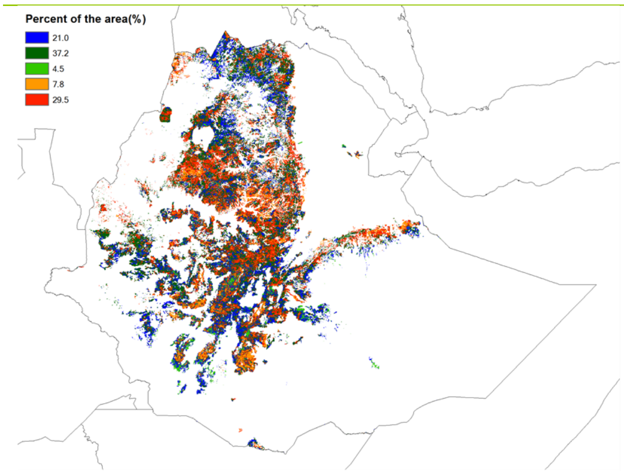
Figure 3.13. Ethiopia crop condition, July-October 2016



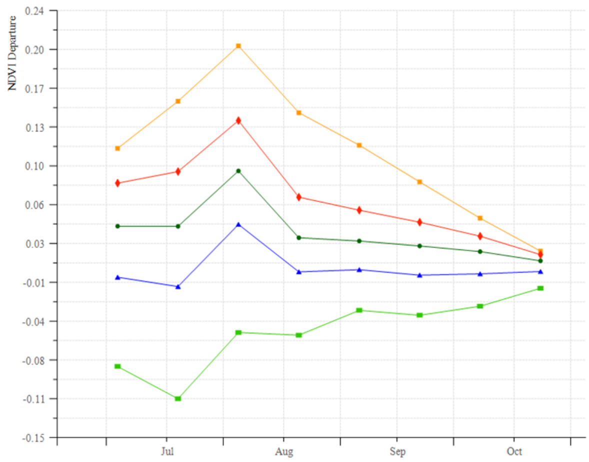
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

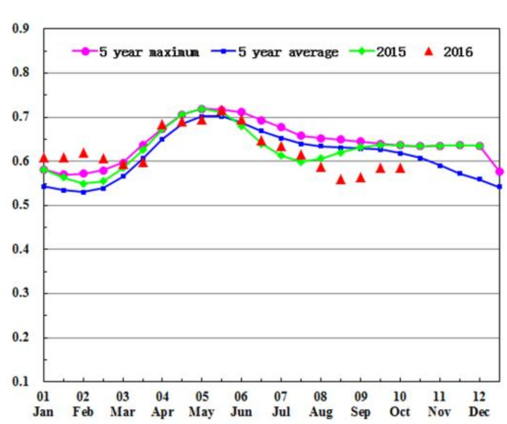
[FRA] France

In France, the reporting period covers important phenological phases for sugar beet (storage organs development and sugar accumulation) and maize (grain filling and ripening), as well as early development stages of winter crops sown in September-October. At the national level, total precipitation was significantly below the fifteen-year average (-41%), while temperature (-0.3°C) and radiation (+3%) showed only slight departures. Rainfall was very scarce within the whole reporting period. An exception was recorded in the middle of October with 10 days with above-average rainfall. The biomass production potential dropped 35% below the recent five-year average. NDVI was continuously below average from the end of June, with highest negative departures at the end of August and early September.

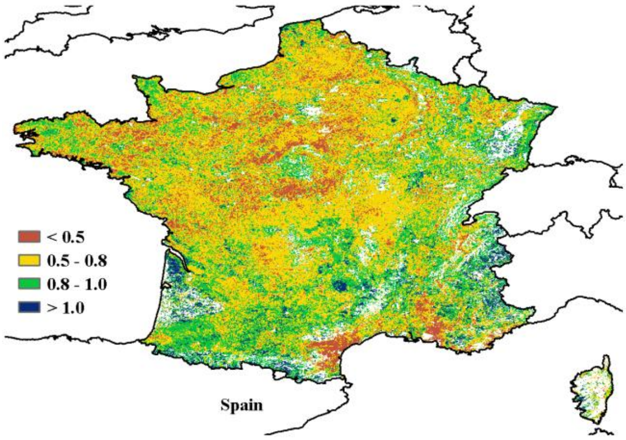
Negative NDVI departures actually occurred over the majority of agricultural areas, especially in the wide belt from the northwest (Bretagne) across the center to the east. Significantly below average NDVI occurred in 35% of agricultural areas starting in July. The worst crop conditions, affecting 10.8% of arable land, were observed especially in the central regions (south of Centre, Bourgogne, Limousin and Auvergne), northwest (Haute-Normandie), and western areas (Pays de la Loire and Poitou-Charentes). At the scale of the whole country, the VCIx amounts to 0.74, significantly below its average value for the past five years. The lowest values (<0.5) of this indicator are observed in the same regions with the least favorable crop conditions according to NDVI. This leads to a lower than usual expectation for maize and sugar beet.

In the second ten-day period of October, higher than average rainfall was favorable for emergence and early development of winter crops. The drought that caused the production of rainfed summer crops to be below average also led to a delay of winter crop sowing. Their output in 2017 will depend critically on winter rains.

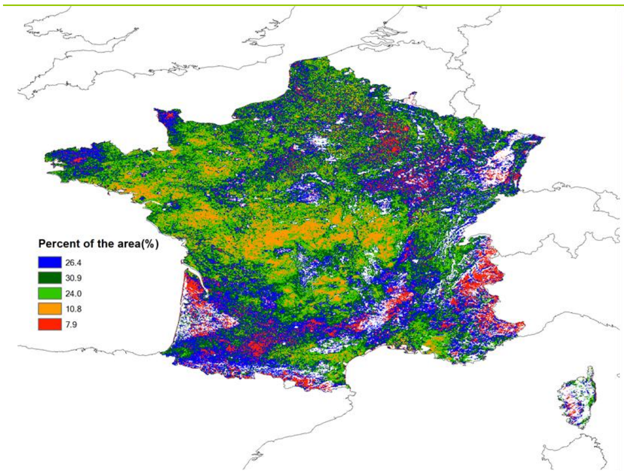
Figure 3.14. France crop condition, July-October 2016



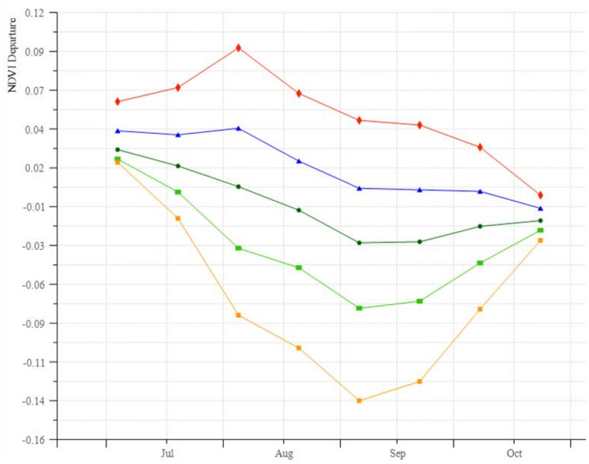
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

[GBR] United Kingdom

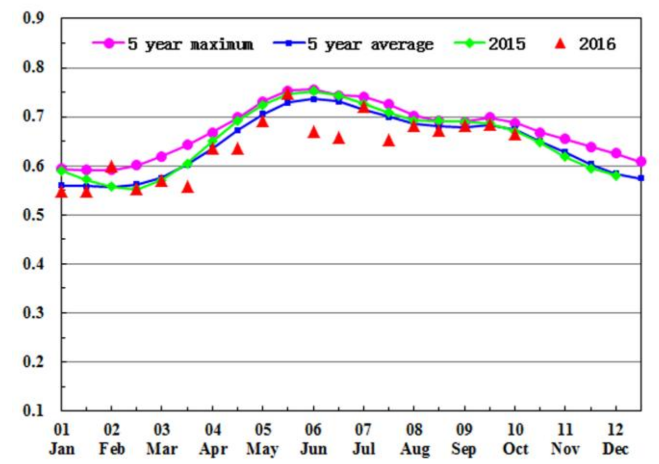
In the beginning of the monitoring period, negative departures from average were recorded for both precipitation and the agronomic indicators. These then continued in the south and southeast of the country, where long periods with rainfall scarcity (RAIN at -30% comparing to the fifteen-year average) and higher than average temperatures were recorded for July-September.

Across the monitoring period, NDVI profiles indicate worse than average crop condition for 13.8% of the total area, located mainly in the above mentioned regions. This could negatively affect yield of spring barley grown in the south of the country. Although maximum Vegetation Condition Index (VCI) values varied across the country, they were all above 0.5, with a national value of 0.91.

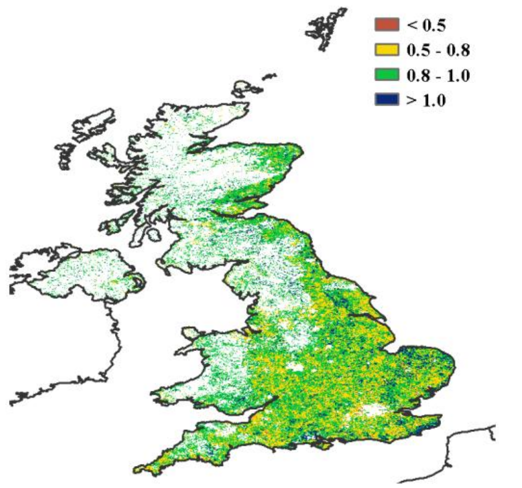
At the national level, precipitation was 12% below the fifteen-year average, whereas temperature (TEMP, +0.4°C) and radiation (RADPAR, +4%) were above average. In July and August, crop condition development (as indicated by the NDVI patterns) was clearly below the five-year average and last year's values as a result of rainfall deficit and higher than usual temperatures. A biomass reduction of 9% compared to the five-year average is foreseen, which could affect also tuber crops and grasslands.

Summer crop condition was generally good, but more moisture will be needed for winter crops.

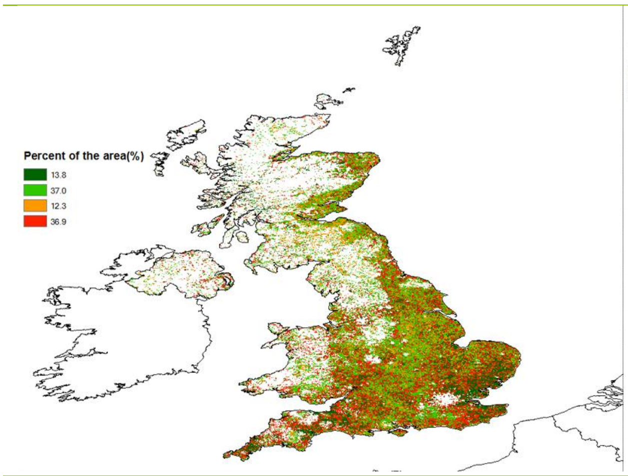
Figure 3.15. United Kingdom crop condition, July-October 2016



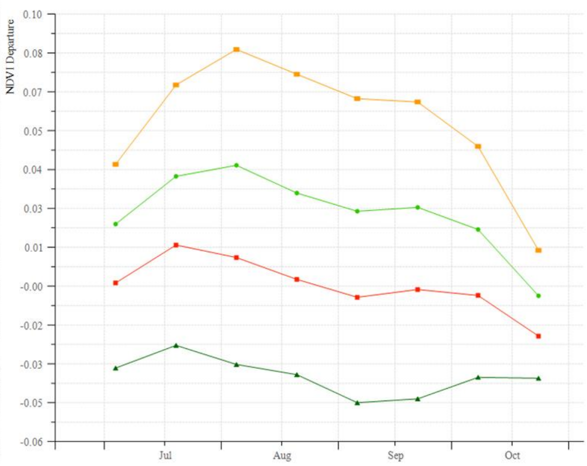
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



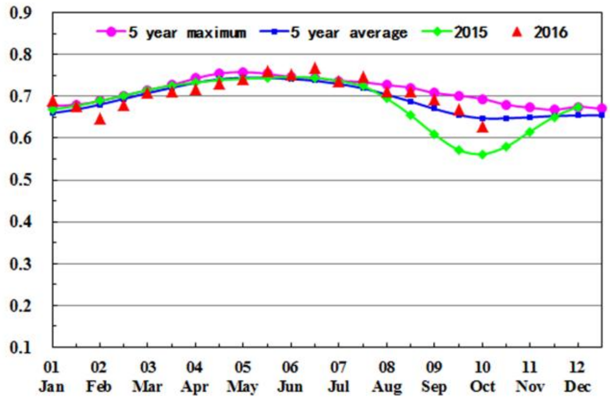
(d) NDVI profiles

[IDN] Indonesia

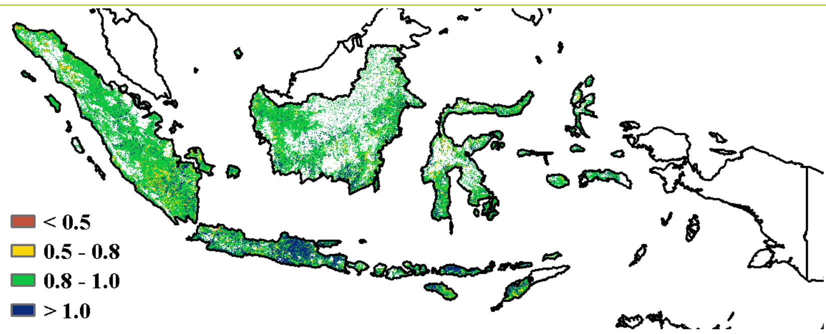
In Indonesia, the dry season maize and rice crops were entering their generative or early ripening stages over the monitoring period. Crops generally showed good condition from August to October. Precipitation was significantly above average (RAIN, +36%), resulting from the fading El Niño. Consistent with the increase in rainfall, radiation (RADPAR) displayed a decrease of 5% while the biomass accumulation potential (BIOMSS) increased significantly by 21% compared with the recent five-year average. The national average NDVI curve follows a profile similar to the recent five-year average. Contrasting NDVI clusters are observed with mostly above average conditions on the island of Java in August.

