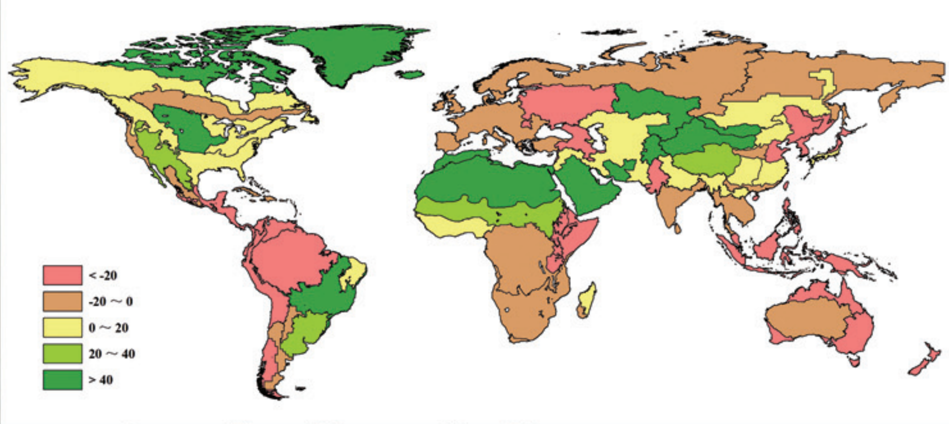

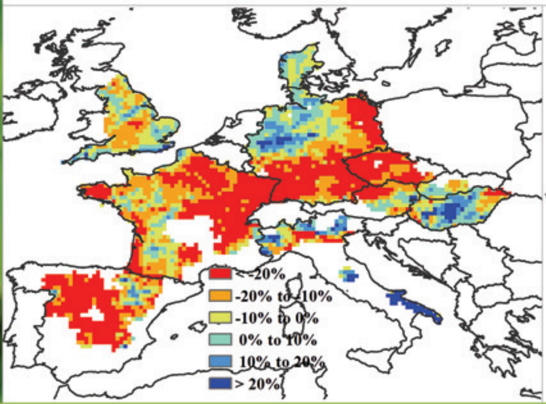

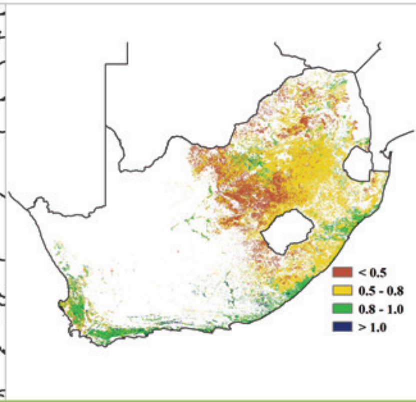

CropWatch bulletin

QUARTERLY REPORT ON GLOBAL CROP PRODUCTION

Monitoring Period: July 2015 - October 2015

November 30, 2015

Volume 15, No. 4 (Total No. 99)

Institute of Remote Sensing and Digital Earth (RADI)

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

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

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Abbreviations

5YA	Five-year average, the average for the April-July periods from 2010 to 2014; one of the standard reference periods.
14YA	Fourteen-year average, the average for the April-July periods from 2001 to 2014; one of the standard reference periods and typically referred to as “average.”
BIOMSS	Agroclimatic indicator for biomass production potential
BOM	Australian Bureau of Meteorology
CALF	Cropped Arable Land Fraction
CAS	Chinese Academy of Sciences
CWSU	CropWatch Spatial Units
DM	Dry matter
EC/JRC	European Commission Joint Research Centre
ENSO	El Niño Southern Oscillation
FAO	Food and Agriculture Organization of the United Nations
GAUL	Global Administrative Units Layer
GMO	Genetically Modified Organism
GVG	GPS, Video, and GIS data
ha	hectare
kcal	kilocalorie
MPZ	Major Production Zone
MRU	Monitoring and Reporting Unit
NDVI	Normalized Difference Vegetation Index
OCHA	UN Office for the Coordination of Humanitarian Affairs
PAR	Photosynthetically active radiation
RADI	CAS Institute of Remote Sensing and Digital Earth
RADPAR	PAR agroclimatic indicator
RAIN	Rainfall agroclimatic indicator
SOI	Southern Oscillation Index
TEMP	Air temperature agroclimatic indicator
Ton	Thousand kilograms
VCIx	Maximum Vegetation Condition Index
VHI	Vegetation Health Index
VHIn	Minimum Vegetation Health Index
W/m^2	Watt per square meter

Bulletin overview and reporting period

This CropWatch bulletin presents a global overview of crop stage and condition between July 1 and October 31, 2015. It is the 99th bulletin produced by the CropWatch group at the Institute of Remote Sensing and Digital Earth (RADI) at the Chinese Academy of Sciences, Beijing. CropWatch analyses are based mostly on several standard and new ground-based and remote sensing indicators, following a hierarchical approach. The analyses cover large global zones; major producing countries of maize, rice, wheat, and soybean; and detailed assessments of Chinese regions.

In parallel to the increasing spatial precision of the analyses, indicators become more focused on agriculture as the analyses zoom into smaller spatial units. CropWatch uses two sets of indicators: (i) agroclimatic indicators—RAIN, TEMP, and RADPAR, which describe weather factors; and (ii) agronomic indicators—BIOMSS, VHIn, CALF, CI, and VCIx, describing crop condition and development. The indicators RAIN, TEMP, RADPAR and BIOMSS do not directly describe the weather variables rain, temperature, radiation, or biomass, but rather are spatial averages over agricultural areas, which are weighted according to the local crop production potential. For more details on the CropWatch indicators and spatial units used for the analysis, please see the quick reference guide in Annex C, as well as online resources and publications posted at www.cropwatch.com.cn.

Chapter	Spatial coverage	Key indicators
Chapter 1	World, using Monitoring and Reporting Units (MRU), 65 large, agro-ecologically homogeneous units covering the globe	RAIN, TEMP, RADPAR, BIOMSS
Chapter 2	Major Production Zones (MPZ), six regions that contribute most to global food production	As above, plus CALF, VCIx, and VHIn, CI
Chapter 3	30 key countries (main producers and exporters)	As above plus NDVI
Chapter 4	China	As above
Chapter 5	Special topics: Production outlook, disaster events, trends in Europe, and El Niño.	
Online Resources	www.cropwatch.com.cn	

Newsletter and online resources

The bulletin is released quarterly in both English and Chinese. To sign up for the mailing list, please e-mail cropwatch@radi.ac.cn or visit CropWatch online at www.cropwatch.com.cn. Visit the CropWatch Website for additional resources and background materials about methodology, country agricultural profiles, and country long-term trends.

Executive summary

This bulletin presents a qualitative and quantitative assessment of worldwide food production. It is based on the independent analysis of environmental and agronomic indicators, most of them satellite-based, as well as other sources by the CropWatch team in the Chinese Academy of Sciences. Maize, rice, wheat and soybean, and major food producing countries, including China, receive special attention but other crops and areas are mentioned when required. The current reporting period from July to October 2015 mostly covers the planting of summer crops in the southern hemisphere, the harvest of summer crops as well as the planting of winter crops in the northern hemisphere. In many tropical and equatorial areas, the period includes the overlapping harvest of a first crop and the planting of the second.

After an overview of agroclimatic and agronomic conditions, which have largely been dominated by El Niño impacts (including areas of severe water stress in eastern and southern Africa), the sections below introduce the revised CropWatch estimates for 2015 production of cereals (2457 million tons, a value almost identical to 2014) and soybean (309 million tons, a 1% increase over the previous season). Total 2015 food production in China (including cereals, legumes, and tubers) reaches 568.1 million tons, up 4.3 million tons from 2014, a 0.8% increase.

Overall agro-environmental and agronomic conditions between July and October 2015

El Niño indices continued to strengthen during this monitoring period and reached sustained negative values in August. Although sources differ, it is likely that the phenomenon will persist at least until the end of 2015. Extreme weather patterns were largely compatible with El Niño impacts, and included an increased frequency of tropical cyclones (no less than ten named cyclones are reported on in the section on disasters) and abnormal precipitation. Several areas report population exposed to severe food insecurity.

The anomalies are marked and regionally well defined. They include both rainfall excess and deficit areas:

- *Abundant rainfall* over much of north America, where cropped arable land fraction decreased 3% due to unfavorable conditions in Canada, but increasing 1% in the USA.
- *Abundant rainfall* (+40% to +150%) from Bolivia and Paraguay to southern Brazil. The fraction of Cropped arable land increased very significantly in Brazil (+10%) and Argentina (+11%) where conditions, however, were significantly less favorable than in Brazil. For South America as a whole, cropped arable land increased 8% and cropping intensities reached 168%, as high as in South and Southeast Asia.
- *Abundant rainfall* (+70% to +170%) over an immense area west (Mauritania) and north (Tunisia) of the Sahara, stretching into Central Asia (Kazakhstan, where cropped arable land increased by a spectacular 36%; Tajikistan; Uzbekistan with an increase of 9% of cropped arable land and a doubling of the biomass production potential, and Xinjiang where biomass production potential was up 90%) via the Middle-east (Iraq; Iran where cropped arable land fell 8% but cropping intensity increased 3%). Countries were at very different timings of their crop calendar but all are semi-arid and they have benefited from unexpected moisture for their crops, rangelands and livestock.
- *Widespread water deficit* in central and southern America, including Caribbean islands (Jamaica with 48% precipitation); the Dry Corridor (the Free and Sovereign State of the Chiapas in southern Mexico and the neighboring areas of Guatemala, El Salvador, Honduras and Nicaragua); Ecuador (rainfall drop of 48%); Colombia to northern Brazil; much of the Southern Cone. The biomass production potential underwent a significant reduction here.

- *Drought* in southern Africa (Malawi, Zambia, Zimbabwe, South Africa), eastern Africa including Kenya (-51% rainfall), south Sudan and parts of Ethiopia (Tigray and Afar, with an estimated 1.8 million people in need of food aid). In Ethiopia, both cropped arable land and cropping intensity fell 4%.
- *Dry* Southeast Asia, especially Timor Leste (-94%) and Papua New Guinea (-80%). In Indonesia (-67%), the biomass production potential fell 59% and the smoke from widespread fires became a health hazard. Although the crop arable land fraction remained stable, cropping intensity fell 2%.
- *Drought* in Oceania, including New Caledonia (-81%) and New Zealand (-73%). In Australia, however, the fraction of cropped arable increased (+8%) while cropping intensity fell (-4%).
- *Dry conditions* in a large area in Eurasia, with deficits increasing from west (-30%) and north (-30%) to east (up to -75%) and encompassing Switzerland, north-west Russia (Karelia) to the Oblast of Aktyubinsk (Kazakhstan), the Caucasus, northern Black sea and Romania, with the driest areas in Ukraine (stable cropped area, but a 1% drop in cropping intensity) and western Russia (Belgorod, Kursk, Voronezh, Lipetsk and Tambov). Some of the areas also suffered from low temperatures and the resulting biomass production potential drop was between 50% and 70%, for instance in the oblasts of Atyraus (Kazakhstan), Stavropol and Belgorod (Russia).
- *Drought* in the Korean DPR (-64%) and neighboring provinces in China (Jilin, -28%; Liaoning, -43%). The corresponding drop in biomass production potential varies from 20% to 40%.
- *Drought* in west and southern India (Gujarat, -78%), where the fraction of cropped arable land decreased 5% nationwide.

Global production estimate

The latest CropWatch estimates for the 2015 cereals and soybean production puts the total at 990 million tons for maize (unchanged from 2014), 742 million tons for paddy rice (-0.1% compared with 2014) and 724 million tons for wheat (up 0.3%). Soybean displays an increase of 1% and reaches 309 million tons. For China, CropWatch estimates 194 million tons for maize (+1%), 202 million tons for rice (+1%), 122 million tons for wheat (+2%) and 13 million tons for soybeans (-1%). When considering only major exporters the situation changes only little for maize, rice and soybean but more significantly for wheat (+2.31%).

The largest changes for individual countries are mostly directly linked with the agroclimatic and agronomic variables listed above. For maize, they include Ethiopia (-3%), Cambodia (-10%), India (-6%; cultivated arable land decreased 5% as a result of both droughts and floods), South Africa (-12%) and Ukraine (-6% due to a complex interactions of factors). For rice, the most noteworthy decreases are those of India (-1%) and Romania (-9%). Although Mexico is not a rice producer of any relevance, the size of the drop in production (-33%) is nevertheless worth mentioning.

Marked increases of wheat output include Egypt (+5%), Turkey (+10%), Iran (+4% after several years of unfavorable weather) and Kazakhstan (+16% resulting from increased cropland fraction and abundant rainfall). In Latin America, Brazil (+4%) significantly outperformed its southern neighbor Argentina (-4%). Canada underwent a severe decrease of 8% compared with the 2014 season.

China

Conditions that prevailed in China during the monitoring period integrate well into the global patterns mentioned above. At the national scale, average conditions (rainfall, +1%; temperature, -0.7°C; RADPAR, -3%; cropped arable land fraction, 0% and cropping intensity, 0%) hide the diversity of local situations, including drought, excess rainfall associated with cyclones and low temperature. Cropped arable land fraction increased by 5% in the Loess Region and uncropped arable land was mainly located in the northwest of China. The impact of pests and diseases was relatively moderate except for plant hoppers and leaf folders in Huanghuaihai, and the middle and lower reaches of the Yangtze River.

The harvest of maize, rice, wheat and soybean was over at the end of the reporting period. Single rice production is revised to 131.5 million tons, an increase of 1% compared with the previous year. Early and late rice productions remain same as in the forecast issued by CropWatch in August: 35.1 and 35.7 million tons, respectively, which results in a total rice output of 202 million tons.

CropWatch revised the total annual food output (including cereals, legumes and tubers) to 568.1 million tons, 0.8% up from 2014 (a 4.3 million tons increase). The total summer crop production is forecast at 407.3 million tons, a 0.6% increase (equivalent to 2.4 million tons) when compared to last year when there was a drought and slightly above the 2013 summer crop production.

الملخص التنفيذي

تقدم هذه النشرة تقييما نوعيا وكميا لإنتاج المواد الغذائية في جميع أنحاء العالم. حيث يقوم هذا التقرير بتحليل مستقل للمؤشرات البيئية والزراعية، ومعظم المعطيات مستقاة من الأقمار الصناعية، فضلا عن مصادر أخرى يتم اعدادها من طرف الفريق النموذجي بالأكاديمية الصينية للعلوم. تهتم على وجه الخصوص بكل من الذرة والأرز والقمح وفول الصويا، وجل الدول الرئيسية المنتجة للغذاء، بما في ذلك الصين، ويتم ذكر المحاصيل والدول الأخرى عند الحاجة. يغطي التقرير الحالي الفترة ما بين يوليو و أكتوبر من 2015 كما يغطي معظم المحاصيل الصيفية بالنصف الجنوبي للكرة الأرضية، وحصاد المحاصيل الصيفية وكذلك زراعة المحاصيل الشتوية بالنصف الشمالي للكرة الأرضية. بالنسبة للكثير من المناطق المدارية والاستوائية، فإنها تشهد تداخلا بين فترة الحصاد المتعلقة بالزراعة الأولى وزراعة المحصول الثاني.

بعد لمحة عامة عن الظروف المناخية الزراعية والزراعية، والتي تهيمن عليها آثار النينيو إلى حد كبير (بما في ذلك مجالات ضغط حاد على المياه في شرق وجنوب أفريقيا)، والأقسام أدناه، تمثل تقديرات CropWatch المعدلة لعام 2015 لإنتاج الحبوب (2457 مليون طن، و تبقى تقريبا في مستوى انتاج سنة 2014) وفول الصويا (309 ملايين طن، أي بزيادة قدرها 1٪ عن الموسم السابق). يصل إجمالي الإنتاج الغذائي في الصين سنة 2015 (بما في ذلك الحبوب والبقول والدرنيات) 568.1 مليون طن بزيادة 4.3 مليون طن مقارنة بالسنة الفارطة، أي بزيادة قدرها 0.8٪.

الظروف الزراعية البيئية والزراعية الشاملة بين يوليو وأكتوبر 2015

واصلت مؤشرات النينيو حضورها البارز خلال فترة الرصد وقد وصلت القيم السلبية مستوى مستقرا في أغسطس. على الرغم من أن مصادر المعلومات مختلفة، فمن المرجح أن هذه الظاهرة سوف تستمر على الأقل حتى نهاية عام 2015. أحوال الطقس المتطرفة كانت متوافقة إلى حد كبير مع تأثيرات النينيو، وشملت زيادة وتيرة الأعاصير المدارية (تم الإبلاغ عن ما لا يقل عن أسماء عشرة أعاصير في قسم الكوارث) وهطول أمطار غير اعتيادية. كما أعلنت عدة مناطق أن سكانها معرضون لغياب تام للأمن الغذائي.

تم التعرف وتحديد الحالات الشاذة على المستوى الإقليمي. وتشمل هذه الحالات كل المناطق التي تعرف فائضا أوعجزا في هطول الأمطار:

• هطول أمطار غزيرة على جزء كبير من شمال أمريكا، حيث انخفضت نسبة الأراضي الصالحة للزراعة المزروعة ب3٪ وذلك بسبب الظروف غير المواتية في كندا، وبالمقابل ارتفعت **هذه** النسبة ب1٪ في الولايات المتحدة.

• هطول أمطار غزيرة (+ 40٪ إلى + 150٪) في بوليفيا والباراغواي وجنوب البرازيل. كما عرفت نسبة الأراضي الصالحة للزراعة المزروعة زيادة كبيرة جدا في البرازيل (+ 10٪) والأرجنتين (+ 11٪) بالرغم من أن الظروف بهذه الأخيرة كانت أقل ملاءمة بكثير مقارنة مع البرازيل. بأمريكا الجنوبية ككل، زادت نسبة الأراضي الصالحة للزراعة المزروعة ب8 ٪ وبلغت كثافة المحصول 168٪، نفس وتيرة الارتفاع عرفتها مناطق جنوب وجنوب شرق آسيا.

• هطول أمطار غزيرة (+ 70٪ إلى + 170٪) على مساحات شاسعة غرب (موريتانيا) وشمال (تونس) الصحراء، كما تشمل آسيا الوسطى (كازاخستان، حيث ارتفعت نسبة الأراضي الصالحة للزراعة المزروعة 36٪، طاجيكستان، أوزبكستان بزيادة قدرها 9٪ من الأراضي الصالحة للزراعة المزروعة وكما تضاعفت إمكانيات إنتاج الكتلة الحيوية، وشينجيانغ حيث ارتفعت إمكانات إنتاج الكتلة الحيوية بنسبة 90٪) عبر الشرق الأوسط (في كل من العراق وإيران انخفضت نسبة الأراضي الصالحة للزراعة المزروعة ب 8٪ وبالمقابل زادت كثافة المحاصيل ب 3٪). جل هذه البلدان تتميز بمناخ شبه قاحل، وبالرغم من تفاوت محاصيلها حسب التقويم ، لكنها قد استفادت من هذه الظروف المناخية الرطبة غير المتوقعة لفائدة المحاصيل والمراعي والثروة الحيوانية.

• امتد العجز المائي على نطاق واسع في وسط وجنوب أمريكا، بما في ذلك جزر البحر الكاريبي (عرفت جامايكا انخفاضا في هطول الأمطار ب48٪)؛ الممر الجاف (دولة تشياباس في جنوب المكسيك والمناطق المجاورة لغواتيمالا والسلفادور وهندوراس ونيكاراغوا)؛ الإكوادور (انخفاض هطول الأمطار ب48٪)؛ كولومبيا الى شمال البرازيل؛ و كثير من بلدان المخروط الجنوبي. كما عرفت قدرة إنتاج الكتلة الحيوية انخفاضا كبيرا.

• شمل الجفاف جنوب أفريقيا (ملاوي وزامبيا وزيمبابوي وجنوب أفريقيا)، و شرق أفريقيا بما في ذلك كينيا (-51٪ هطول الأمطار)، و جنوب السودان وأجزاء من إثيوبيا (تيغري وعفار، تم إحصاء نحو 1.8 ملايين شخص في حاجة ماسة للمعونة الغذائية). في إثيوبيا، انخفضت كل من نسبة الأراضي الصالحة للزراعة المزروعة و تكثيف المحاصيل ب4٪.
• مناطق جنوب شرق آسيا الجافة، خصوصا في تيمور الشرقية (-94٪) وبابوا غينيا الجديدة (-80٪). اندونيسيا (-67٪)، حيث شهدت إمكانات إنتاج الكتلة الحيوية انخفاضا ب59٪ وشكل الدخان المتصاعد الناتج عن الحرائق ،على نطاق واسع، خطرا على الصحة. على الرغم من أن نسبة المحاصيل الزراعية لا تزال مستقرة، انخفض تكثيف المحاصيل بنسبة 2٪.
• الجفاف في أوقيانوسيا، شمل كلا من كاليدونيا الجديدة (-81٪) ونيوزيلندا (-73٪). في أستراليا، ارتفعت نسبة الأراضي الصالحة للزراعة المزروعة (+ 8٪)، في حين انخفضت الكثافة المحصولية (-4٪).
• ظروف جافة في مناطق واسعة من أوراسيا، مع زيادة العجز في الغرب (30-٪) ومن الشمال (30-٪) إلى الشرق (إلى 75-٪) بما في ذلك سويسرا، شمال غرب روسيا (كاريليا) وصولا لأكتوبي الأوبلاست (كازاخستان) والقوقاز وشمال البحر الأسود ورومانيا، اضافة الى المناطق الأكثر جفافا في أوكرانيا (المساحة مستقرة، ولكن تكثيف المحاصيل انخفض بنسبة 1٪) وغرب روسيا (بيلغورود، كورسك، فورونيج، يبيتسك وتامبوف). وقد عانت بعض هذه المناطق أيضا من انخفاض درجات الحرارة وانهيار الإنتاج المحتمل من الكتلة الحيوية بنسب تتراوح ما بين 50٪ و 70٪، على سبيل المثال في أقاليم أتروس (كازاخستان) ستافروبول وبيلغورود (روسيا).
• ميز الجفاف كلا من كورية الشمالية (-64٪) والمحافظات المجاورة للصين (جيلين -28٪، لياونينغ -43٪) حيث نتج عنه انخفاض في إمكانية إنتاج الكتلة الحيوية بنسب تتراوح ما بين 20٪ و 40٪.
• ميز الجفاف غرب وجنوب الهند (ولاية غوجارات، -78٪)، حيث انخفضت نسبة الأراضي الصالحة للزراعة المزروعة بنسبة 5٪ على الصعيد الوطني.

تقديرات الإنتاج العالمي

أحدث تقديرات إنتاج الحبوب وفول الصويا الصادرة عن تقريرCropWatch في عام 2015، ، بلغت ما مجموعه 990 مليون طن من الذرة (على غرار 2014)، 742 مليون طن في الأرز الشعير (-0.1٪ مقارنة ب2014) و 724 مليون طن من القمح (بنسبة 0.3٪). عرفت الصويا ارتفاعا في الانتاج بنسبة 1.0٪ ليصل إلى 309 مليون طن. بالنسبة للصين، يقدر CropWatch إنتاج الذرة ب 194 مليون طن (+ 1٪) و 202 مليون طن بالنسبة للأرز (+ 1٪) و 122 مليون طن من انتاج القمح (+ 2٪) و 13 مليون طن من فول الصويا (-1٪). عند النظر فقط للمصدرين الرئيسيين، فان الوضع يعرف تغيرا طفيفا بالنسبة للذرة والأرز وفول الصويا، ولكن التغيير الأهم فقد طرأ على انتاج للقمح (+ 2.31٪).
أهم التغيرات التي طرأت على مختلف البلدان ترتبط عموما بالمتغيرات المناخية الزراعية والزراعية المذكورة أعلاه. بالنسبة للذرة يتعلق الأمر بأثيوبيا (-3٪)، كمبوديا (-10٪) والهند (-6٪، حيث انخفضت الأراضي الصالحة للزراعة المزروعة بنسبة 5٪ بسبب الجفاف والفيضانات)، و جنوب أفريقيا (-12٪) وأوكرانيا (-6٪ حيث تم رصد التفاعل المعقد بين عدة عوامل). وبالنسبة للأرز، كانت أهم الانخفاضات تلك التي عرفتها كل من الهند (-1٪) ورومانيا (-9٪). على الرغم من أن المكسيك ليست واحدة من المنتجين الرئيسيين للأرز، من المهم أن نذكر أن حجم الانخفاض في الإنتاج هو 33٪.
بالنسبة لإنتاج القمح، فقد شهد زيادات كبيرة في مصر (+ 5٪)، تركيا (+ 10٪)، إيران (4٪ بعد عدة سنوات من سوء الأحوال الجوية) وكازاخستان (16٪ وهو ما يرجع إلى زيادة نسبة الأراضي المزروعة والأمطار الغزيرة). فيما يخص انتاج القمح بأمريكا اللاتينية، البرازيل (+ 4٪) تجاوزت إلى حد كبير انتاج جارتها في الجنوب الأرجنتين (-4٪). عانت كندا انخفاضا شديدا في الانتاج بنسبة 8٪ مقارنة مع موسم 2014.