Altogether, CropWatch estimates that normal yields can be expected for this season's crops.

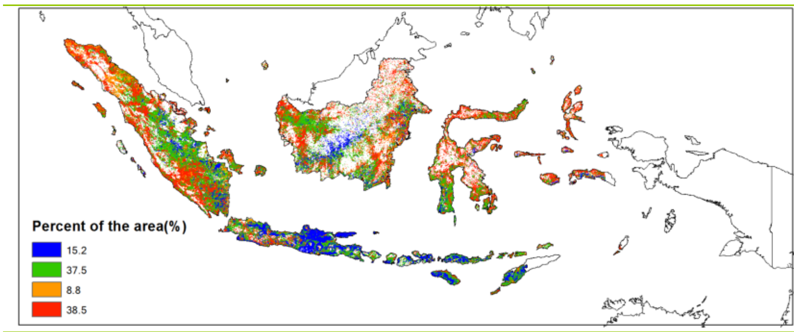
Figure 3.16. Indonesia crop condition, July-October 2016



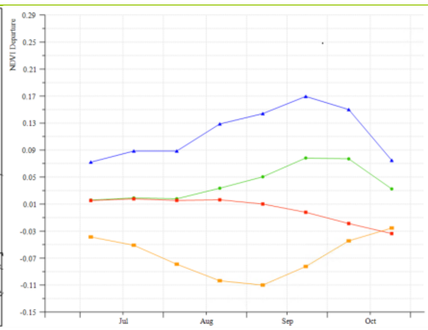
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA

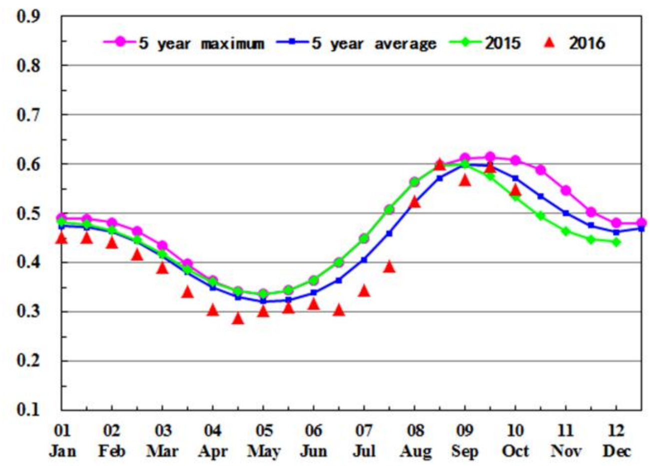


d) NDVI profiles

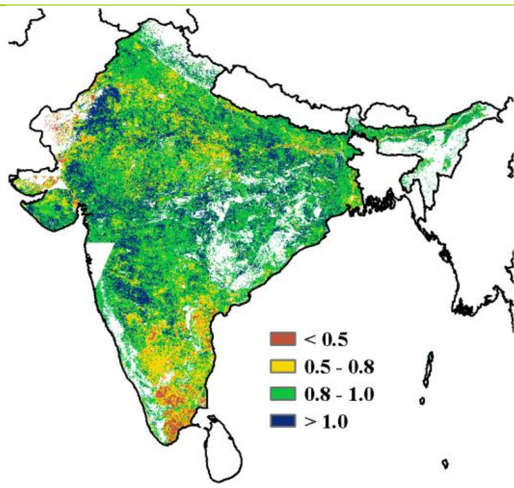
[IND] India

The current monitoring period corresponds to the rainfed kharif season crops. Over the last four months, crop condition was below average for the country. Excess rainfall (RAIN, +12%), primarily in Andhra Pradesh (+9%), Bihar (+38%), Rajasthan (+79(%), Uttar Pradesh (+29%), and Madhya Pradesh (+62%), caused flooding and damaged the crops. Temperature (TEMP) remained average, while photosynthetically active radiation (RADPAR) decreased by 6%. The crop condition development was below the previous five-year average, while the national NDVI profiles remained average. In Tamil Nadu, Andhra Pradesh, Gujarat, and Karnataka, the maximum VCI value stayed below 0.5, indicating poor crop condition. The cropped arable land fraction (CALF) increased by 1 percentage point as compared to the five-year average while the biomass accumulation potential (BIOMSS) rose 3%. Overall, as per Crop Watch indicators, crop condition was below average and a reduced output is expected, due mainly to the damage caused by the recent floods.

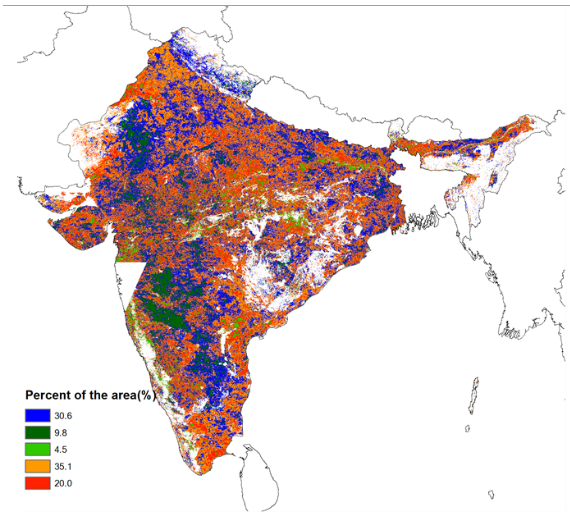
Figure 3.17. India crop condition, July-October 2016



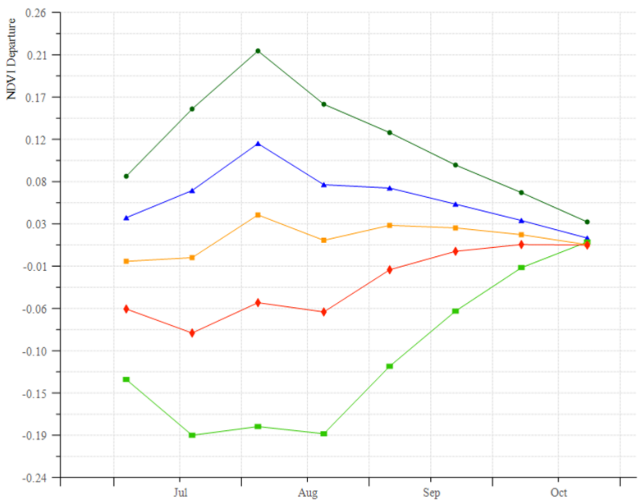
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

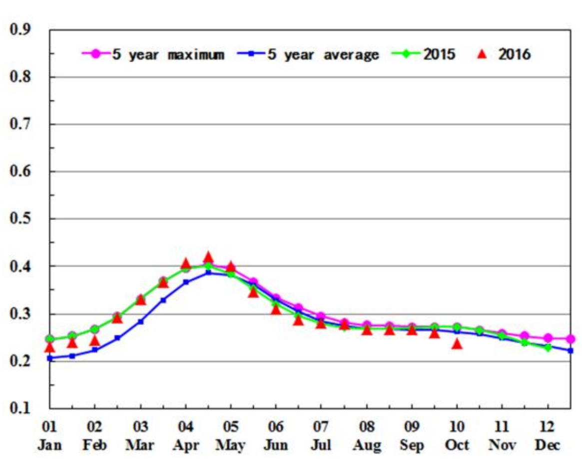
[IRN] Iran

Crop condition was generally close to or below average from July to October 2016 in Iran. The summer crops (potatoes and rice) were harvested in September, while winter wheat and barley started to be sown in the same month. Accumulated rainfall (RAIN, -39%) was below average over the last four months, while temperature (-0.5°C) was slightly below and RADPAR (+1%) close to average. CropWatch agro-climatic indices for the current season indicate unfavorable weather conditions for crop growth, which is confirmed by the significant decrease of the BIOMSS indicator by 42%. Compared to the five-year average, the national average of VCIx for this monitoring period was 0.6, and CALF increased by 3 percentage points. The cropping intensity (+4%) above the five-year average indicates higher crop land utilization in 2016.

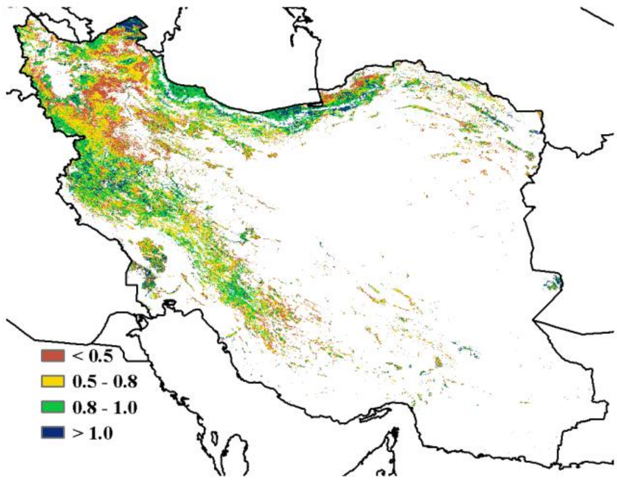
According to the national crop condition development graphs, the major rice producing areas (Mazandaran and Gilan provinces in the central-north region) experienced favorable conditions, while in most of the northwestern region, crop condition was below average for the entire monitoring period. Crop condition in the central-western region, such as in Kermanshah, Llam, and surrounding provinces, was above average except during early August and at the end of October.

Overall, the production of rice in Iran is expected to be above average, while the outlook for other summer crops is just fair.

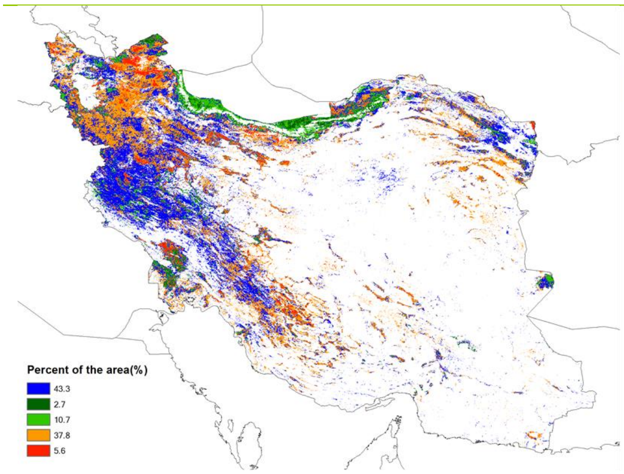
Figure 3.18. Iran crop condition, July-October 2016



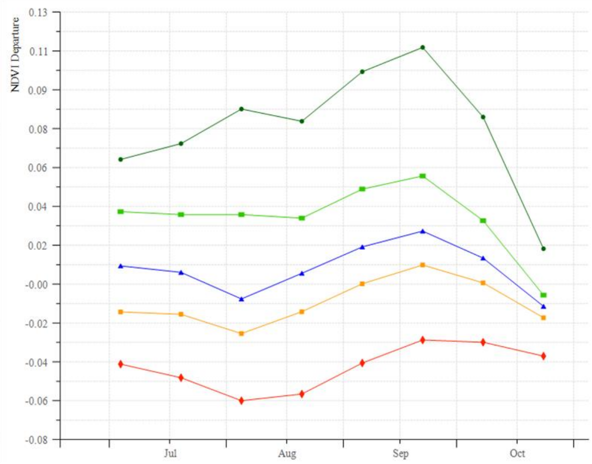
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

[KAZ] Kazakhstan

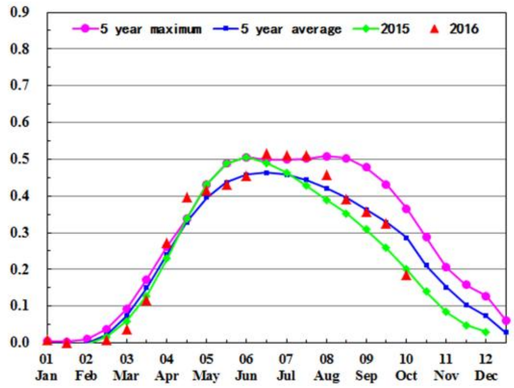
During the reporting period, weather conditions were generally favorable for growth and harvesting of spring crops. The CropWatch agroclimatic indicators show that rainfall (RAIN) was well above average (+56%), temperature (TEMP) below (-0.8°C), and radiation (RADPAR) slightly below (-2%). BIOMSS is expected to increase by 34% compared to the five-year average.

Spatial NDVI patterns and profiles show that in August crop condition was below the five-year average in 30.5% of the agricultural areas. In all other areas it was significantly above average (locally even very significantly, up to 0.2 NDVI units), due to the abundant rainfall. Since then, NDVI departures from average decreased continuously, returning to average conditions at the end of October. This created favorable conditions for farm operations and winter crops emergence and early tillering. The national average of the VCIx (1.00) was above average conditions, and the arable land fraction increased by 23% compared to its five-year average.

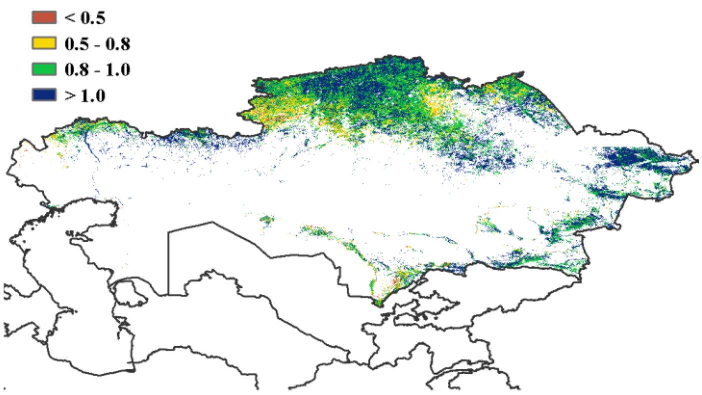
The most favorable conditions of crops occurred in northern areas (northeast of Kustanayskaya, Severo-kazachstanskaya and the north of Pavlodarskaya oblasts) as well as in the east of kazakhstan (Vostochno-kazachstanskaya oblast). The agroclimatic indicators show favorable condition in the northern part, with a 36% increase of rainfall and a 24% increase of biomass compared with the fifteen-year average.

According to the crop condition development graph, overall crop condition was average from the end of August. Thanks to precipitation well-distributed in time (with a drier than usual August and close to average September) the output of summer crops is bound to increase. In 2016, wheat production is expected to amount to 7 million tons, up 100,000 tons from the previous year.

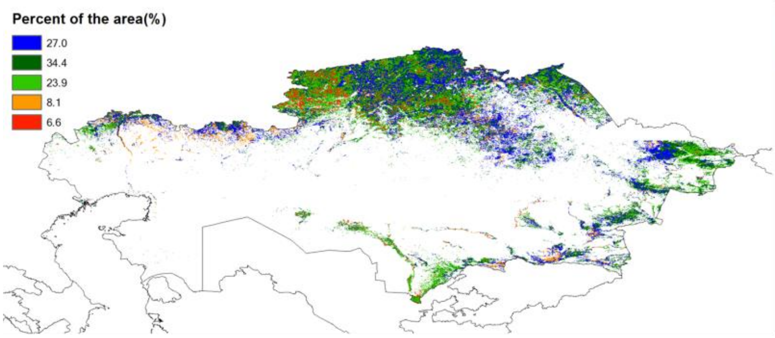
Figure 3.19. Kazakhstan crop condition, July-October 2016



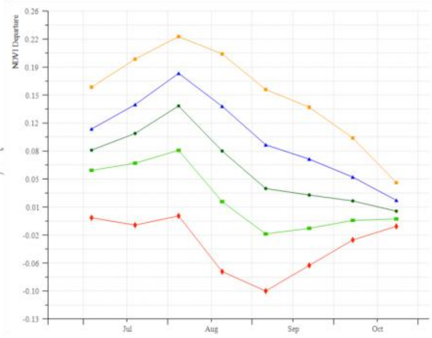
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



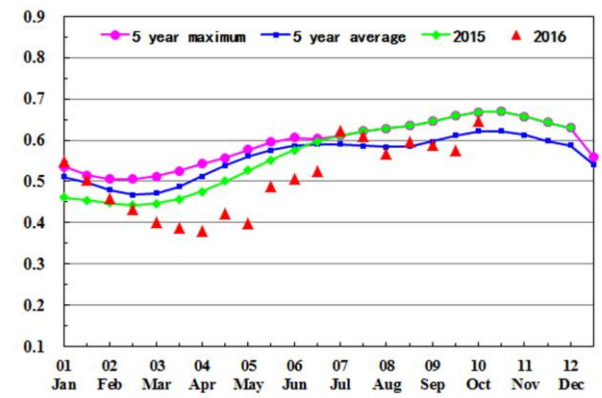
(d) NDVI profiles

[KHM] Cambodia

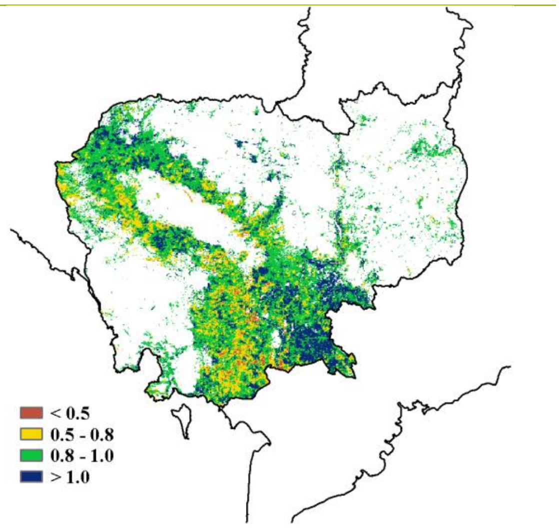
Crops in Cambodia displayed around average conditions over the reporting period, which coincides with the planting of the main paddy crop. Overall, rainfall was higher than average (+29.5%) over much of the country, with cloudiness causing a 2% drop in RADPAR. The biomass accumulation potential increased 8%.

Overall crop condition, which was better than average during mid-July, changed to average in the two months that followed. In the area of south Tonle Sap (29.1% of the cropland in the whole country), crop conditions were below average over the entire period. The maximum VCI of this area (0.5-0.8) confirms the low NDVI. With the exception of this area, however, nearly half of the country experienced near average crop condition. Limited patches in southeast and northwest Tonle Sap performed better than average, for instance in Kampong Chan, Prey Veng, and Svay Rieng. Overall crop prospects for the country are at the same level as recent years.

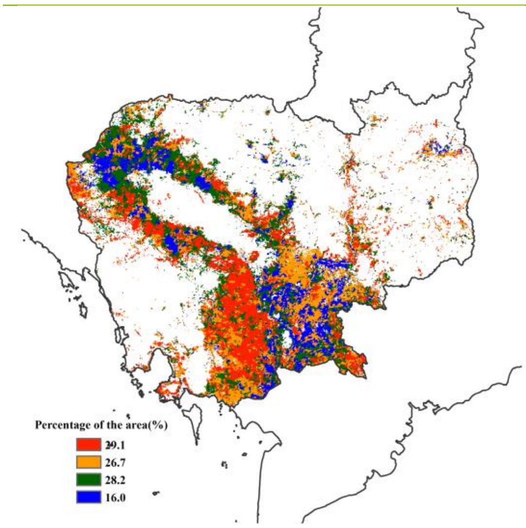
Figure 3.20. Cambodia crop condition, July-October 2016



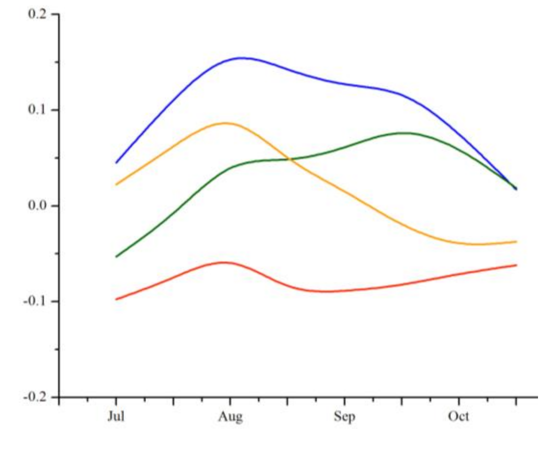
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

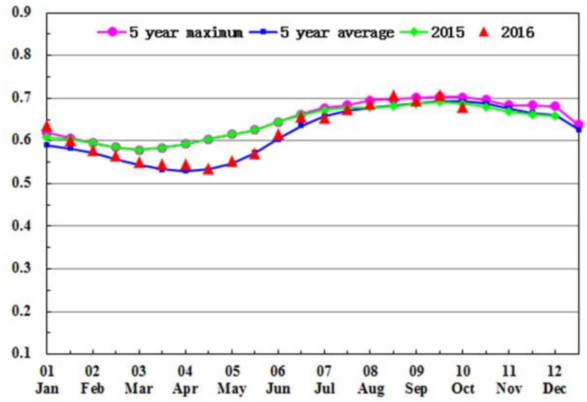
[MEX] Mexico

During this monitoring period, maize and sorghum (spring to summer) were still growing, while rice (spring to summer) was being harvested. Overall, crop condition was average according to the crop condition development graph based on NDVI.

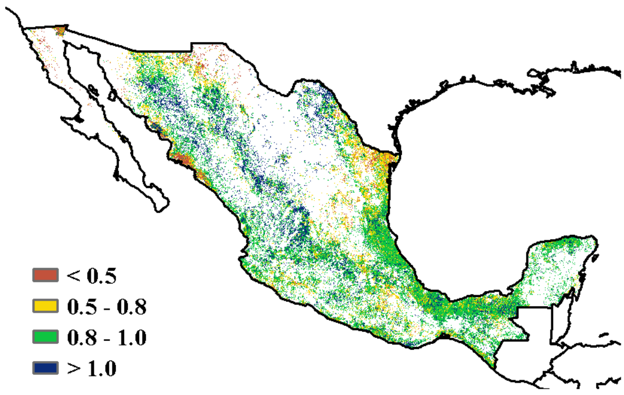
The CropWatch agroclimatic indicators show that rainfall and temperature separately dropped below average by 9% and 0.2°C while RADPAR increased by 2%. Consequently, BIOMSS was below average by 6%. In contrast, CALF and cropping intensity increased respectively by 5% and 3%. The map of spatial patterns for maximum VCI show that high values (larger than 0.5) of this indicator are widespread, while low values occur only in western Sinaloa, northern Chihuahua and Tamaulipas provinces. According to the graph for spatial NDVI patterns and NDVI profiles, crop condition was above average in 68.9% of planted areas, mainly in Veracruz, Tabasco, Coahuila, Guanajuato, and Jalisco. On the contrary, crops in western Sinaloa, southwestern and northern Sonora, and northern Chihuahua and Tamaulipas (accounting for about 31% of all cropland), experienced below or close to average crop condition, a pattern also confirmed by maximum VCI.

Altogether, crop yields for this season in Mexico are expected to be above average.