الصين

الظروف التي كانت سائدة في الصين خلال فترة الرصد تتفق و الاتجاهات العالمية المذكورة أعلاه. على الصعيد الوطني، وظروف متوسطة (الهطول، 1٪، درجة الحرارة، -0.7 ° C؛ RADPAR، 3-٪، ونسبة الأراضي الصالحة للزراعة المزروعة، 0٪ وتكثيف المحصول، 0٪) تخفي تنوع الأوضاع المحلية، بما في ذلك الجفاف والأمطار الزائدة المرتبطة بالأعاصير ودرجات الحرارة المنخفضة. ارتفعت نسبة الأراضي الصالحة للزراعة المزروعة بنسبة 5٪ في منطقة اللوس، في حين أن الأراضي الصالحة للزراعة غير المزروعة تتركز أساسا في شمال غرب الصين. وكان أثر الأمراض والآفات معتدلا

نسبيا، باستثناء Cnaphalocrocis medinalis وNilaparvata lugens في كل من هوانغ هوايهاي، وبمتوسط و أدنى مجرى نهر اليانغتسى.

تم الانتهاء من حصاد الذرة والأرز والقمح وفول الصويا في نهاية الفترة المشمولة بالتقرير. تمت مراجعة انتاج الأرز فقط بزيادة قدرها 1٪ مقارنة بالعام السابق (131.5 مليون طن). و لا يزال إنتاج الأرز المبكر والمتأخر في نفس مستوى توقعات CropWatch الصادرة في أغسطس: بانتاج يقدر ب 35.7 و 35.1 مليون طن على التوالي، و هكذا يكون الإنتاج الإجمالي للأرز قد بلغ 202 مليون طن.

راجع CropWatch إجمالي الإنتاج السنوي من الغذاء (بما في ذلك الحبوب والبقول والدرنيات) إلى 568.1 مليون طن، بزيادة +0.8٪ مقارنة مع 2014 (أي بزيادة قدرها 4.3 مليون طن). ويقدر إجمالي إنتاج المحاصيل الصيفية ب 407.3 مليون طن بزيادة قدرها 0.6٪ (ما يعادل 2.4 مليون طن) مقارنة بالعام الماضي الذي تميز بالجفاف وقريبا من إنتاج المحاصيل الصيفية سنة 2013.

Résumé

Ce bulletin présente une évaluation qualitative et quantitative de la production alimentaire dans le monde entier. Il est basé sur une analyse indépendante des indicateurs environnementaux et agronomiques, la plupart d'entre eux sont basés sur l'imagerie satellite, ainsi que d'autres sources de l'équipe de CropWatch au sein de l'Académie chinoise des sciences. Le maïs, le riz, le blé et le soja, et les principaux pays producteurs d'aliments, y compris la Chine, reçoivent une attention particulière, toutefois les autres cultures et zones sont mentionnées, s'il y a besoin. La période de rapport actuelle de Juillet à Octobre 2015, couvre principalement la plantation de cultures d'été dans l'hémisphère sud, la récolte des cultures d'été ainsi que la plantation de cultures d'hiver dans l'hémisphère nord. Cette période comprend un chevauchement entre la récolte de la première culture et la plantation de la seconde.

Après un aperçu des conditions agro-climatiques et agronomiques, qui ont été largement dominées par les effets d'El Niño (y compris les régions de l'Afrique orientale et australe marquées par un sévère stress hydrique), les sections ci-dessous présentent les estimations revues de CropWatch pour l'année 2015 pour la production des céréales (2457 millions de tonnes ; une valeur quasi identique à 2014) et de soja (309 millions de tonnes ; une augmentation de 1% par rapport à la saison précédente). La production alimentaire totale pour 2015 en Chine (Incluant les céréales, les légumineuses et les tubercules) atteint 568,1 millions de tonnes, avec une augmentation de 4,3 millions de tonnes comparée à 2014, ce qui veut dire une hausse de 0,8%.

Conditions agro-environnementales et agronomiques globales entre Juillet et Octobre ici à 2015

Les indices d'El Niño ont continué de se raffermir au cours de la période de surveillance et ont atteint des valeurs négatives stabilisées en Août. Bien que les sources diffèrent, il est probable que le phénomène persisterait au moins jusqu'à la fin de 2015. Les conditions météorologiques extrêmes ont été largement compatibles avec les effets d'El Niño, et comprenaient une augmentation de la fréquence des cyclones tropicaux (pas moins de dix cyclones nommés sont rapportés dans la section sur les catastrophes) et les précipitations anormales. Plusieurs régions signalent que la population est exposée à l'insécurité alimentaire sévère.

Les anomalies sont repérées et bien définis à l'échelle régionale. Ils comprennent à la fois des zones de précipitations excédentaires et déficitaires:

• Des précipitations abondantes au cours de la majeure partie de l'Amérique du Nord, où la fraction de terres arables cultivées a diminué au Canada de 3% vu les conditions défavorables, alors qu'elle a augmenté de 1% aux Etats-Unis.

• Les précipitations sont abondantes (+ 40% à + 150%) au niveau de la Bolivie et du Paraguay au sud du Brésil. La fraction des terres arables cultivées, a augmenté de façon très significative au Brésil (+ 10%) et en Argentine (+ 11%) où les conditions étaient nettement moins favorables comparé au Brésil. Dans l'ensemble, pour l'Amérique du Sud, les terres arables ont augmenté de 8% et l'intensification des cultures a atteint 168%, cette hausse a été aussi enregistrée pour les régions du Sud et du sud-est de l'Asie.

• Les précipitations sont abondantes (+ 70% à + 170%) sur une immense zone à l'ouest (Mauritanie) et au nord (Tunisie) du Sahara, et s'étendent en Asie centrale (Les terres arables cultivées ont connu une augmentation importante de 36 % à Kazakhstan. Tadjikistan et Ouzbékistan ont connu de leur part une augmentation de 9% des terres arables cultivées avec un doublement de leur potentiel de production de la biomasse. Au niveau de Xinjiang le potentiel de production de la biomasse a augmenté de 90%) à travers le Moyen-Orient (En Irak et Iran, les terres arables cultivées ont diminué de 8%, alors que l'intensification des cultures a augmenté de 3%). Ces pays, de climat semi-aride et qui sont marqués par la disparité des calendriers de leurs récoltes, ont bénéficié d'une humidité inattendue pour leurs cultures, parcours et élevage.

• Le déficit hydrique est largement répandu en Amérique centrale et du sud, y compris les îles des Caraïbes (Jamaïque a connu une baisse de 48% des précipitations); Corridor sec (l'État libre et souverain du Chiapas au sud du Mexique et les régions voisines du Guatemala, El Salvador, Honduras et Nicaragua); Equateur (baisse des précipitations de 48%); Colombie au nord du Brésil, une grande partie du Cône Sud. Dans ce cas de figure, le potentiel de production de biomasse a été touché par une réduction significative.
• La sécheresse a touché l'Afrique australe (Malawi, Zambie, Zimbabwe, Afrique du Sud), l'Afrique de l'Est dont le Kenya (-51% précipitations), le sud du Soudan et certaines parties de l'Ethiopie (environ 1.8 millions de personnes dans le besoin d'une aide alimentaire à Tigré et Afar). En Ethiopie, les terres arables cultivées et l'intensification des cultures ont chuté à la fois de 4%.
• Le sud-est d'Asie sec/aride, notamment au Timor-Leste (-94%) et en Papouasie-Nouvelle-Guinée (-80%). En Indonésie (-67%), le potentiel de production de biomasse a connu une chute de 59% et la fumée des incendies répandus est devenue un danger pour la santé. Bien que la fraction des terres arables des cultures reste stable, l'intensification des cultures a connu une diminution de 2%.
• La sécheresse en Océanie, y compris la Nouvelle-Calédonie (-81%) et la Nouvelle-Zélande (-73%). Cependant en Australie, la fraction des terres arables cultivées a augmenté (+ 8%), tandis que l'intensification des cultures a diminué (-4%).
• Des conditions sèches dans des grandes étendues en Eurasie, avec des déficits croissants à l'ouest (-30%) et au nord (-30%) à l'est (jusqu'à -75%) et en englobant la Suisse, le nord-ouest de la Russie (Carélie) jusqu'à l'Oblast d'Aktobe (Kazakhstan), le Caucase, le nord de la mer Noire et la Roumanie, avec les régions les plus sèches en Ukraine (la superficie cultivée est stable, mais avec une baisse de 1% dans l'intensification des cultures) et l'ouest de la Russie (Belgorod, Koursk, Voronej, Lipetsk et Tambov). Certaines de ces zones ont souffert aussi des basses températures et de la chute du potentiel de la production de la biomasse résultante, qui est comprise entre 50% et 70% par exemple dans les oblasts d'Atyraus (Kazakhstan), Stavropol et au Belgorod (Russie).
• Une sécheresse dans le RMR de Corée (-64%) et dans les provinces voisines en Chine (Jilin, -28%; Liaoning, -43%). Quant au potentiel de production de la biomasse la diminution varie de 20% à 40%.
• Une sécheresse dans l'ouest et le sud de l'Inde (Gujarat, -78%), où la fraction des terres arables cultivées a diminué de 5% au niveau national.

Estimation de la production mondiale

Les dernières estimations de CropWatch en 2015, pour la production des céréalicultures et du soja, donne un total de 990 millions de tonnes de maïs (similaire à 2014), 742 millions de tonnes pour le riz paddy (-0,1% par rapport à 2014) et 724 millions de tonnes pour le blé (une hausse de 0,3%). Le Soja affiche une hausse de 1,0% et atteint 309 millions de tonnes. Pour la Chine, CropWatch estime la production de maïs à 194 millions de tonnes (+ 1%), 202 millions de tonnes pour le riz (+ 1%), 122 millions de tonnes pour le blé (+ 2%) et 13 millions de tonnes pour le soja (-1%). Lorsqu'on examine seulement les principaux exportateurs, la situation ne change que légèrement pour le maïs, le riz et le soja, mais de façon plus significative pour le blé (+ 2,31%).
Les changements les plus importants pour les différents pays sont globalement liés à des variables agro-climatiques et agronomiques listés ci-dessus. Pour le maïs, les pays inclus sont l'Ethiopie (-3%), le Cambodge (-10%), l'Inde (-6%; les terres arables cultivées ont diminué de 5% suite aux sécheresses et inondations), l'Afrique du Sud (-12%) et l'Ukraine (-6% vu l'interaction complexe de plusieurs facteurs). Pour le riz, les baisses les plus notables sont celles de l'Inde (-1%) et de la Roumanie (-9%). Bien que le Mexique ne fait pas partie des principaux producteurs de riz, il est important de mentionner que l'ampleur de la baisse de sa production est de 33%.
De fortes augmentations ont marqué la production de blé en Égypte (+ 5%), Turquie (+ 10%), Iran (+ 4% après plusieurs années de conditions météorologiques défavorables) et Kazakhstan (+ 16% ce qui est dû à l'augmentation de la fraction des terres cultivées et aux pluies abondantes). En Amérique latine, le Brésil

(+ 4%) a nettement dépassé l'Argentine, son voisin de sud (-4%). Canada a subi une baisse sévère de 8% par rapport à la saison de 2014.

Chine

Les conditions qui régnaient en Chine au cours de la période de surveillance s'accordent avec les tendances mondiales mentionnées ci-dessus. À l'échelle nationale, des conditions moyennes (précipitations, + 1%; température, -0,7 °C; RADPAR, -3%; la fraction de terres arables cultivée, 0% et l'intensification culturale, 0%) cachent la diversité des situations locales, y compris la sécheresse, l'excès de précipitations associés aux cyclones et la basse température. La fraction des terres arables cultivées a augmenté de 5% dans la région de Lœss, alors que les terres arables non cultivées sont principalement situées dans le nord-ouest de la Chine. L'impact des maladies et des ravageurs a été relativement modéré, sauf pour les pyrales des herbes (*Cnaphalocrocis medinalis*) et les cicadelles brunes (*Nilaparvata lugens*) dans HuangHuaihai, et le cours médian et aval du fleuve Yangtsé.
La récolte du maïs, du riz, du blé et du soja était achevée à la fin de la période considérée. Seule la production de riz a été révisée à 131,5 millions de tonnes, soit une augmentation de 1% par rapport à l'année précédente. La production du riz précoce et tardif reste au même niveau que dans les prévisions émises par CropWatch en Août: 35.1 et 35,7 millions de tonnes, respectivement, ce qui entraîne une production totale de riz s'élevant à 202 millions de tonnes.
CropWatch a revu la production alimentaire annuelle totale (incluant les céréales, les légumineuses et les tubercules) à 568,1 millions de tonnes, jusqu'à +0.8% par rapport à 2014 (une augmentation de 4,3 millions de tonnes). La production totale des cultures d'été est estimée à 407.3 millions de tonnes avec une hausse de 0,6% (l'équivalent de 2,4 millions de tonnes) par rapport à l'année dernière qui était marquée par une sécheresse et légèrement au-dessus de la production des cultures d'été en 2013.