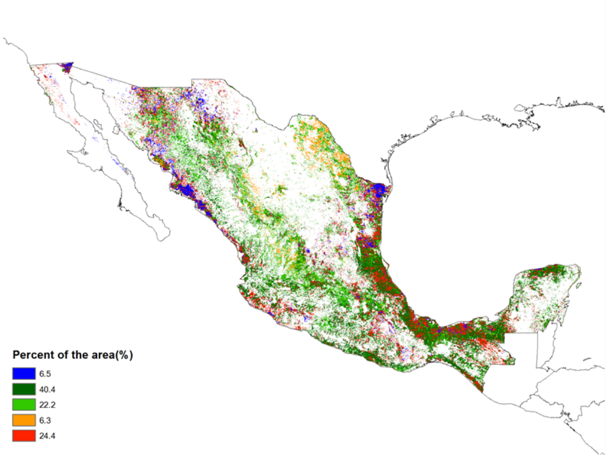
Figure 3.21. Mexico crop condition, July-October 2016



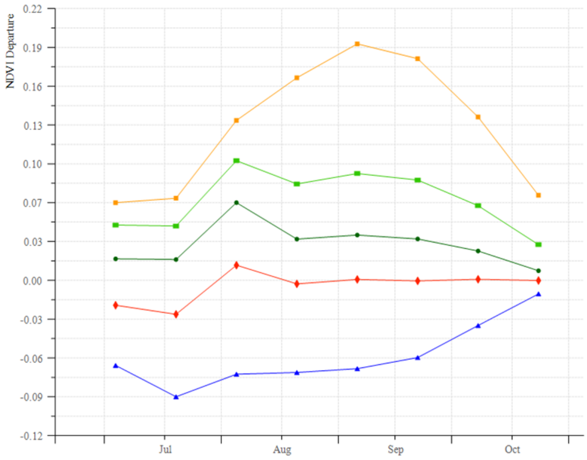
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA

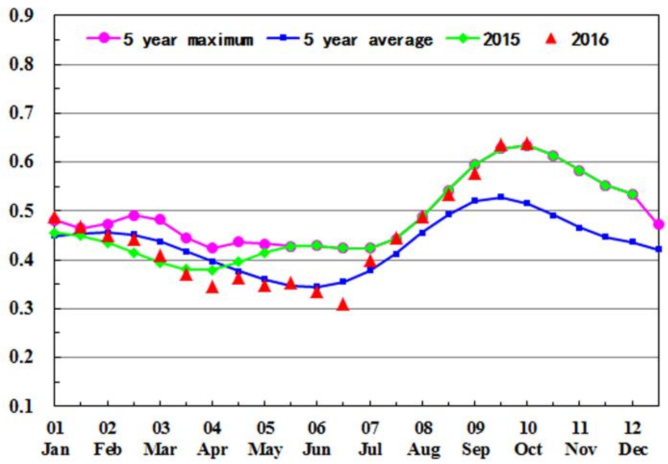


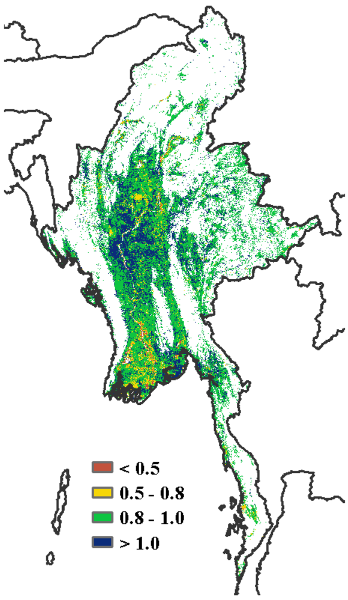
(d) NDVI profiles

[MMR] Myanmar

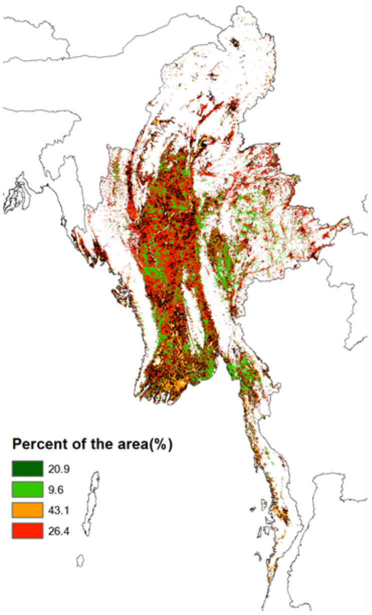
The reporting period covers the mid-cycle stages of the main rice crop (which accounts for 85% of annual production) as well as the harvest of potatoes, which started the last week of September. It also covers the sowing of winter wheat and maize in September. The CropWatch agroclimatic and agronomic indicators show average rainfall (RAIN, -1%), TEMP (-0.1°C), radiation (RADPAR -2%), and biomass accumulation potential (BIOMSS). The national NDVI profile values were slightly above average from early July to October in the whole country. In the central part of the country (that is, Mandalay and Magway regions), VCIx exceeded 1.0 while only some small patches in the Delta (Ayeyawaddy and Yangon divisions) show VCIx below 0.5. Other areas enjoyed a "normal" VCIx between 0.8 and 1.0. The crops that suffered damage due to flooding are expected to recover, resulting in a slight increase in paddy production. Overall, CropWatch assesses the crop condition and production outlook for the country as average.

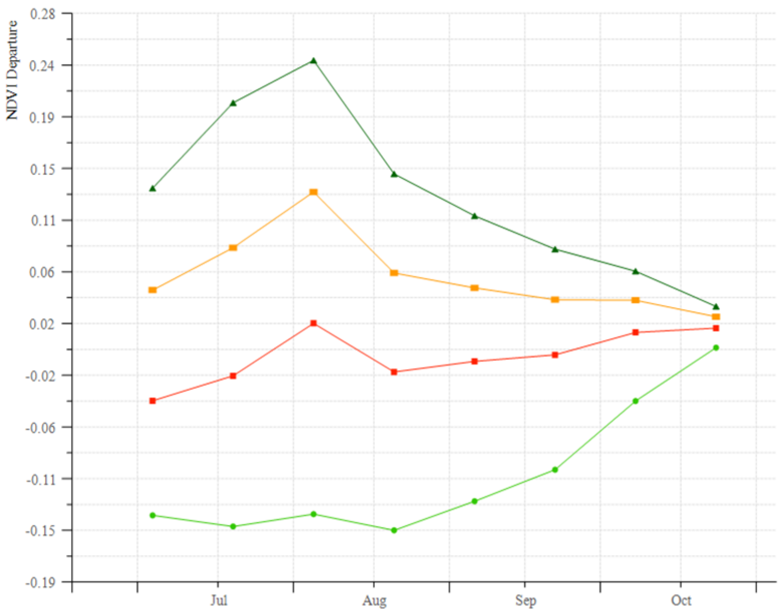
Figure 3.22. Myanmar crop condition, July-October 2016





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





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

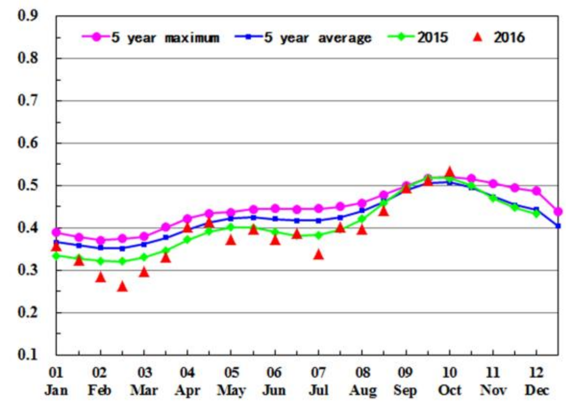
ARG AUS BGD BRA CAN DEU EGY ETH FRA GBR IDN IND IRN KAZ KHM MEX MMR **NGA** PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF

[NGA] Nigeria

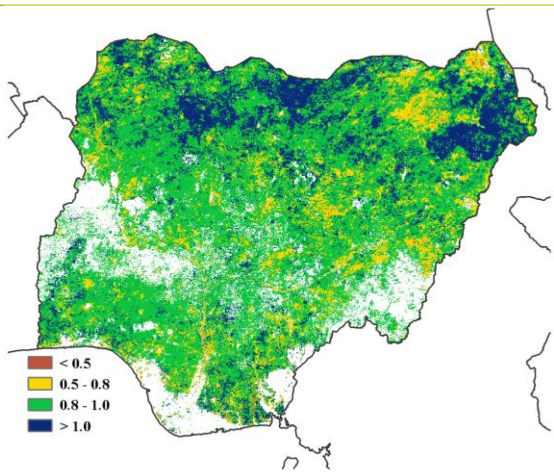
Between July and October, Nigerian farmers were harvesting their maize, rice, sorghum and yam crops, while the second maize crop, irrigated rice, and cassava were growing. Temperature and RADPAR were average, while rainfall showed a slight increase (RAIN, +8%), which resulted in a minor rise in the biomass production potential (BIOMSS, +4%).

The crop development based on NDVI shows that conditions changed from below average and below the previous year in July to higher than the recent five-year maximum in October. Contrary to the previous year, when the north Sahelian region was characterized by unsatisfactory VCIx, during the current monitoring period the region showed favorable development compared to the average in Borno, Jigawa, western Katsina, and eastern Zanfana. The spatial NDVI patterns and clusters indicate that crop condition was generally above average over much of the country, except in some central areas (12.8% of croplands) and especially in the south (5.2% of area).

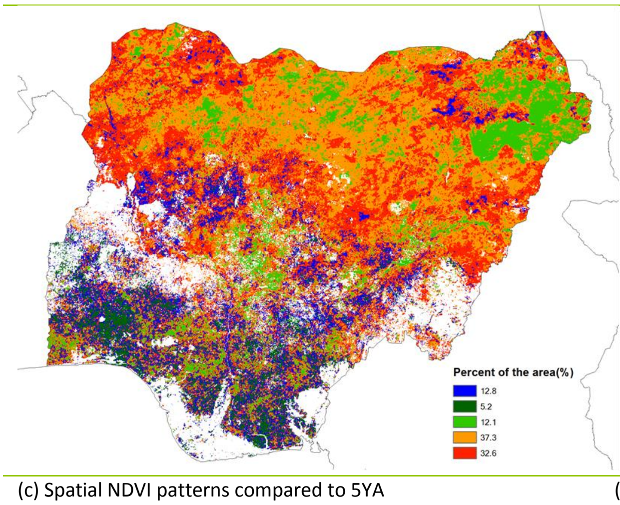
Figure 3.23. Nigeria crop condition, July-October 2016



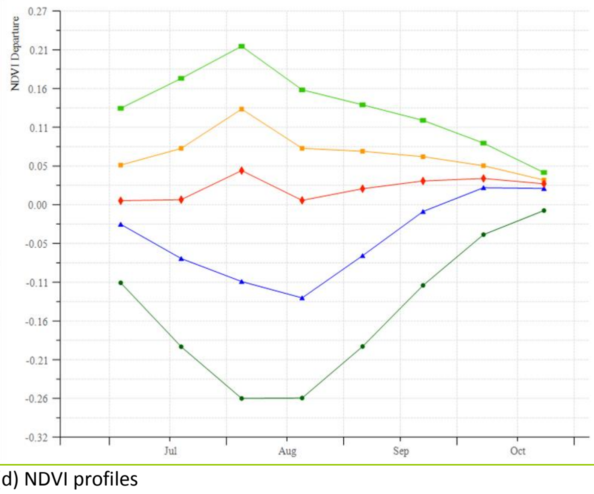
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

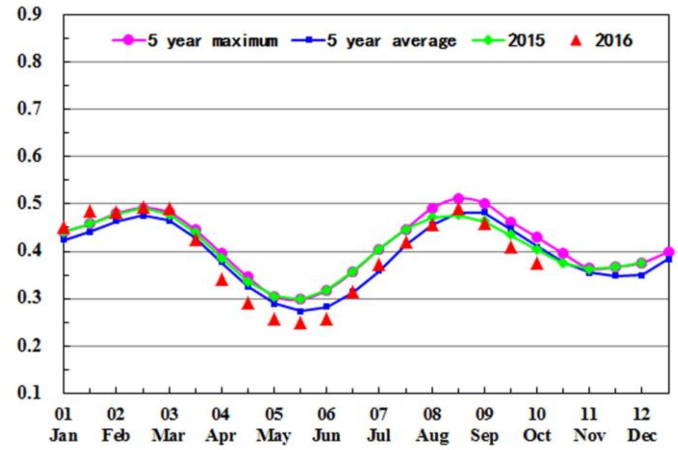
[PAK] Pakistan

This monitoring period covers the growing and harvesting stages of summer (kharif) maize and rice, as well as the sowing of winter barley and wheat. Crop condition was generally unfavorable from July to October. Compared with average, RAIN and RADPAR showed some increase (+6% and +2% respectively), while TEMP was average (-0.3°C). BIOMSS increased by just 3% compared to the recent five-year average. The national average of VCIx (0.70) was above average, the fraction of cropped arable land (CALF) was unchanged, and cropping intensity decreased by 11% compared to average.

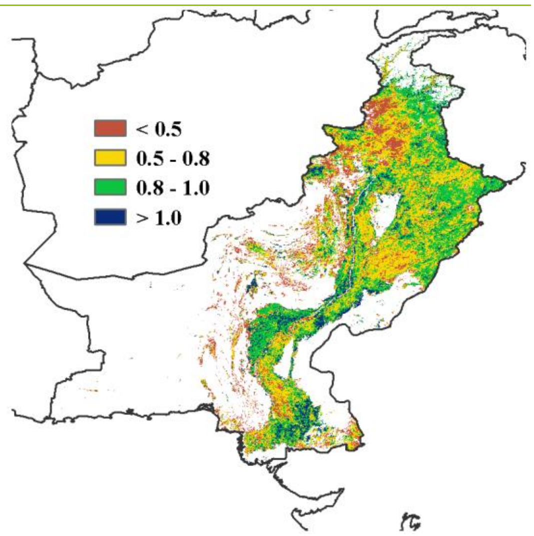
As shown by the crop condition development graph, crops condition varied between below average and average in this period. According to the spatial NDVI patterns and profiles, 73% of the cropped areas were above average throughout the period, while 21.9% was just below, and 4.9% below average but recovering in October (affecting central Khyber Pakhtunkhwa, Punjab, and some areas of Sindh).

Altogether, crop condition for Pakistan is estimated to be average.

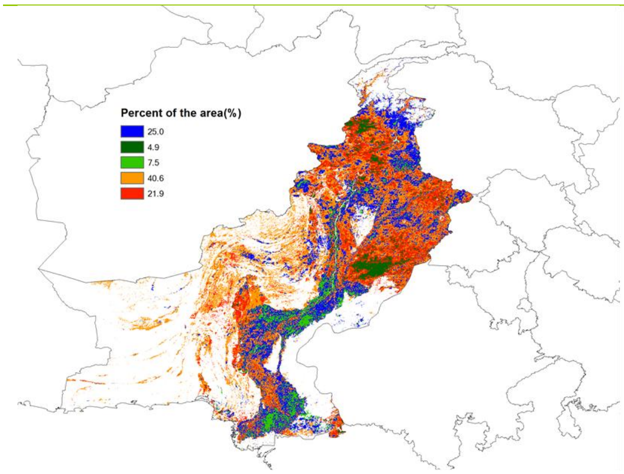
Figure 3.24. Pakistan crop condition, July-October 2016



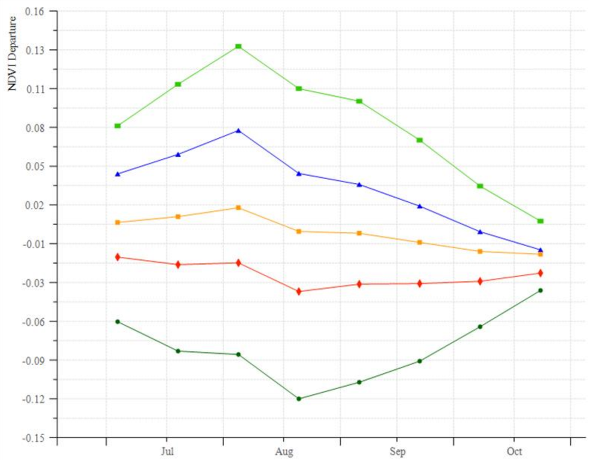
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



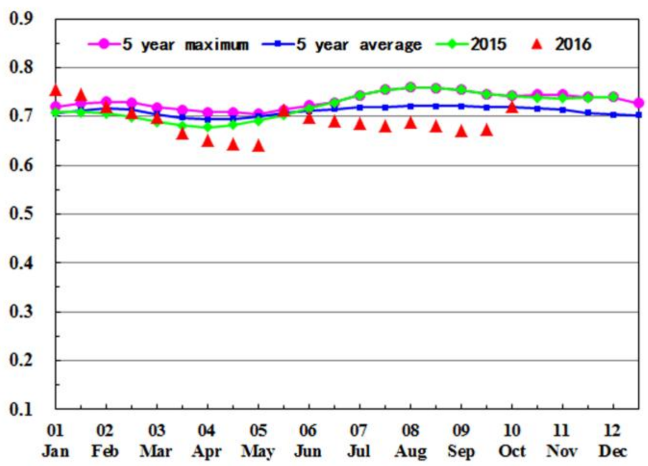
(d) NDVI profiles

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

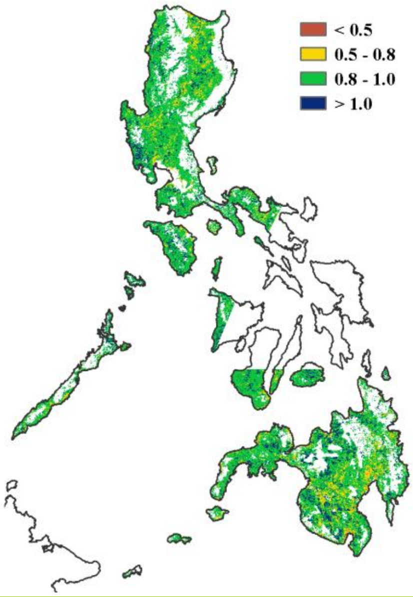
[PHL] The Philippines

The crops in the Philippines generally showed unfavorable condition between August and October according to the NDVI profiles. Harvesting of the main season paddy crop is currently underway. Nationwide, rainfall (RAIN) was 11% above average, accompanied by increased temperature (0.8°C) and about average radiation (RADPAR, -1%). The biomass accumulation potential (BIOMSS) shows a slight increase of 2%, while the cropping intensity decreased by 4% compared with the average. Typhoon Sarika flooded some crops in Luzon during mid-October, but the impact on crops is limited according to the NDVI cluster map, which shows that the VCIx values for most areas are above average. As the main crops have entered into the harvest period, the extreme weather in the monitoring period will not have much impact on the yield.

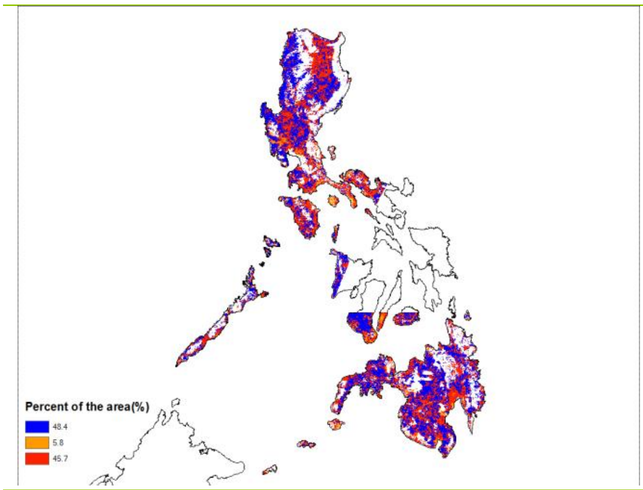
Figure 3.25. Philippines crop condition, July-October 2016



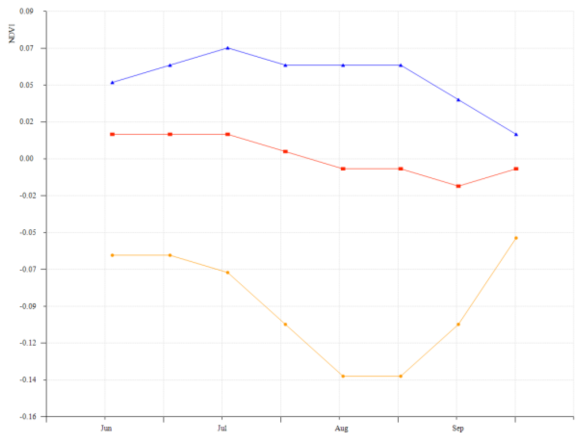
(a) Crop condition development graph based on NDVI



(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

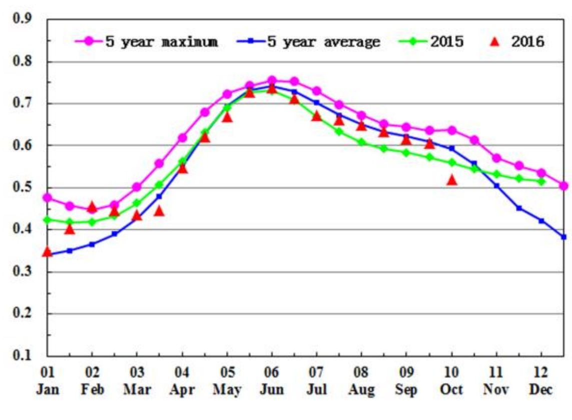
In Poland, meteorological conditions were variable during the reporting period. In July, precipitation totals were above average, locally reaching the fifteen-year maximum in the second ten-day period of the month. The precipitation hampered the cereal harvest in the majority of areas. Dry conditions prevailed from the middle of August until the end of September, and some areas recorded no rain at all in September. This weather benefited sugar beet and maize maturity and final yield. Due to unusually dry soils, winter crops sowing was postponed in central and south-western areas. Abundant precipitation in October was favorable for the emergence and early development of winter crops but caused inundations on heavy soils.

In August, NDVI values below the five-year average occurred on about 6% of agricultural land. Due to scarce rainfall in September, the area of less than average crop condition has increased. In Wielkopolskie and Kujawsko-Pomorskie regions, crop condition indicators presented mixed patterns, below or above the average; the higher than average patterns could indicate a production surplus due to irrigation. The least favorable crop condition occurred in the center, south-west, and west of the country, confirmed by low VCIx; these regions experienced the strongest rainfall deficits in late summer. In the eastern part of the country crop condition was better than average.

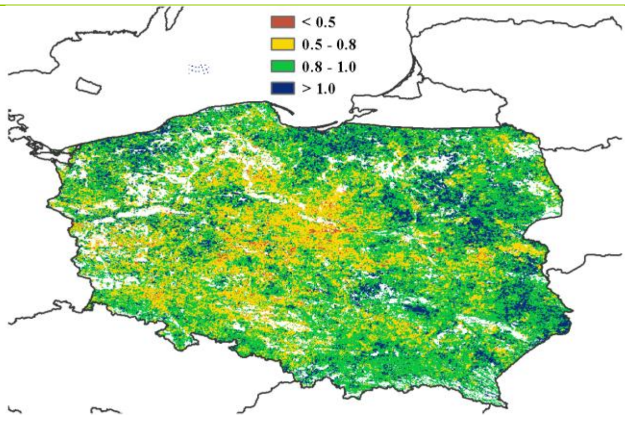
Overall, at the national scale, precipitation presents a positive departure of 28% over average for the reporting period, whereas negative departures concern temperature (-0.7°C) and radiation (-6%). Weather conditions were most favorable in the eastern part of the country, as confirmed by higher than average VCIx and a biomass potential increase of 21%.

Altogether, the production of the Polish crops is foreseen as average.

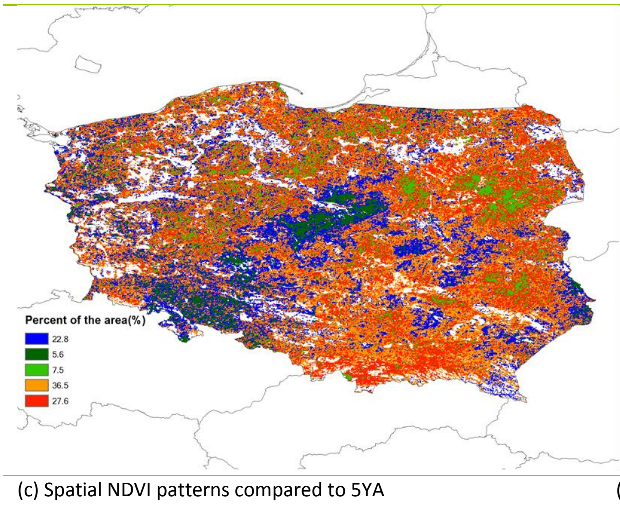
Figure 3.26. Poland crop condition, July-October 2016



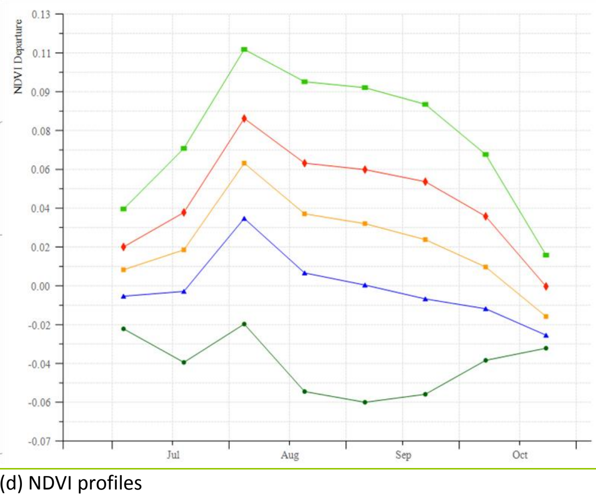
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

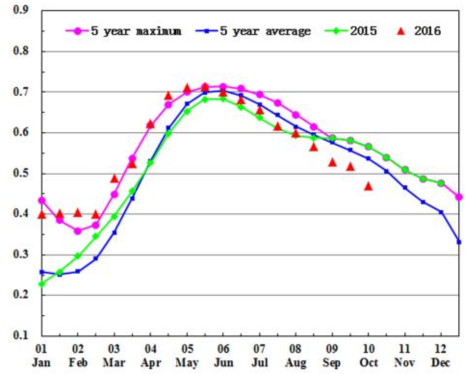
[ROU] Romania

In Romania, July to October precipitation was below average by 27%. The country suffered a long period with very scarce rainfall, which was broken in mid-September but with a significant decrease in temperatures (TEMP, -0.9°C). The prolonged drought followed by a cold period was unfavorable for sowing and early development of winter rape seed and then cereals. Potential biomass accumulation is currently predicted 17% below the average of the recent five years.