Краткий обзор

В этом бюллетене представлены качественная и количественная оценки мирового производства продовольствия. Они основаны на независимом анализе показателей состояния окружающей среды и агрономических показателей, большинство из которых базируется на данных со спутников, а также на других источниках, имеющихся в распоряжении группы CropWatch Китайской Академии Наук. Кукурузе, рису, пшенице и сое и основным странам- производителям продовольствия, включая Китай, отводится особое внимание – другие же культуры и регионы упоминаются лишь только тогда, когда это требуется. Текущий отчетный период с июля по октябрь 2015 г. главным образом охватывает посев яровых культур в южном полушарии, а также уборку урожая яровых культур и посев озимых культур в северном полушарии. Во многих тропических и экваториальных областях этот период включает чересполосную уборку основной культуры и высаживание дополнительной культуры. После проведения обзора агроклиматических и агрономических условий, на которые в значительной степени оказывали воздействие эффекты Эль Ниньо (включая области, подверженные сильному водному стрессу, в восточной и южной Африке), в нижеприводимых подразделах представлены скорректированные CropWatch для 2015 г. оценки мирового сбора зерновых культур (в 2457 млн. тонн - т.е. величина почти та же самая, что и в 2014 г.) и сои (в 309 млн.тонн - т.е. на 1% выше, чем в предыдущем сезоне).

Общий сбор продовольственной растениеводческой продукции в Китае в 2015 г. (включая зерновые, бобовые и клубневые) достигает 568,1 млн. тонн, превышая на 4,3 млн. тонн уровень 2014 г. – т.е. имеет 0,8 % увеличение.

Агроэкологические и агрономические условия в целом за июль – октябрь 2015 г.

Индексы Эль Ниньо продолжали усиливаться на этом отрезке мониторинга и достигли непрерывных отрицательных значений в августе. Хотя источники и разняться в оценках, все- же вероятно, что такой феномен будет продолжать существовать, по крайней мере, до конца 2015 г. Экстремальный характер погодные условий был в значительной степени совместим с эффектами Эль Ниньо и включал возрастающую частоту тропических циклонов и аномальных осадков (не менее чем о десяти получивших имя циклонах упоминается в подразделе, касающемся бедствий). В связи с этим, некоторые районы мира индицируют, что население в них подвержено серьезной продовольственной небезопасности.

Такого рода аномалии зафиксированы, а их границы регионально оконтурены. Они включают как области с избытком осадков, так и с их дефицитом:

- *Обильные осадки* на большей части Северной Америки, где доля распаханных под культуры земель сократилась на 3% из- за неблагоприятных условий в Канаде, однако увеличилась на 1% в США.
- *Обильные осадки* (от +40% до +150% относительно нормы) на пространстве от Боливии и Парагвая до южной части Бразилии. Доля распаханных под культуры земель увеличилась очень заметно в Бразилии (+10%) и Аргентине (+11%) – в последней, однако, условия были значительно менее благоприятными, чем в Бразилии., Для Южной Америки в целом, площадь распаханных под культуры земель увеличилась на 8%, а интенсивность полеводства достигла 168% , т.е. стала такой же высокой как в Южной и Юго- Восточной Азии.
- *Обильные осадки* (от +70% до +170% относительно нормы) на огромном пространстве, простирающемся от западного (Мавритания) и северного (Тунис) секторов Сахары через Средний Восток (Ирак; Иран, где площадь распаханных под культуры земель сократилась на 8%,

но при этом интенсивность полеводства возросла на 3%) до Центральной Азии включительно (Казахстан, где площади пахотных земель увеличились беспрецедентно- на 36%; Таджикистан; Узбекистан с 9% -ым увеличением площади распаханных под культуры земель и удвоением потенциала биопродуктивности; китайская провинция Синьцзян, где потенциал биопродуктивности оказался выше на 90%). Хотя упомянутые территории сильно отличаются по срокам фенологического календаря культур, все они являются полуаридными; поэтому они извлекли выгоду от непредвиденного увлажнения для существующих в них посевов, сухих пастбищ и для домашнего скота.

- *Крупномасштабный водный дефицит* в Центральной и Южной Америке, включая острова Карибского моря (Ямайка с 48% - ым количеством осадков от нормы); «Сухой Коридор» (Свободный и Суверенный Штат Чьяпас в южной Мексике и находящиеся по соседству районы Гватемалы, Сальвадора, Гондураса и Никарагуа с длительным сухим сезоном); Эквадор (снижение осадков от нормы – 48%); пространство от Колумбии до северной части Бразилии; большую часть «Южного Конуса» (Чили, Аргентина, Парагвай, Уругвай и юг Бразилии). Здесь потенциал биопрдуктивности испытал значительное снижение.
- *Засуха* в южной части Африки (Малави, Замбия, Зимбабве, ЮАР) и в восточной Африке, включая Кению (- 51% количества осадков от номы), юг Судана и районы Эфиопии (в провинциях Тигре и Афар население, нуждающееся в продовольственной помощи, оценивается в 1.8 млн. человек). В Эфиопии как площадь распаханных под культуры земель, так и интенсивность полеводства снизились на 4%.
- *Сухая погода* в полувлажных районах Юго-Восточной Азии, особенно в Тимор Лесте (-94% количества осадков от нормы) и Папуа Новой Гвинее (-80% количества осадков от нормы). В Индонезии (- 67% количества осадков от нормы) потенциал биопродуктивности упал на 59% ,а дым от широко распространяющихся лесных пожаров нанес опасность здоровью. Хотя доля распаханных под культуры земель осталась стабильной, интенсивность полеводства снизилась на 2%.
- *Засуха* в Океании, включая Новую Каледонию (-81% количества осадков от нормы) и Новую Зеландию (-73% количества осадков от нормы). В Австралии, однако, доля распаханных под культуры земель возросла (+8%), в то время как интенсивность полеводства снизилась (-4%).
- *Сухие условия* на обширном пространстве Евразии с дефицитом осадков, возрастающем с запада (-30% от нормы) и севера (-30% от нормы) на восток (до -75% от нормы), которое заключает в себе Швейцарию, Северо- Запад России (в частности, Карелию), Актюбинскую область (Казахстан), Кавказ, северное Причерноморье с очень сухими районами внутри Украины (при стабильных пахотно- пригодных площадях, но 1% -ом снижении интенсивности полеводства), Румынию и Центрально- Черноземный Район России.. Некоторые области также пострадали от воздействия низких температур в период вегетации, и снижение окончательного потенциала биопродуктивности составило в них 50% - 70% : например, в Атырауской области (Казахстан), в Ставропольском крае и Белгородской области (Россия)
- *Засуха* в КНДР (-64% количества осадков от нормы) и соседних провинциях Китая (в провинции Цзилинь -28%; в провинции Ляонин -43%). Соответственное падение потенциала биопродуктивности варьирует от 20% до 30%.
- *Засуха* на западе и юге Индии (в штате Гуджарат -78% количества осадков от нормы), где доля распаханных под культуры земель снизилась на 5% от общенациональной.

Оценка глобального валового сбора

По самым последним оценкам, сделанным CropWatch для мирового валового сбора зерновых и сои в 2015 г.., его общий объем определяется: в 990 млн.тонн для кукурузы (не изменился по отношению к 2014 г.), в 742 млн. тонн для риса- сырца (-0,1% в сравнении с 2014 г.) и в 724 млн. тонн для пшеницы (повысился на 0,3%). Валовой сбор сои обнаруживает увеличение на 1% и достигает 309 млн. тонн. Для Китая оценки CropWatch следующие: 194 млн. тонн для кукурузы (+1%), 202 млн. тонн для риса (+1%), 122 млн. тонн для пшеницы (+2%) и 13 млн. тонн для сои (-1%). Если рассматривать только главные страны- экспортеры, то положение изменяется очень незначительно для кукурузы, риса и сои, но более заметно для пшеницы (+2,31%).

Наибольшие изменения валового сбора в отдельных странах непосредственно связаны с агроклиматическими и агрономическими показателями, приводимыми ранее. Для кукурузы они включают Эфиопию (-3%), Камбоджу (-10%), Индию (-6%; обрабатываемые пахотные земли сократились на 5% в результате воздействия как засух, так и паводков), ЮАР (-12%) и Украину (-6% вследствие комплексного взаимодействия факторов). Для риса наибольшего внимания заслуживают сокращения его валового сбора, такие как в Индии (-1%) и Румынии (-9%). Хотя Мексика и не является крупным производителем риса, тем не менее, величина спада его сбора (-33%) заслуживает упоминания.

Страны с заметными увеличениями объема продукции пшеницы включают Египет (+5%), Турцию (+10%), Иран (+4% после нескольких лет с неблагоприятными погодными условиями) и Казахстан (+16% вследствие увеличения доли пахотных земель и обильных осадков); в Латинской Америке - Бразилию (+4%), значительно обгоняющую ее южную соседку Аргентину (-4%). Канада же испытывала сильное снижение в сборе пшеницы – на 8% в сравнении с сезоном 2014 г.

Китай

Условия, которые превалировали в Китае на протяжении периода мониторинга, коррелируют с характером их глобальных особенностей, о которых упоминалось выше. Близость к средним показателям в национальном масштабе (осадки, +1%; температура, -0.7°C; поток радиации,-3%; доля засеянной под культуры площади, 0% и интенсивность полеводства, 0%) маскирует разнообразие локальных ситуаций, включая засухи и избыток осадков, связанный с циклонами и низкими температурами. Доля распаханных под культуры земель в Регионе Лессового Плато увеличилась на 5%, и нераспаханные под культуры земли в основном располагались на северо-западе Китая. Отрицательное воздействие вредителей и болезней было относительно умеренным, за исключением дельфацидов и Cnaphalocrocis medinalis, от которых пострадали посевы на Хуан-Хуанхайской равнине и в районах вдоль среднего и нижнего течения р. Янцзы.

Уборка кукурузы, риса, пшеницы и сои происходила в конце отчетного периода. Валовой сбор риса, высаживаемого в обычные сроки, скорректирован к уровню в 131,5 млн.тонн, т.е.1% -ое увеличение в сравнении с предыдущем годом. Валовые сборы раннего и позднего риса остаются такими же, как и по прогнозу, выданному CropWatch в августе: 35,1 млн. тонн и 35,7 млн. тонн соответственно, что находит отражение в общем объеме произведенного риса - 202 млн. тонн.

CropWatch скорректирован общий годовой объем произведенной продовольственной продукции (включающей зерновые, бобовые и клубневые) к уровню в 568,1 млн. тонн, или на 0,8% выше, чем в 2014 г. (т.е. увеличение на 4,3 млн. тонн). Общий валовой сбор яровых культур прогнозируется в 407,3 млн. тонн, т.е. его 0,6% увеличение (эквивалентное 2,.4 млн. тонн) в сравнении с прошлым годом, когда случилась засуха, и что чуть-чуть выше валового сбора в 2013 г.

Resumen

Este boletín presenta una estimación cualitativa y cuantitativa de la producción mundial de alimentos. Está basado en el análisis independiente de indicadores ambientales y agronómicos, la mayor parte de ellos basados en sensores remotos, así como también otras fuentes y es llevado a cabo por el grupo CropWatch de la Academia de Ciencias de China (Chinese Academy of Sciences). Se brinda especial atención al maíz, arroz, trigo y soja y a los principales países productores de alimentos, incluyendo China, pero también otros cultivos y regiones son mencionadas cuando es relevante. El período de reporte actual (julio a octubre de 2015) cubre la siembra de cultivos de verano en el hemisferio sur, la cosecha de cultivos de verano y la siembra de cultivos de invierno en el hemisferio norte. En muchas de las zonas tropicales y ecuatoriales, el período incluye la superposición de la cosecha de cultivos de primera estación con la siembra de cultivos de segunda estación.

Luego de un análisis general de las condiciones agroclimáticas y agronómicas, que han sido ampliamente dominadas por los impactos de El Niño (incluyendo áreas de stress hídrico severo en el este y sur de África), las siguientes secciones introducen estimaciones actualizadas de CropWatch para 2015 para la producción de cereales (2457 millones de toneladas, similar al obtenido en 2014) y soja (309 millones de toneladas, un incremento del 1 % con respecto a la estación anterior). La producción total de China en 2015 (incluyendo cereales, legumbres y tubérculos) alcanzó los 568,1 millones de toneladas, 4,3 millones por encima de 2014, incrementándose un 0,8 %.

Condiciones agro-ambientales y agronómicas generales entre julio y octubre de 2015

Los índices de El Niño continuaron incrementándose durante este periodo de seguimiento y alcanzaron valores negativos considerables en agosto. Más allá de las diferencias entre fuentes, es de esperar que el fenómeno continúe al menos hasta el final de 2015. Patrones meteorológicos extremos fueron en gran medida compatibles con impactos de El Niño, entre los que se incluye un incremento en la frecuencia de ciclones tropicales (Más de diez ciclones con nombre asignado son descriptos en la sección de desastres), y niveles de precipitación fuera de lo normal. En varias áreas se reporta que la población está expuesta a inseguridad alimentaria severa.

Las anomalías fueron marcadas y bien definidas regionalmente. Incluyeron tanto excesos como déficit de precipitación:

- *Precipitaciones abundantes* en gran parte de América del Norte, donde la fracción de área cultivada disminuyó un 3 % debido a condiciones desfavorables en Canadá, aunque tuvo un incremento de 1 % en Estados Unidos.
- *Precipitaciones abundantes* (+40 % a +150 %) desde Bolivia y Paraguay hasta el Sur de Brasil. La fracción de área cultivada se incrementó en forma muy significativa en Brasil (+10 %) y Argentina (+11 %) donde las condiciones, sin embargo, fueron significativamente menos favorables que en Brasil. Considerando Sudamérica en conjunto, el área cultivada se incrementó un 8%, y la intensidad de cultivo alcanzó un 168 %, un nivel similar al del Sur y Sudeste de Asia.
- *Precipitaciones abundantes* (+70% a +170%) en un área muy grande comprendida por el oeste (Mauritania) y norte (Túnez) del Sahara, extendiéndose hacia Asia Central (Kazajistán, donde el área cultivada se incrementó hasta 36 %; Tayikistán; Uzbekistán con un incremento del 9% del área cultivada y del doble en la producción de biomasa potencial, y Xinjiang donde la producción de biomasa potencial se incrementó hasta un 90 %), Medio Este (Iraq; Irán donde el área cultivada cayó un 8 % pero la intensidad de cultivo se incrementó un 3 %). Estos países se encontraban en diferentes momentos de su estación de crecimiento, pero al tener todos ellos condiciones semiáridas, se han beneficiado de estas condiciones de humedad inesperadas para su producción agrícola y ganadera.

- *Déficit hídrico extendido* en América Central y del Sur, incluyendo las islas del Caribe (Jamaica con un 48 menos % de precipitaciones); El Corredor Seco (El Estado Libre y Soberano de Chiapas en el sur de México y zonas alrededor de Guatemala, El Salvador, Honduras y Nicaragua); Ecuador (caída del 48 % de las precipitaciones); Colombia y norte de Brasil; gran parte del Cono Sur. La producción de biomasa potencial muestra una importante reducción en estas áreas.
- *Sequía* en el sur de África (Malawi, Zambia, Zimbabue, Sudáfrica), este de África incluyendo Kenia (-51% en precipitaciones), sur de Sudán y parte de Etiopía (Tigray y Afar, donde se estima que unos 1.8 millones de personas requerirán ayuda alimentaria). En Etiopía, tanto el área cultivada como la intensidad de cultivo cayeron 4%.
- *Sequía* en Sudeste Asiático, especialmente en Timor Oriental (-94 %) y Papúa Nueva Guinea (-80 %). En Indonesia (-67%), la producción de biomasa potencial cayó un 59 % y los fuegos extendidos se convirtieron en un peligro para la salud. A pesar de que la fracción de tierra cultivada se mantuvo estable, la intensidad de cultivo disminuyó 2 %.
- *Sequía* en Oceanía, incluyendo Nueva Caledonia (-81 %) y Nueva Zelanda (-73 %). En Australia, sin embargo, la fracción de tierra cultivada se incrementó (+8%) mientras que la intensidad de cultivo cayó (-4%).
- *Condiciones de sequía* en grandes áreas de Eurasia, con déficits incrementándose desde el oeste (-30%) y norte (-30%) hacia el este (hasta -75%) e incluyendo Suiza, noroeste de Rusia (Karelia) hasta el oblast de Aktyubinsk (Kazajistán), el Cáucaso, parte norte del mar Negro y Rumania; las zonas más secas se encuentran en Ucrania (área cultivada estable, pero caídas en 1 % en la intensidad de cultivo) y oeste de Rusia (Belgorod, Kursk, Voronezh, Lipetsk y Tambov). Algunas de las áreas también sufrieron de bajas temperaturas y la caída en producción de biomasa potencial estuvo entre 50 y 70 %, por ejemplo en los oblast de Atyraus (Kazajistán), Stavropol y Belgorod (Rusia).
- *Sequía* en DPR Corea (-64 %) y provincias Chinas vecinas (Jilin, -28%; Liaoning, -43%). La caída en producción de biomasa potencial varió entre 20 y 40 %.
- *Sequía* en el oeste y sur de India (Gujarat, -78%), donde la fracción de área cultivada cayó un 5 % a nivel nacional.

Estimación de la producción global

Las más recientes estimaciones de CropWatch para la producción de cereales y soja de 2015 indican un total de 990 millones de toneladas de maíz (sin diferencia con 2014), 742 millones de toneladas de arroz (-0,1 en comparación con 2014) y 724 millones de toneladas de trigo (incremento del 0,3%). La soja mostró un incremento del 1 % alcanzando 309 millones de toneladas. Para China, CropWatch estima una producción de 194 millones de toneladas de maíz (+1 %), 202 millones de toneladas de arroz (+1%), 122 millones de toneladas de trigo (+2%) y 13 millones de toneladas de soja (-1%). Considerando únicamente los principales exportadores la situación cambia solo levemente para maíz, arroz y soja pero significativamente para trigo (+2,31%).

Los cambios más importantes a nivel país están directamente relacionados con las variables agroclimáticas y agronómicas indicadas arriba. Para maíz se incluyen los casos de Etiopía (-3%), Camboya (-10%), India (-6%; área cultivada disminuyó 5 % como resultado de sequías e inundaciones), Sudáfrica (-12%) y Ucrania (-6% debido a una compleja interacción de factores). Para arroz, los casos más notables de disminución de producción fueron los de India (-1%) y Rumania (-9%). Aunque Méjico no es un productor importante de arroz, la magnitud de su caída en producción (-33%) es digna de mencionar.

Incrementos marcados en la cosecha de trigo fueron observados en Egipto (+5 %), Turquía (+10%), Irán (+4% luego de varios años con condiciones meteorológicas desfavorables) y Kazajistán (+16 % como resultado de incremento en el área cultivada y abundantes precipitaciones). En América Latina, Brasil

(+4%) superó ampliamente a su vecino del sur Argentina (-4%). Canadá mostró una fuerte disminución del 8 % en comparación con 2014.

China

Las condiciones prevalecientes en China durante este período de seguimiento se integran bien con los patrones globales mencionados anteriormente. A nivel nacional, condiciones promedio (precipitaciones, +1%; temperatura, -0.7°C; RADPAR, -3%; fracción de tierra cultivada, 0% e intensidad de cultivo, 0%) ocultan la diversidad de situaciones a nivel local, incluyendo sequías, excesos de precipitaciones asociados a ciclones y bajas temperaturas. La fracción de área cultivada se incrementó un 5% en la región del Loess y las áreas no cultivadas se ubicaron principalmente en el noroeste de China. El impacto de plagas y enfermedades fueron relativamente moderadas, excepto por la presencia de *Nilaparvata lugens* y *Cnaphalocrocis medinalis* en HuangHuaihai, y en los cursos medio y bajo del río Yangtze.

La cosecha de maíz, arroz, trigo y soja había finalizado al final de este período de reporte. La producción de arroz de 1 estación se ajustó en 131,5 millones de toneladas, un incremento del 1% en comparación con el año anterior. Las producciones de arroz temprano y tardío permanecieron sin cambios con respecto a las predicciones de CropWatch de Agosto: 35,1 y 35,7 millones de toneladas, respectivamente, lo que resultó en una cosecha total de arroz de 202 millones de toneladas.

CropWatch ajustó la producción anual de alimentos (incluyendo cereales, legumbres y tubérculos) en 568.1 millones de toneladas, 0,8 % por encima de 2014 (un incremento de 4,3 millones de toneladas). La producción total de cultivos de verano se estima en 407,3 millones de toneladas, un 0,6 % de incremento (equivalente a 2,4 millones de toneladas) en comparación con el año anterior donde hubo una sequía y levemente por encima de la producción de cultivos de verano de 2013.

Chapter 1. Global agroclimatic patterns

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

1.1 Overview

Global patterns of rainfall for the four-month monitoring period of July to October 2015 are largely compatible with El Niño impacts, with several marked and regionally well-defined anomalies, especially in Central and South America, east and southern Africa as well as Southeast Asia and Oceania.

However, as is increasingly noted by the climate monitoring community, there is no such thing as a "normal" El Niño, nor is there any typical and predictable behaviour when moving beyond very broad regional patterns. El Niño means havoc, i.e. droughts, floods and cyclones, but the details change every time. For instance, the classical pattern would mean wet conditions in the Horn of Africa and east Africa, and drought in the south, as happened in 1991-1992.

During the current season, we have dry conditions over all of south and east Africa for the reporting period, with more severe impacts in the east as the CropWatch RAIN index shows a deficit of 19% in southern Africa (Mapping and Reporting Unit, MRU-09), and as much as 25% and 28% in the Horn of Africa (MRU-04) and the eastern African Highlands (MRU-02), respectively. Even equatorial central Africa (MRU-01) is affected (-6%) and north and central Madagascar (MRU-05) recorded above average RAIN (+12%).

Throughout the Caribbean, Central and South America suffered from drought (with deficits between 20% and 30%), except the east, from the Brazilian Nordeste (MRU-22) to the Argentinian Pampas (MRU-26), where the excess reached 53% in central-eastern Brazil (MRU-23).

As described in subsequent sections of this chapter, there are also spatially coherent patterns of abnormal rainfall in western, central and eastern Asia. They are, however, not part of the "normal" El Niño impacts, which stresses again that the currently on-going El Niño is rather atypical, except maybe in Oceania.

An unusually weak association between the climate variables also characterizes the current reporting period. For instance, there is no discernible link between rainfall and temperature anomalies, at the global or even regional scales, including latitudinal variations. The loose association between RAIN and the CropWatch radiation indicator (RADPAR) is negative during the reporting period, as expected, but not statistically significant.

With the exception of Subarctic America (MRU-65) of which only the extreme south holds some agricultural relevance, all other extremes do not follow any pattern (table 1.1).

Table 1.1. RAIN, TEMP and RADPAR anomalies in the global MRU with the largest rain anomalies

MRU	RAIN (%)	TEMP (°C)	RADPAR (%)
56. New Zealand	-73	-0.5	-4
53. Northern Australia	-71	-0.7	5
65. Subarctic America	165	1.9	-8
32. Gansu-Xinjiang (China)	173	-0.4	0
47. Mongolia region	309	-0.1	0

Not all impacts of El Niño will be negative. For instance, the aforementioned rainfall anomaly of -6% in equatorial central Africa (MRU-01) is accompanied by a drop in temperature (-0.7°C) and an increase in sunshine (+6%), which corresponds to favourable conditions: The areas have abundant rainfall largely exceeding crop water requirements, low sunshine is usually limiting crop growth and night-time respiration loss is significant due to high temperature. Similar situations can only be identified on a case-by-case basis due to the absence of coherent spatial patterns among the climate variables.

1.2 Rainfall

During the monitoring period, lower-than-average rainfall occurred in many regions around the world as can be seen on figure 1.1.