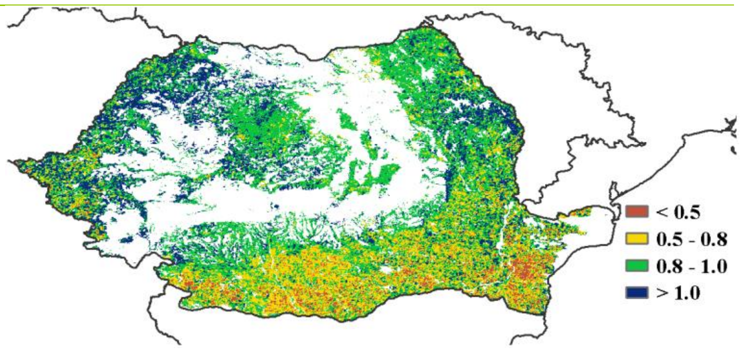
In August about 30% of agricultural land suffered worse than average crop condition. The area along the southern border of the country, covering 9.6% of the agricultural area, experienced particularly negative departures from the five-year average, with maximum VCIs between 0.5 and 0.8, and often below 0.5; this concerns the Sud-Vest Oltenia region (including Dolj and Olt counties) through the Sud-Muntenia region (Teleorman County) to the Sud-Est region (Constanta County).

According to the NDVI profiles, crop condition since August was continuously below average as a consequence of unfavorable weather. In the south and southeast, NDVI was below the average of the last five years, whereas in the Carpatian region and the western part of the country the profiles were above the average. The overall maximum VCI was 0.86, indicating close to average summer crops production; colder than usual meteorological conditions could have caused a slowdown of the development of winter crop seedlings.

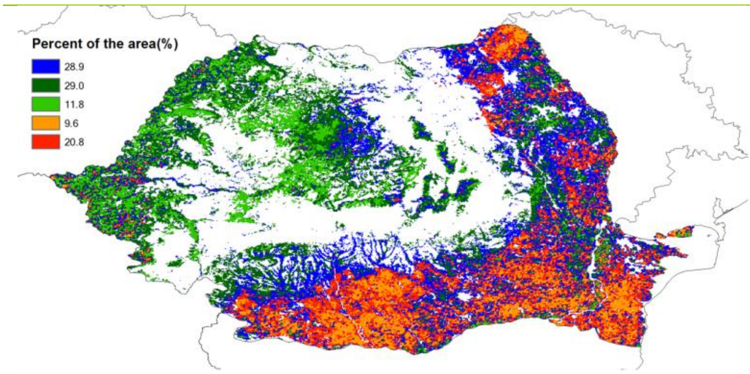
Figure 3.27. Romania crop condition, July-October 2016



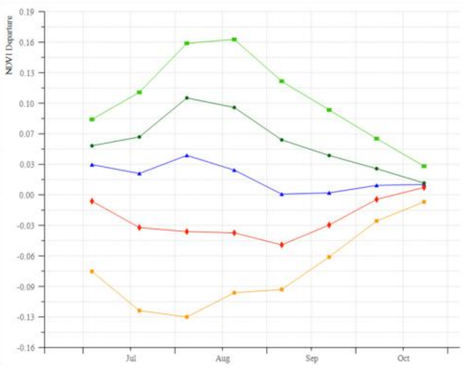
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

[RUS] Russia

Nationwide agroclimatic indicators were close to average, with somewhat lower temperature (TEMP, -0.4°C) and slightly worse biomass accumulation (BIOMSS, -3%). Crop condition development, based on NDVI, was also near the average and slightly better than last year.

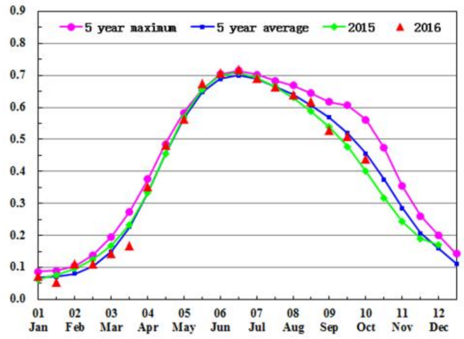
The central region presents positive prospects for biomass production (4%) due to a precipitation surplus (RAIN, +10%), even though in the end of the reporting period lower than usual temperature was recorded (-0.6°C in general).

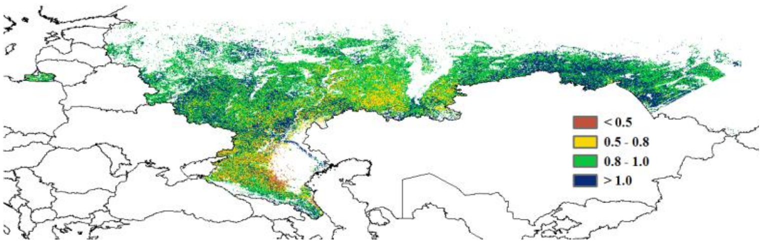
The Volga and Southern Ural regions, also very important producers, experienced precipitation deficits (-11%) with moderate temperature excess, especially in the Ural area (+0.5°C), which reduced biomass expectation in both regions (-9%). A BIOMSS reduction due to both low rain and low temperature affected the northern Caucasus, neighboring areas to the north, as well as an area near the Black Sea, with negative departures from average as large as 25%.

Spatial NDVI profiles, confirmed by maximum VCIx <0.8, show that from June onward crop condition for about 9% of the total area was worse than the five-year average. This applies to the southwest and Volga regions toward the Urals and may result in below average expectation both for cereals harvested in August and summer crops.

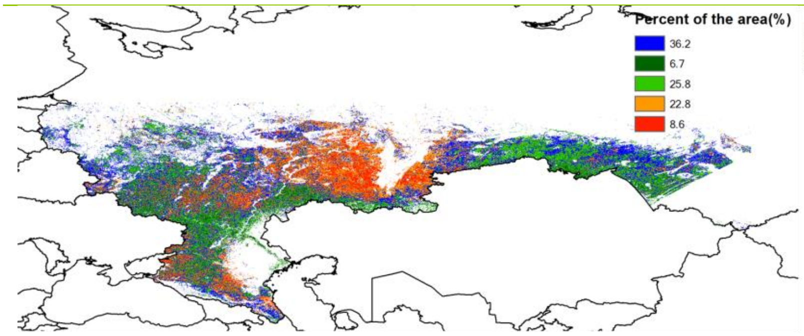
Overall crop production in Russia is foreseen to be close to average levels and early development of winter crops presents better perspectives than last year.

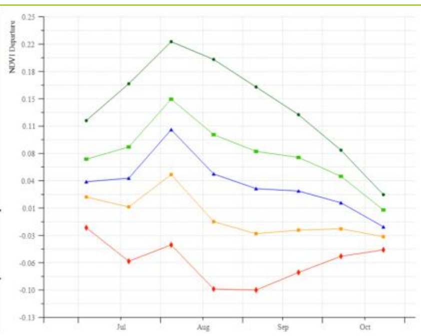
Figure 3.28. Russia crop condition, July-October 2016





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





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

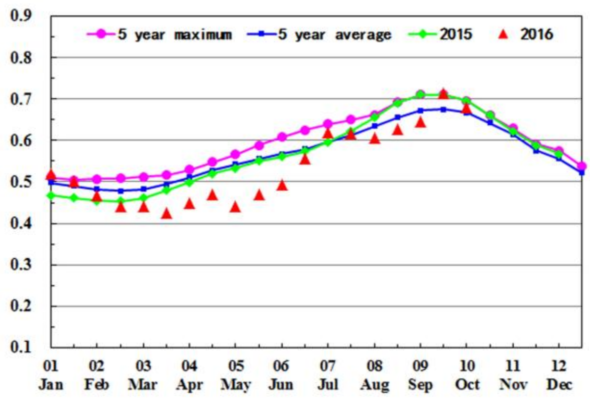
[THA] Thailand

The reporting period covers the end of the monsoon season in Thailand. Maize harvesting was completed in September, while it started in October for the main paddy crop and in September for sorghum. The CropWatch agroclimatic and agronomic indicators show average conditions for TEMP and RADPAR, while a small increase in rainfall (RAIN, +9%) resulted in a rise of the biomass accumulation potential (BIOMSS, +7%) compared to the previous five-year average.

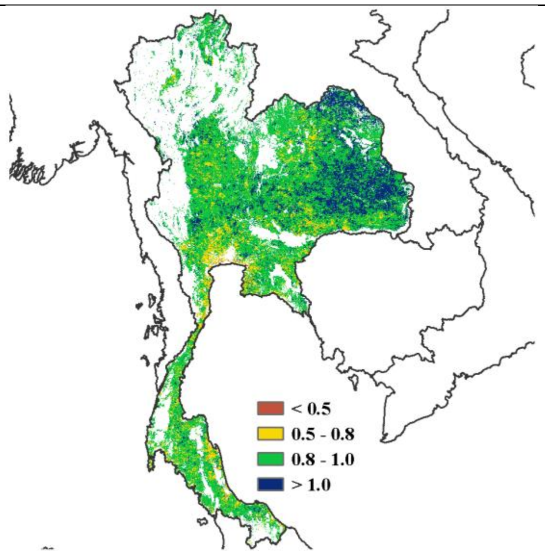
The national NDVI values were slightly below average from early July to September, then increased above average and followed the five-year maximum at the end of September before returning to average values. In the eastern provinces (Nong Khai, Bueng Kan, Udon Thani, Sakon Nakhan, Mukdahan, Kalasin, Maha-Sarakham, Roi Et, Yasothan, Amnatcharoen,Ubon Ratchathani, Surin Sisaket, and Khan Kaen) VCIx exceeded 1. VCIx dropped below 0.5, indicating generally poor conditions in Samut Prakan, Bangkok, Nonthaburi, Samut Sakhan, Samut Songkharm, Nakhon Pathom, Pathum Thani, Phatthalung Trang, Nakhon Si Thammarat, and Songkhla provinces.

Due to normal rainfall, the crop production will be above average.

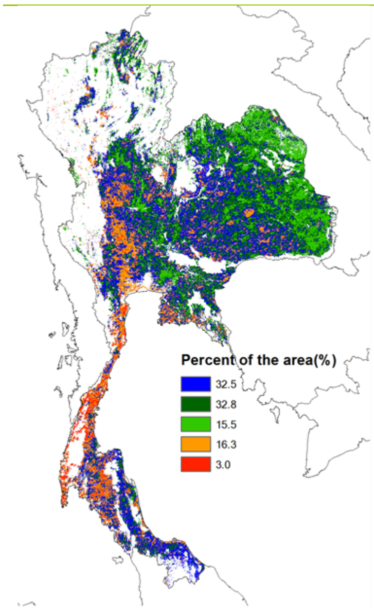
Figure 3.29. Thailand crop condition, July-October 2016



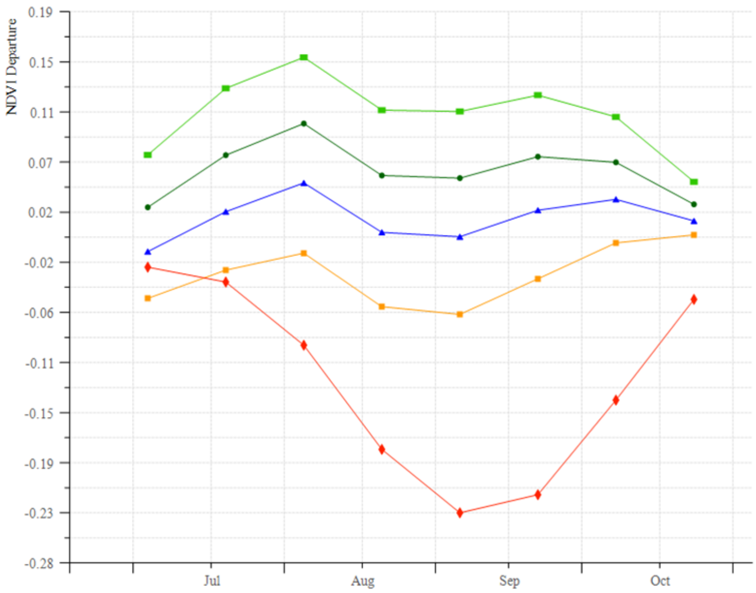
(a) Crop condition development graph based on NDVI



(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

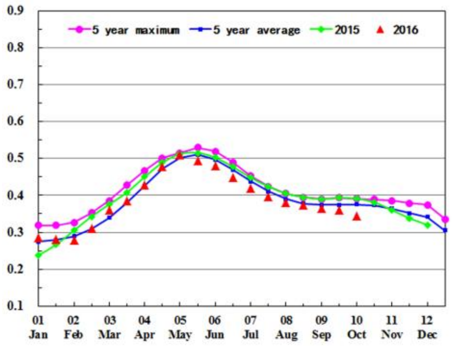
[TUR] Turkey

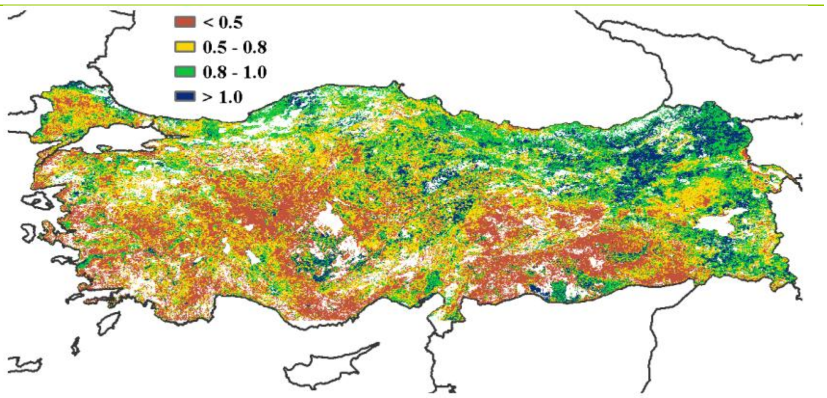
Major agricultural regions in Turkey suffered rainfall shortages within the reporting period. At the national scale precipitation totals were 43% below the fifteen-year average. Temperature and radiation were near to average, with the exception of the southeast of the country, which was warmer than usual by 0.7°C. The maximum VCI (0.72) was below average and the cropped arable land fraction (CALF) increased by 2 percentage points compared to the five-year average. Nationwide, NDVI was below last year's values and slightly below the five-year average; NDVI dropped significantly in October. In general, biomass production is expected to be much lower than the five-year average (BIOMSS, -37%).