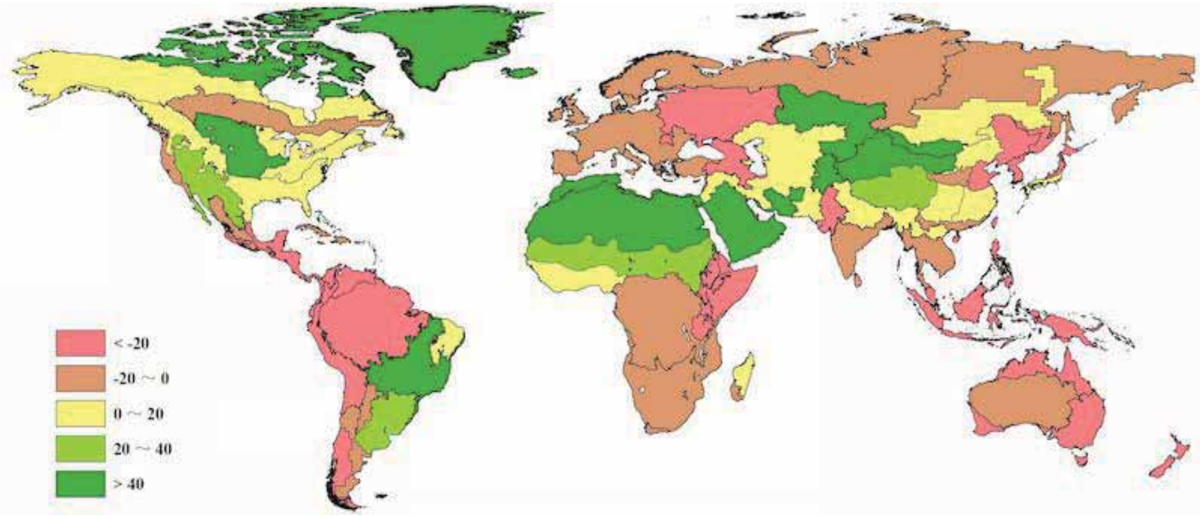
Abnormal rainfall deficits occurred in some major agricultural areas of Asia, including Punjab to Gujarat (MRU-48, -41%), East Asia (MRU-43, -48%), Huanghuaihai in China (MRU-34, -30%), northeast China (MRU-38, +24%), Hainan (MRU-33, -41%), Taiwan (MRU-42, -25%) and maritime Southeast Asia (MRU-49, -52%).

Unfortunately, drought continued in major production zones in Australia, Europe and Africa, including New Zealand (MRU-56 -73%), Queensland to Victoria (MRU-54, -43%), north Australia (MRU-53, -71%), Ukraine to the Ural Mountains (MRU-58, -25%) and non-Mediterranean Western Europe (MRU-60, -16%).

With the exception of north African Mediterranean areas (MRU-07, +46%), below average rainfall prevailed in Africa, including the East African highlands (MRU-02, -28%), the Horn of Africa (MRU-04, -25%), southern Africa (MRU-09, -19%) and Western Cape in South Africa (MRU-10, -19%).

Above average rainfall occurred in major production zones in both North and South America, including the Pampas (MRU-26, +35%), Central eastern Brazil (MRU-23, +53%), and the Northern Great Plains (MRU-12, +45%). Abundant rainfall fell over some pastoral regions, including Southern Mongolia (MRU-47, +309%), Gansu-Xinjiang (MRU-32, +173%) and the Ural to Altai Mountains (MRU-62, +50%).

Figure 1.1. Global map of rainfall anomaly (as indicated by the RAIN indicator) by MRU, departure from 14YA, July-October 2015 (percentage)



Note: Data for July-October, compared with the fourteen-year average (14YA) for the same period 2001-2014.

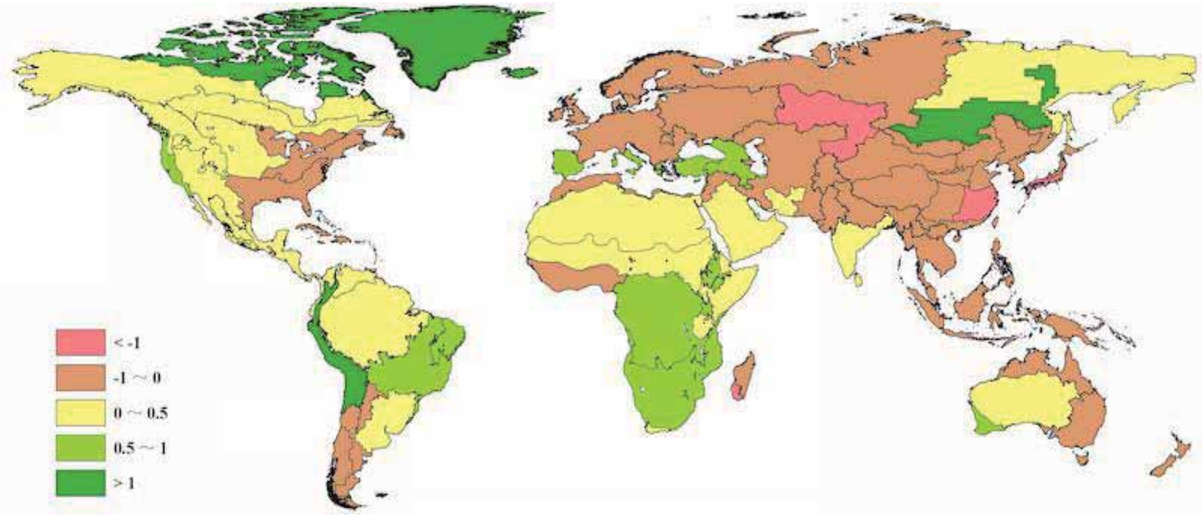
1.3 Temperature

Over the reporting period, the temperature departures of different MRUs show different patterns across continents (figure 1.2). In Eurasia, most MRUs show a negative departure compared to the average. The temperatures in the region from the Ural to the Altai Mountains, the Lower Yangtze (China) and southern Japan and Korea (MRU-62, -1.1°C, MRU-37, -1.3°C and MRU-46, -1.2°C respectively) were significantly below average by more than 1°C. Only in Mediterranean Europe and Turkey, Caucasus, eastern Central Asia and eastern Siberia (MRU-59, 0.9°C; MRU-29, 0.6°C; MRU-52, 1.0°C and MRU-51, 0.1°C respectively), were temperature departures positive.

In North America, the temperature was close to average except on the West Coast (MRU-16), with a departure of 0.9°C. In northern South America, the temperature departures were positive but negative in the Southern Cone, especially in central-north Argentina, western Patagonia and the semi-arid Southern Cone (MRU-25, -0.6°C; MRU-27, -0.5°C and MRU-28, -0.8°C respectively), where the temperature was below average by more than 0.5°C.

In Africa and Australia, the greatest negative temperature departures are found in south-western Madagascar (MRU-06, -1.1°C). In most other areas, the temperature was close to average and the departures were less than 1°C.

Figure 1.2. Global map of air temperature anomaly (as indicated by the TEMP indicator) by MRU, departure from 14YA, July-October 2015 (degrees Celsius)



Note: Data for July-October 2015, compared with the fourteen-year average (14YA) for the same period 2001-2014.

1.4 Photosynthetically active radiation

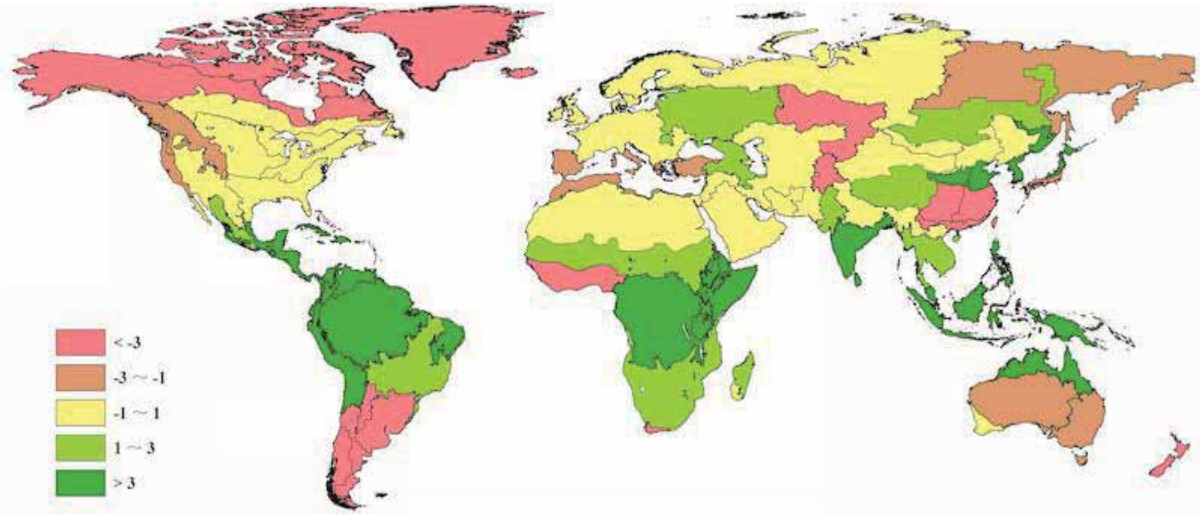
As a key agroclimatic indicator, Photosynthetically Active Radiation (PAR, as assessed by the CropWatch agroclimatic indicator RADPAR) has an obvious relationship with temperature and rainfall patterns: abundant rainfall is associated with high cloudiness, which leads to low daytime temperatures, mostly in temperate areas. Compared to the recent average of the total 65 MRUs, slightly more than half of them are above average (figure 1.3).

The highest departure from the recent reference period occurred in central north Argentina (MRU-25) and the Pampas (MRU-26), with 10% and 9% decrease in PAR respectively. RADPAR also shows a decrease in the northernmost area of the continent, which is not of agricultural relevance, Sub Arctic America (MRU-65) where the variable dropped 8%, and Boreal North America (MRU-61) where it decreased by 3% compared to the average.

Record high PAR departures are concentrated in several adjacent areas, including (i) East African Highlands (MRU-02, +7%), equatorial central Africa (MRU-01, +6%) and the Horn of Africa (MRU-04, +4%); (ii) the Caribbean (MRU-20, +5%) and Amazon (MRU-24, +5%); (iii) Southeast Asia islands (MRU-49, +9%) and Southern Asia (MRU-45, +6%).

In China, the major paddy rice production areas, the Lower Yangtze (MRU-37) and southern China (MRU-40), show significant a decrease in terms of PAR with -8% and -7% respectively. South-west China (MRU-41) also experienced below average PAR with a -3% departure, which probably results from the cloudiness associated with abundant rainfall in the region. The areas with high PAR are the Chinese Loess Region (MRU-36, +7%), Huanghuaihai (MRU-34, +5%), and Hainan (MRU-33, +3%). The rest of China generally shows average PAR level during the current reporting period.

Figure 1.3. Global map of PAR anomaly (as indicated by the RADPAR indicator) by MRU, departure from 14YA July-October 2015 (percentage)



Note: Data for July-October 2015, compared with the fourteen-year average (14YA) for the same period 2001-2014.

1.5 Biomass

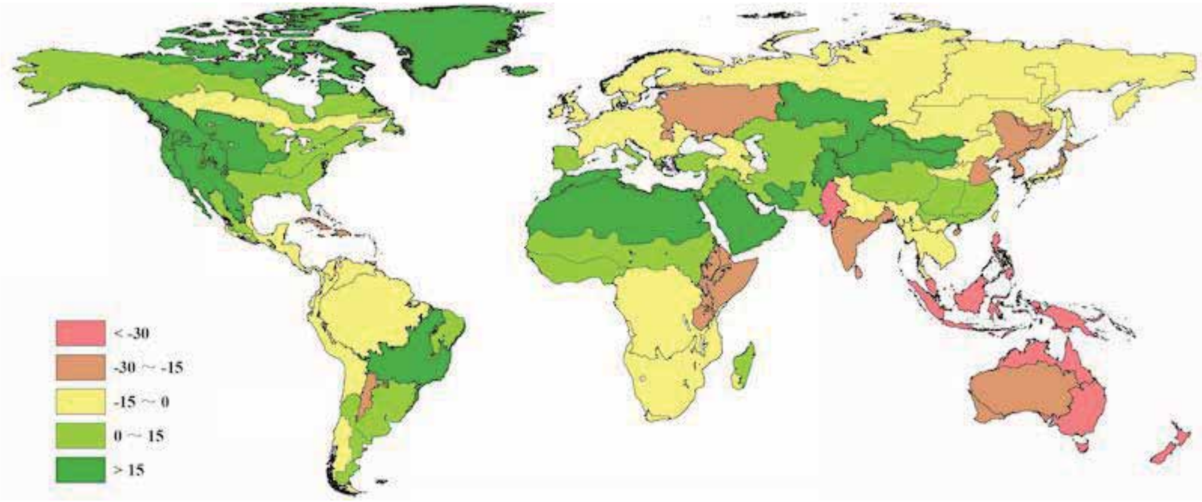
BIOMSS is a synthetic agro-climatic indicator that takes into account rainfall and temperature to estimate the potential biomass accumulation. Recent departures from average for the 65 global MRUs are shown in figure 1.4.

During this monitoring period, the notable change in rainfall compared with the average has affected the biomass production potential across the world. Over the reporting period, biomass variations are brought about more by RAIN anomalies than by TEMP anomalies (the R-squared between BIOMSS and RAIN and between BIOMSS and TEMP are 0.83 and 0.07 respectively).

Due to favorable rainfall in Eurasia, Africa and America, the BIOMSS in 28 MRUs show an upward trend compared with the average of the last five years. The greatest positive BIOMSS departures are found in the Northern Great Plains (MRU-12, 45% on RAIN and 30% on BIOMSS), the southwest United States and north Mexican highlands (MRU-18, 33% on RAIN and 36% on BIOMSS), North Africa-Mediterranean (MRU-07, 46% on RAIN and 36% on BIOMSS), central eastern Brazil (MRU-23, 53% on RAIN and 38% on BIOMSS), Ural to Altai mountains (MRU-62, 50% on RAIN and 39% on BIOMSS), Gansu-Xinjiang (China) (MRU-32, 173% on RAIN and 90% on BIOMASS), and southern Mongolia (MRU-47, 309% on RAIN and 125% on BIOMSS).

Declines in BIOMSS (compared to average values for the same period) are similarly affected by significantly decreased rainfall: In the following MRUs, the BIOMSS departures are well below the average of the last five years: Northern Australia (MRU-53, -71% on RAIN and -71% on BIOMSS), New Zealand (MRU-56, -73% on RAIN and -60% on BIOMSS), maritime Southeast Asia (MRU-49, -52% on RAIN and -47% on BIOMSS), Queensland to Victoria (MRU-54, -43% on RAIN and -43% on BIOMSS), Punjab to Gujarat (MRU-48, -41% on RAIN and -43% on BIOMSS) and East Asia (MRU-43, -48% on RAIN and -30% on BIOMSS).

Figure 1.4. Global map of biomass accumulation (BIOMSS) by MRU, departure from 5YA, July-October (percentage)



Note: Data for July-October 2015, compared with the five-year average (5YA) for the same period 2010-2014.

Chapter 2. Crop and environmental conditions in major production zones

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

2.1 Overview

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

Table 2.1. July-October 2015 agroclimatic indicators by Major Production Zone, current value and departure from 14YA

	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 14YA (%)	Current (°C)	Departure from 14YA (°C)	Current (MJ/m^2)	Departure from 14YA (%)
West Africa	961	16	26.5	-0.2	968	-4
South America	498	46	20.5	0.5	957	-5
North America	444	24	20.6	0.1	1092	0
South and SE Asia	1050	3	27.4	-0.1	969	3
Western Europe	238	-15	16.1	-0.3	910	0
C. Europe and W. Russia	168	-29	15.3	-0.6	869	3

Note: Departures are expressed in relative terms (percentage) for all variables, except for temperature, for which absolute departure in degrees Celsius is given. Zero means no change from the average value; relative departures are calculated as (C-R)/R*100, with C=current value and R=reference value, which is the fourteen-year average (14YA) for the same period (July-October) for 2001-14.

Table 2.2. July-October 2015 agronomic indicators by Major Production Zone, current season values and departure from 5YA

	BIOMSS (gDM/m^2)		Cropped arable land fraction		Maximum VCI Intensity	Cropping Intensity	
	Current	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current	Current (%)	Departure from 5YA (%)
West Africa	2052	5	83	-2	0.83	130	1
South America	1146	19	95	8	0.77	168	1
North America	1273	20	87	-3	0.87	120	-2
South and SE Asia	1694	-12	84	0	0.86	168	1
Western Europe	935	-13	91	-1	0.76	125	-2
C Europe and W Russia	735	-20	92	0	0.78	103	0

Note: Departures are expressed in relative terms (percentage) for all variables. Zero means no change from the average value; relative departures are calculated as (C-R)/R*100, with C=current value and R=reference value, which is the five-year (5YA) average for the same period (July-October) for 2010-2014.

2.2 West Africa

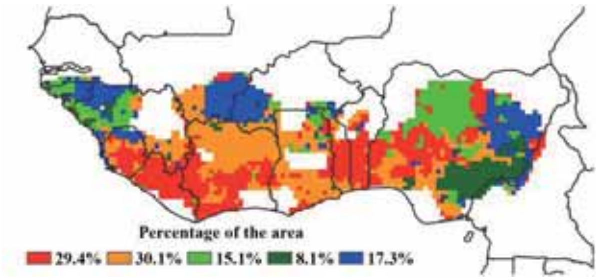
The west African MPZ as a whole recorded rather favourable rainfall conditions during the reporting period (+16%) even if the value hides large regional differences. In general, the west and the east as well as the northern fringe (corresponding to the southern Sahel) enjoyed favorable conditions: Guinea Bissau, +45%; Guinea, +29%; south-east Mali and south Burkina Faso (both with +35% nation-wide); northern Ghana (+14% over the whole country) and Nigeria (+21%, with excess concentrated in the northern half of the country). Temperature patterns show similar values the region; they were consistently below but close to average (-0.2°C). RADPAR was 4% below average (-2% in Liberia to -9% in Guinea Bissau).

The resulting biomass production estimate is up 5% on average with the most negative departures in Côte d'Ivoire (-5%) and Liberia (-8%), and the highest anomalies in Guinea Bissau (+11%), and Guinea Conakry and Ghana (both at +10%). The biomass production potential map shows unfavourable values in Liberia, the south of Côte d'Ivoire as well as Togo and Benin. This very largely coincides with the areas of high cropping intensity (200%) where the first maize crop, harvested in August and September, may have suffered some water stress in its final stages. The period also corresponds to the planting of the second maize crop to be harvested at the end of the year and throughout early 2016.

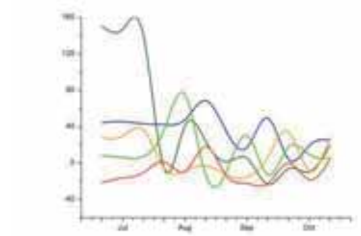
Rice and especially tubers constitute important crops in the area. For the western half of the region and irrigated rice in the eastern half, the harvest is on-going and will last until December or January of 2016. In the east, rain-fed rice is harvested earlier (in September) at about the same time as maize. Yams are harvested over a long period of about 6 months at the end of the year, while cassava is brought in later, usually around December and January.

The comparison of satellite-based crop indices, the agroclimatic indices and the crop calendar indicate that there were favorable conditions of cereals in the western and in the northern (Sahelian) parts of the region. However, conditions are mixed in Liberia and in the southern parts of the countries between Côte d'Ivoire and Nigeria. This data is correlated in figure 2.1.

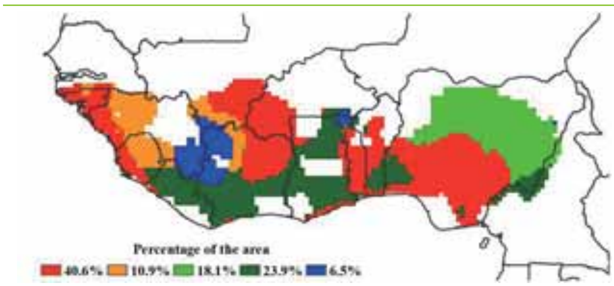
Figure 2.1. West Africa MPZ: Agroclimatic and agronomic indicators, July-October 2015



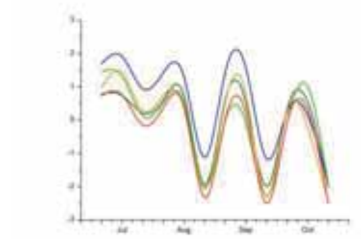
a. Spatial distribution of rainfall profiles



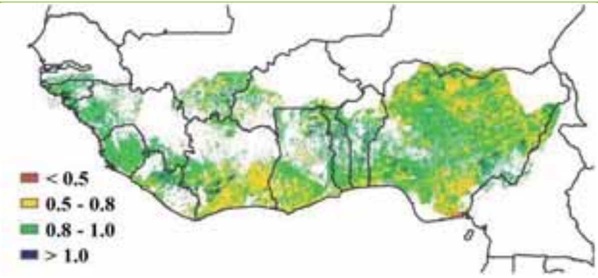
b. Profiles of rainfall departure from average (mm)



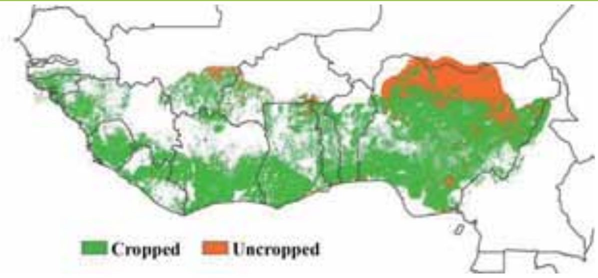
c. Spatial distribution of temperature profiles



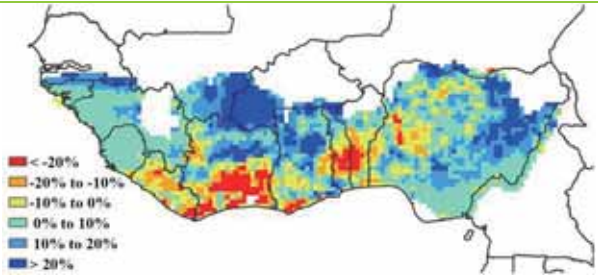
d. Profiles of temperature departure from average (°C)



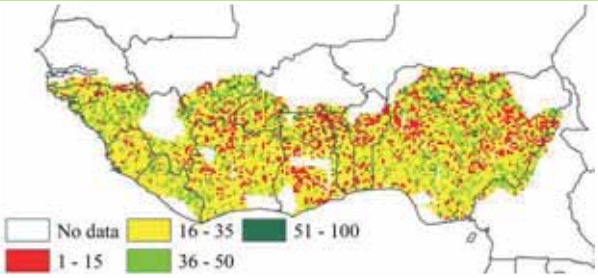
e. Maximum VCI



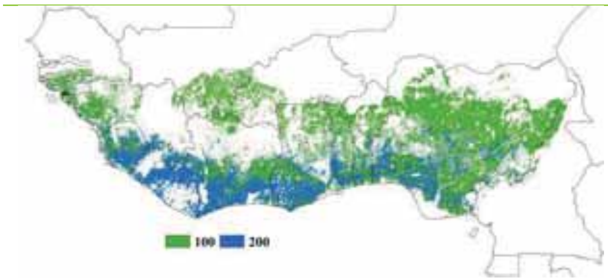
f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum



h. Cropping intensity

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

2.3 North America

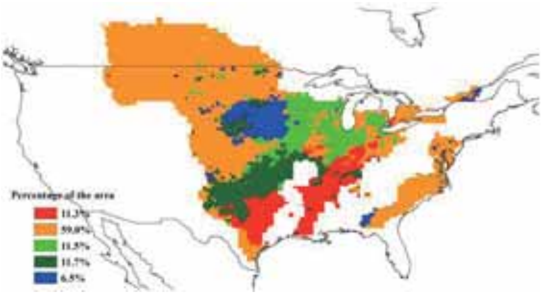
In general, crop condition was average in the North American MPZ during the July to October monitoring period of 2016, which covered flowering, heading, filling and the harvest of summer crops (maize, soybean, paddy, sorghum and spring wheat).

Overall, CropWatch agroclimatic indicators show favorable or normal weather conditions: rainfall was 24% above average, temperature was 0.1°C above average and radiation was average. Biomass shows a 20% positive departure compared to last five years average. However, the fraction of cropped arable land (CALF) was 3% below average and large uncropped arable land areas occurred in the major production zones of Canada and the northern spring wheat zones of the United States. A low CALF rate was paralleled by a 2% drop of cropping intensity and below average VCIx (0.5).

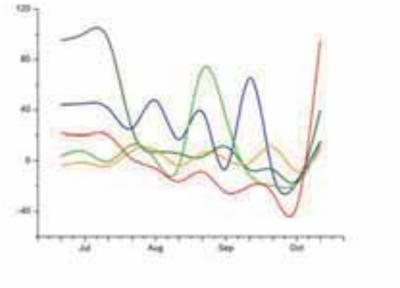
Abundant precipitation fell in the period from mid-August to mid-September in the Corn Belt, including Iowa (+43%), Illinois (+5%), Minnesota (+43%), Nebraska (+88%) and Missouri (+77%), which benefited the growth of maize and soybean in these states. After mid-September, rainfall declined to below average values, which had little influence on crops that had reached maturity and were harvested. In the rice production zones, below average rainfall continued from late-July onwards, and paddy yield decreased due to water deficit at the heading and grain filling stages.