The areas (9.1% of arable land) that experienced the most unfavorable conditions, especially during the summer months, occur in the northwest (the European part of the country), in the Aegean region, and in Central Anatolia and the south (Mediterranean region). This spatial pattern is confirmed by low maximum VCI values (<0.5). Barley and maize are the crops most affected as they were at grain filling and ripening phases during the reporting period. The coastal area of the Black Sea and the northeast (spring barley cultivation area) presented rather favorable conditions, which appear clearly in the maximum VCI map with pixels above 0.8.

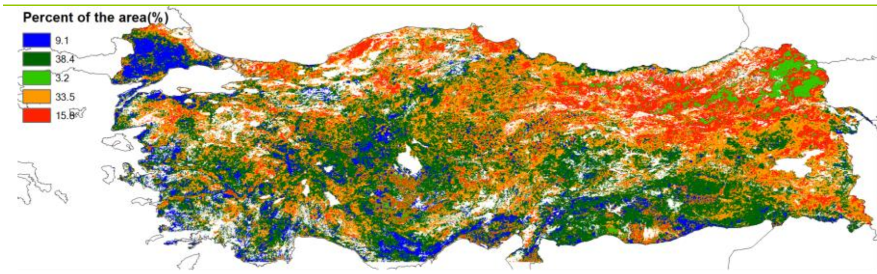
In general, the production outlook is below last year's and the five-year average due to unfavorable weather conditions.

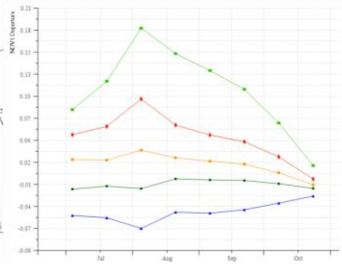
Figure 3.30. Turkey crop condition, July-October 2016





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





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

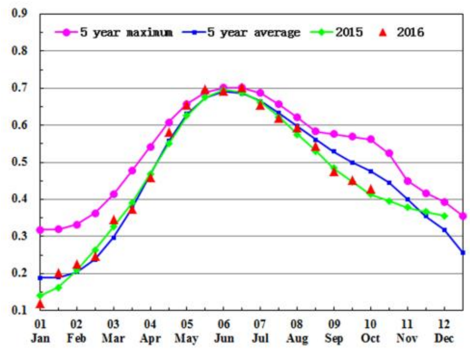
[UKR] Ukraine

In Ukraine during the reporting period both precipitation and temperature were below average (respectively -13% and -0.6°C), negatively affecting the biomass production potential (-12%). Across all the important agricultural regions similar departures from the average were recorded. In July and mid-August close to average precipitation prevailed, but throughout September a rainfall deficit persisted over most of the country. A precipitation surplus was recorded in the beginning of October, a period that was preceded and followed by dekads with temperature lower than the average.

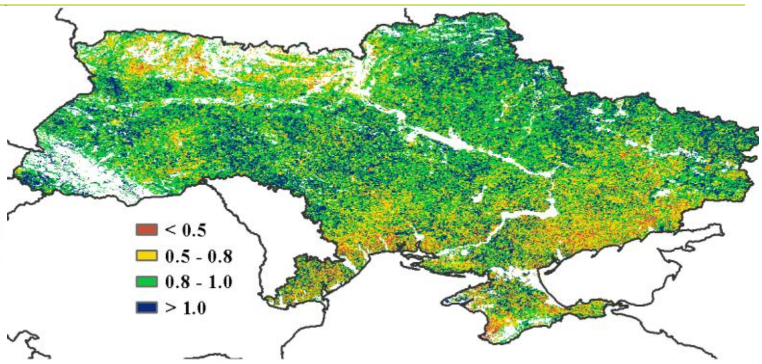
At the national scale, NDVI indicated worsening crop conditions from July, being below the five-year average and similar to the last year's values. Spatial NDVI patterns show that about 8% of the agricultural area in the country presented significantly below average NDVI from the beginning of the reporting period until the middle of September. This concerns mainly the western Ukraine (Ternopil and Khmelnytskyi oblasts) and the south and east (Donetsk Oblast). The VCIx values indicate crop conditions in the south and east (more pixels with VCIx <0.5) are worse than in the western part of the country. In central and northeastern parts, both NDVI and VCIx (>1.0) indicate good crop conditions.

The weather conditions may negatively affect spring cereals and maize production in non-irrigated areas in the south of the Ukraine.

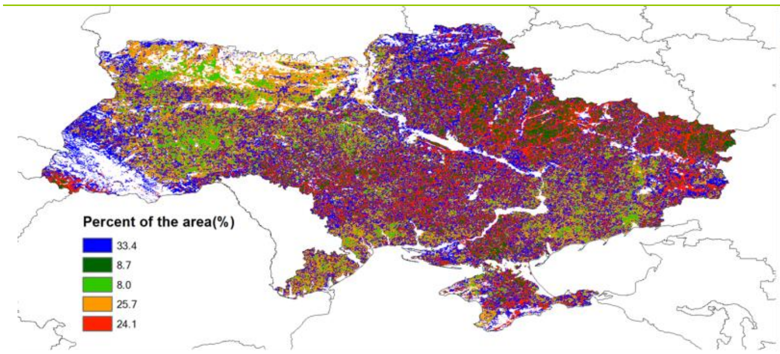
Figure 3.31. Ukraine crop condition, July-October 2016



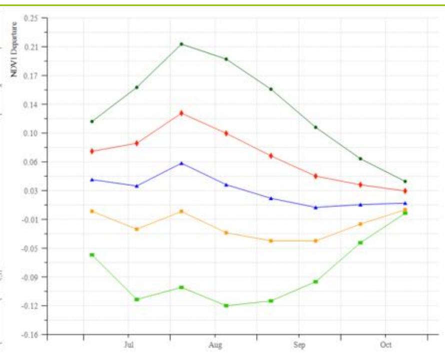
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

[USA] United States

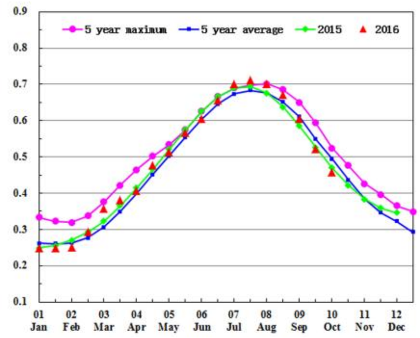
CropWatch agroclimatic and agronomic indicators show above average crop condition in the United States, especially maize, soybeans, and rice, which were growing during this monitoring period from July to October, 2016.

The prevailing weather was warm and wet with precipitation 23% above average, and close to average temperature (+ 0.5°C) and RADPAR (-1%). Abundant rainfall was recorded in the northern Great Plains, including North Dakota (RAIN, +150%), South Dakota (+126%), Nebraska (+85%), Kansas (+107%), and Montana (+127%), benefiting the growth of wheat, soybean, and maize. In the Corn Belt, maize and soybeans enjoyed favorable soil moisture availability in Iowa (RAIN, + 109%), Illinois (+56%), Missouri (+59%), Minnesota (+121%), Wisconsin (+90%), Indiana (+27%), Michigan (+19%), and Ohio (+12%). According to the Federal Emergency Management Agency (FEMA), torrential rainfall in August caused floods in Louisiana. In Arkansas, a major rice producer, 13% below average rainfall occurred, but with little impact because of sufficient inflow from the Mississippi river. Temperature was above or close to average in most areas including major maize and soybean states (Illinois, +0.9°C; Iowa, +0.5°C), major rice states (Arkansas, +0.6°C), the major spring wheat state (North Dakota, -0.2°C), and major winter wheat producers (Kansas, +0.2°C).

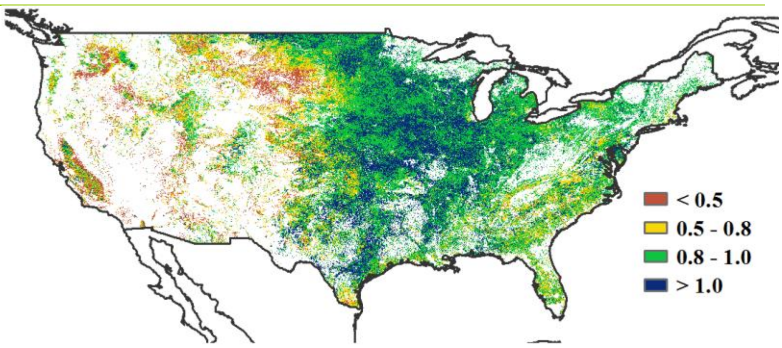
Favorable crop condition is confirmed by the CropWatch agronomic indicators, all compared to the average of the recent five years. Biomass showed an 18% positive departure, CALF was 2% above, and cropping intensity also increased by 2%. The VCIx was 0.92, and in the northern Great Plains and Corn Belt VCIx even exceeded 1. As shown by the spatial NDVI patterns and NDVI profiles, the positive NDVI departure covered almost the entire country, including the central and western Corn Belt, Great Plains, and lower Mississippi River, indicating just limited damage to the crops from heavy rainfall.

Overall, CropWatch puts the current year's output as a 5% increase for maize compared with 2015, as well as increases for rice (+6%) and soybeans (+3%). For wheat, an output similar to 2015 is projected (0%). (See section 5.1 and tables 5.1 and B.5 for production estimates.)

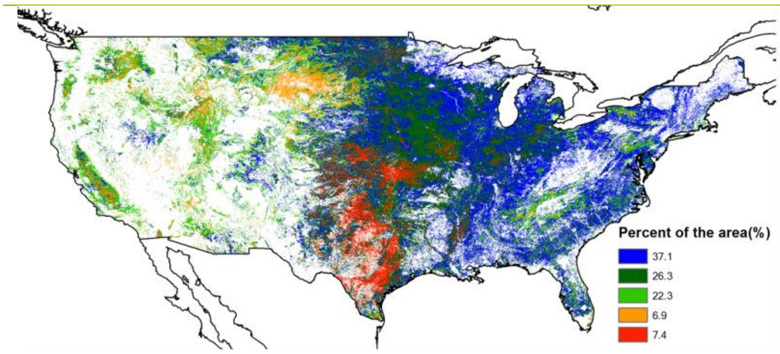
Figure 3.32. United States crop condition, July-October 2016



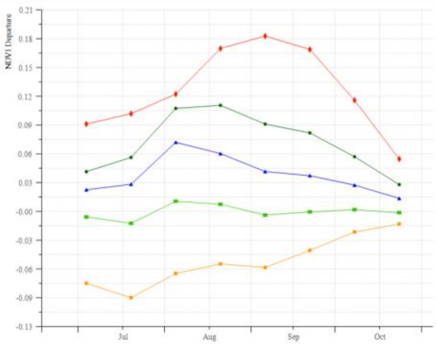
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



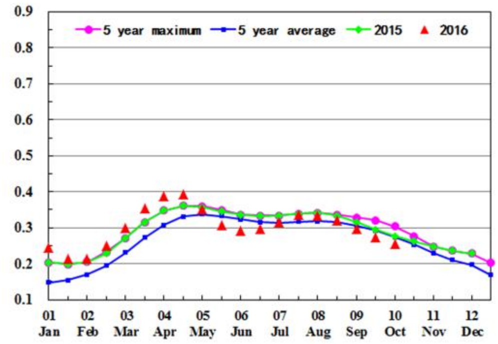
(d) NDVI profiles

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

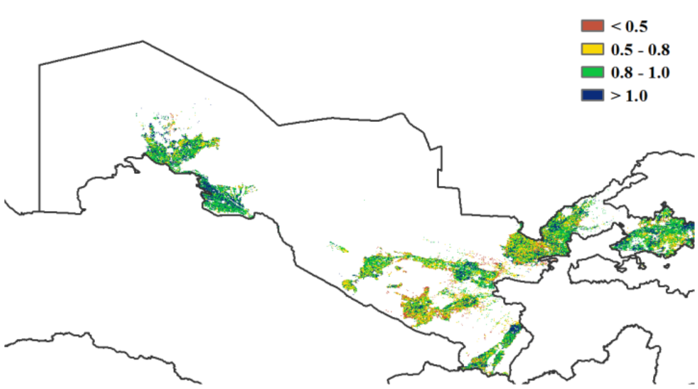
[UZB] Uzbekistan

The reporting period covers the harvest of maize and cotton (which is mostly cultivated in the Aral sea area) and the sowing of winter wheat, the country's most important cereal crop, mainly in the east. As shown in the crop condition development graph, NDVI was below average from late August to October. Spatial NDVI patterns, however, show that crop condition was persistently below average only in 10.8% of the arable land. The national average of the VCIx was 0.90, and the arable land fraction (CALF) increased by a whopping 20 percentage points compared to the five-year average. This is due to the combined effect of RAIN (+169% over average), and close to normal TEMP (-0.5°C) and RADPAR (-2%). The resulting biomass production potential BIOMSS rose +133% above the average of the previous five-years. Crop condition was favorable, with good conditions for growth further supported by sufficient soil moisture for the forthcoming wheat crop.

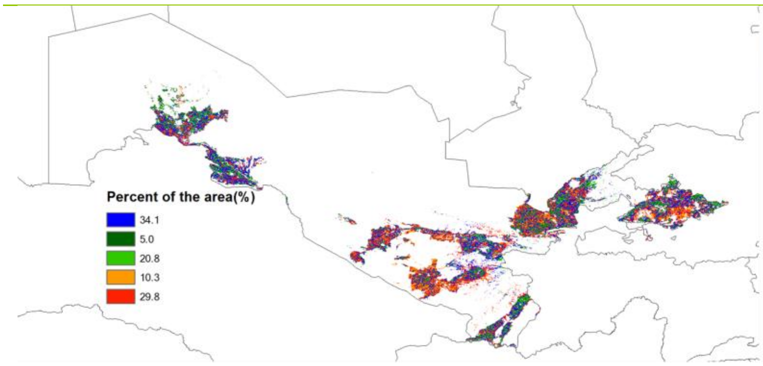
Figure 3.33. Uzbekistan crop condition, July-October 2016



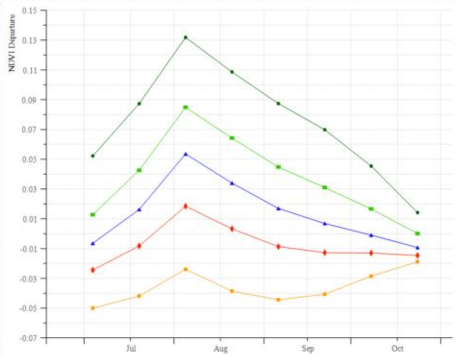
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

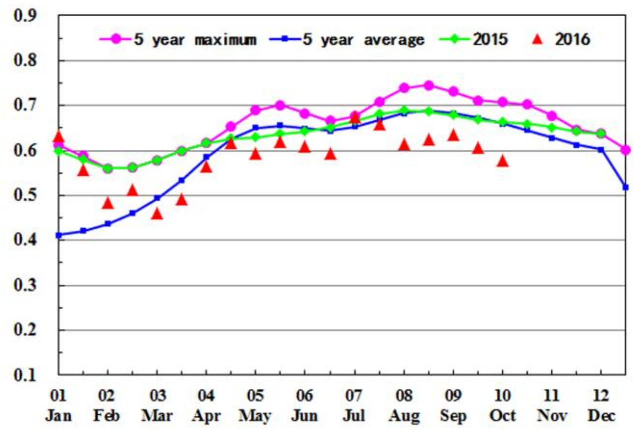
[VNM] Vietnam

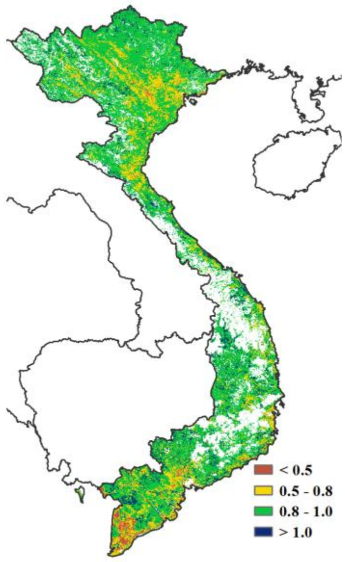
The harvesting period of summer and autumn rice has been completed, while the 10th month rice was still growing in mid-October. The crop condition from July to October was lower than the recent five-year average. For the period under consideration, most CropWatch agroclimatic and agronomic indicators show conditions near the average (RADPAR, 0%; TEMP, +0.3°C; and BIOMSS, +1%) or above (RAIN, +12.5%).

Spatial NDVI profiles show that the crop condition was lower than average in the country as a whole. Generally, areas in the north fare better than central and southern locations. According to spatial NDVI patterns, about 11.4% of the croplands recorded consistently low NDVI, especially in the center of the country (Gia Lai and Binh Dinh), the north (Nghe An), the Red river basin and delta (Hanoi, Yen Bai), and especially the south (Ho Chi Minh, Long Anh and Tien Giang and, south of the delta, Bac Lieu). These conditions are confirmed by VCIx values between 0.5 and 0.8.

NDVI profiles show that crop condition was above average in nearly 50% of the major rice plantation area, mainly (as already mentioned) the north (Lao Cai and Lang Son), with VCIx ranging between 0.8 and 1. Based on CropWatch indicators, the crop situation in Vietnam is considered to be close to but below average.

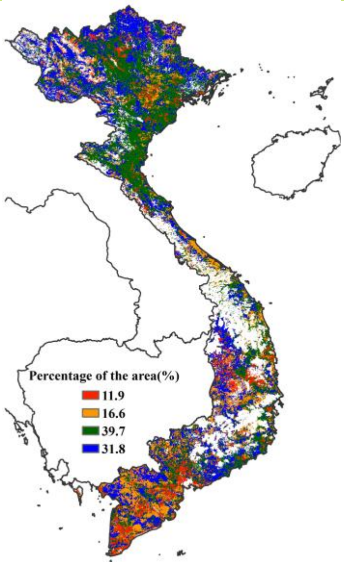
Figure 3.34. Vietnam crop condition, July-October 2016

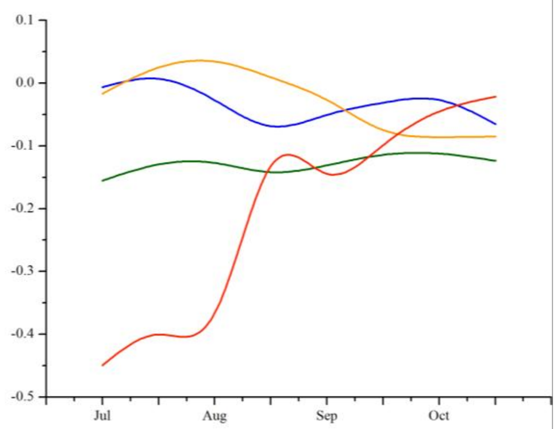




(a) Crop condition development graph based on NDVI

(b) Maximum VCI





(c) Spatial NDVI patterns compared to 5YA

(d) NDVI profiles

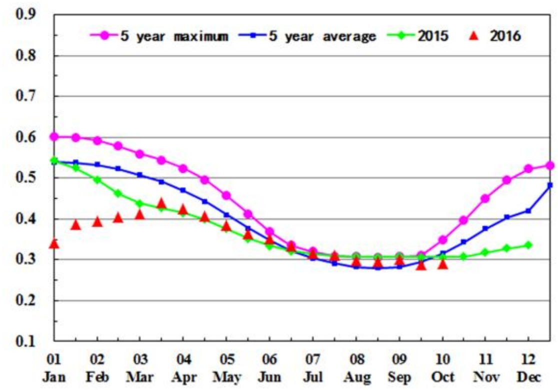
[ZAF] South Africa

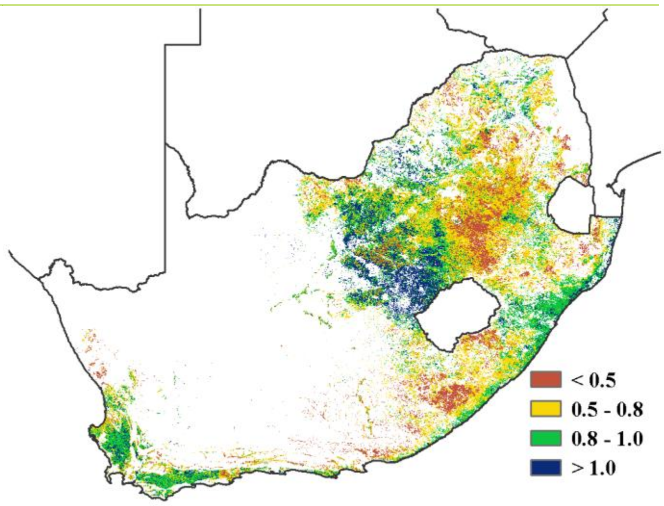
Compared to the last five years, crop condition in South Africa showed an above average level between July and August, but below average in the two months after—a period getting close to the harvesting time for wheat and barley. Additionally, agronomic indicators show a 12% reduction in rainfall (RAIN) compared to average, while temperature (TEMP) increased by a very significant 2.9°C. Despite a radiation (RADPAR) increase of 2%, the biomass production potential (BIOMSS) fell 13% compared to the five-year average.

Most parts of Orange Free State and North West Province showed quite low maximum VCI. In contrast, the Mediterranean southern coastal areas—major growing areas of most winter crops, showed relatively good maximum VCI between 0.8-1.0. The spatial NDVI clusters and profiles further show high values in Kwa-Zulu Natal and the southwestern and eastern cape which are citrus producing areas, indicating a fairly good overall production.

Since the growing period is just about starting in the western half of the country, no specific assessment can be made currently about the forthcoming 2015/16 maize crop.

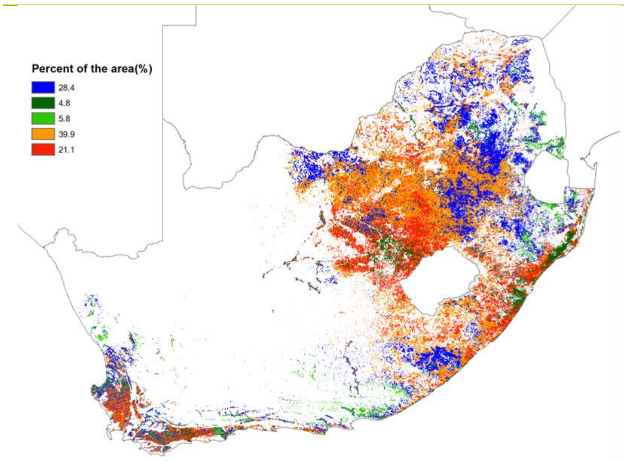
Figure 3.35. South Africa crop condition, July-October 2016

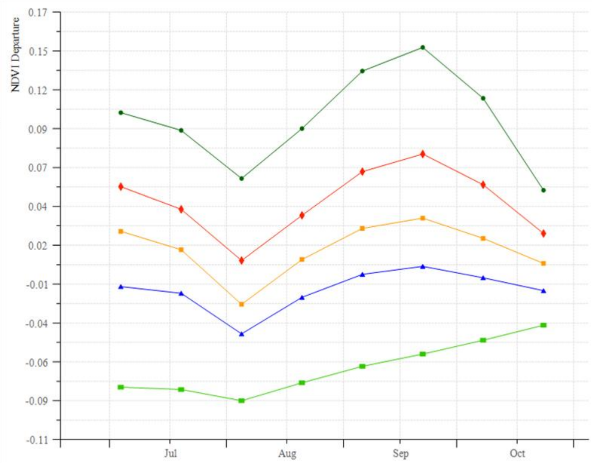




(a) Crop condition development graph based on NDVI

(b) Maximum VCI





(c) Spatial NDVI patterns compared to 5YA

(d) NDVI profiles