After August, the major crop production zones of Canada recorded average rainfall and above average temperatures. However, this was insufficient to replenish soil moisture after the serious drought that happened during the previous monitoring period. This data is correlated in figure 2.2.

Figure 2.2. North America MPZ: Agroclimatic and agronomic indicators, July-October 2015

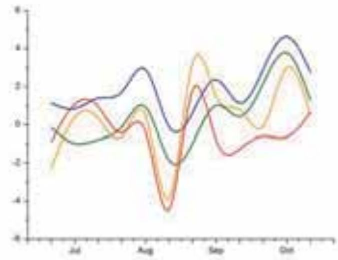


a. Spatial distribution of rainfall profiles

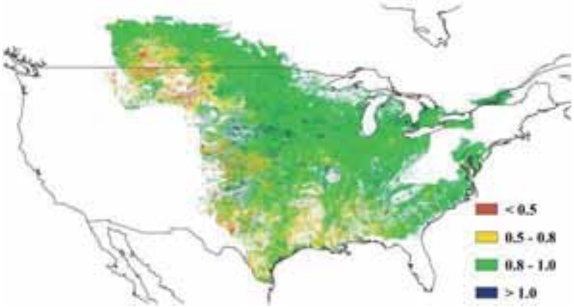


b. Profiles of rainfall departure from average (mm)

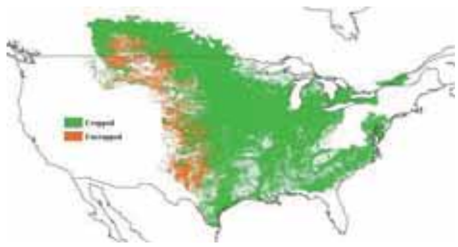
c. Spatial distribution of temperature profiles



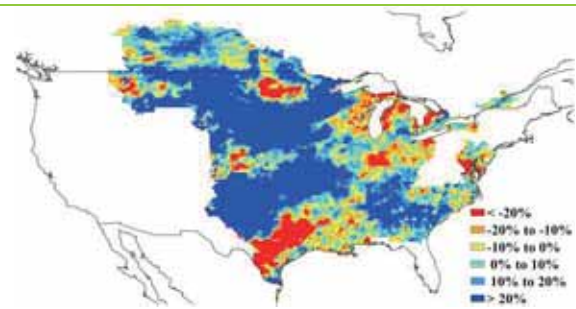
d. Profiles of temperature departure from average (°C)



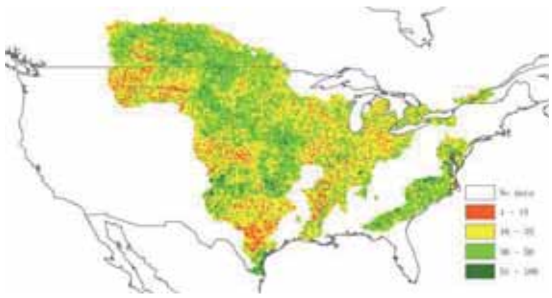
e. Maximum VCI



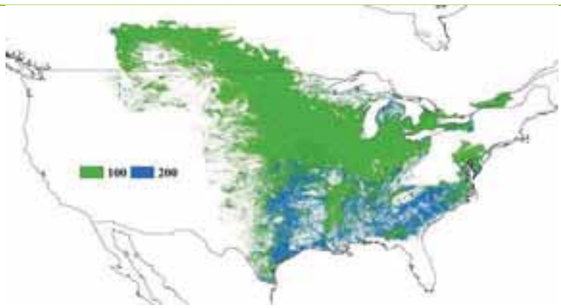
f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum



i. Cropping intensity

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

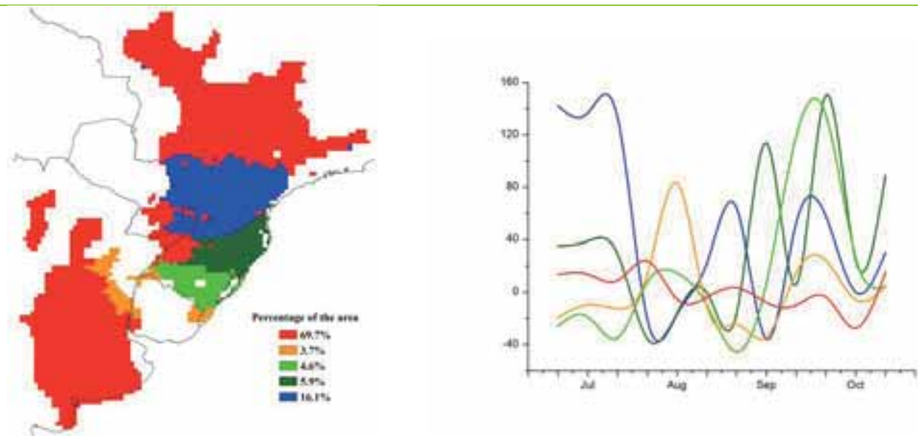
2.4 South America

The condition of crops was slightly above average in the South American MPZ during the monitoring period. The two major crops (maize and soybean) are currently off growing season. Sufficient (46% above average) rainfall above the area provided favorable soil moisture for winter crops (wheat and rapeseed). Warm weather during the winter benefits the emergence and seeding development of winter crops in the region as well. Overall agroclimatic conditions were beneficial to crops as shown by the 19% above average BIOMSS.

However, the spatial distribution of agroclimatic and agronomic indicators observed over July to October (figure 2.3) was inhomogeneous. Even if temperature over the whole MPZ was above average from July to August, temperature clusters indicate that below average temperature dominated the Pampas as well as southern Rio Grande do Sul. In combination with sufficient rainfall in Rio Grande do Sul, Santa Catarina, and Parana, BIOMSS is 20% above average in those regions while the variable is below average for most other regions mainly due to the below average rainfall. The vegetation health index (VHI) map confirms the favorable conditions in Rio Grande do Sul, Santa Catarina, and Parana but indicates water deficit in the Pampas and Sao Paulo. The unfavorable climatic conditions in the Pampas resulted in below average crop condition as confirmed by VCIx values below 0.5.

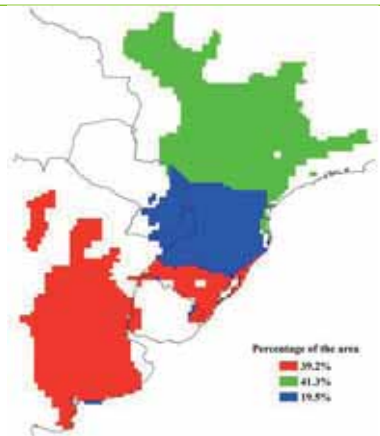
The cropped arable land fraction (CALF) for the MPZ exceeded 95%, which is 8% above the previous five-year average. Most of the uncropped arable land is located in central Cordoba and an area between Bahia Blanca and Santa Rosa. The cropping intensity is 168%, about 1% up compared to the five years average: 68% of the arable land is double cropped. Most of single cropping areas occur in the central Pampas and central Sao Paulo. Compared to the cropping intensity map in 2014, a clear shift of double cropping systems from central Buenos Aires to southern and eastern Buenos Aires is observed. This is strong evidence for the fact that local farmers commonly adopt a rotation in which single cropping of soybean in one year is followed by winter wheat - soybean double cropping in the following year. All of this data is correlated in figure 2.3.

Figure 2.3. South America MPZ: Agroclimatic and agronomic indicators, July-October 2015

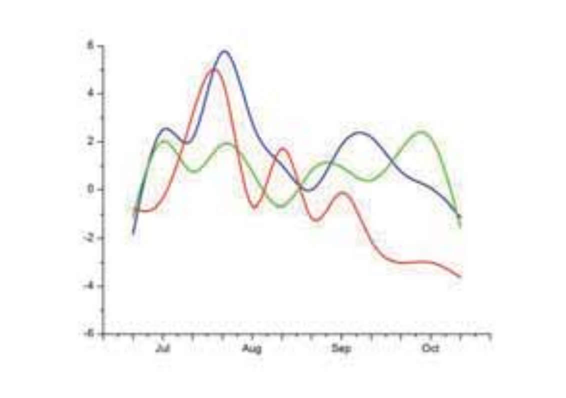


a. Spatial distribution of rainfall profiles

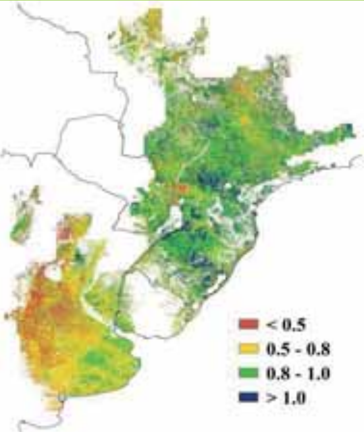
b. Profiles of rainfall departure from average (mm)



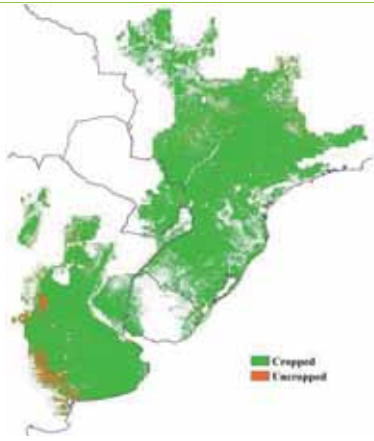
c. Spatial distribution of temperature profiles



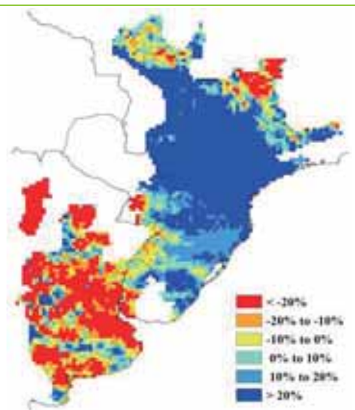
d. Profiles of temperature departure from average (°C)



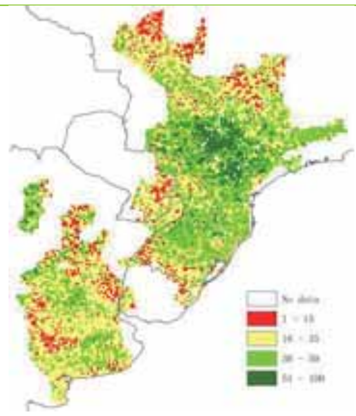
e. Maximum VCI



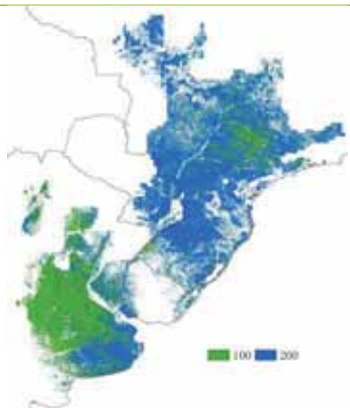
f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum



i. Cropping intensity

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

2.5 South and Southeast Asia

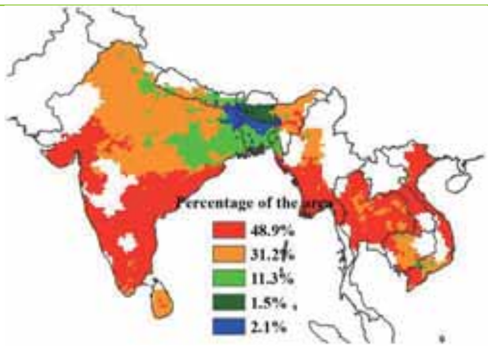
The reporting period covers the growing and harvesting of the main wet season crops in the South and Southeast Asia MPZ. The MPZ experienced 3% above average rainfall (RAIN), but was nevertheless below average in India (-2%), Thailand (-10%), Vietnam (-10%) and Myanmar (-8%). According to the rainfall profiles the MPZ received below average rainfall during mid August and mid September while it received above average rainfall during early September and throughout October, as can be seen in figure 2.4. The temperature (TEMP) was average; the profiles show that below average temperatures were recorded in the Indian states of Orissa, West Bengal, Assam and Jharkhand as well as in Bangladesh during the period of early September and October.

The maximum VCI values range from 0.8 to 1 indicating good crop condition. However, VCIx ranged from 0.5 to 0.8 in southern and northern India, as well as in central Myanmar and Cambodia pointing at average crop condition here.

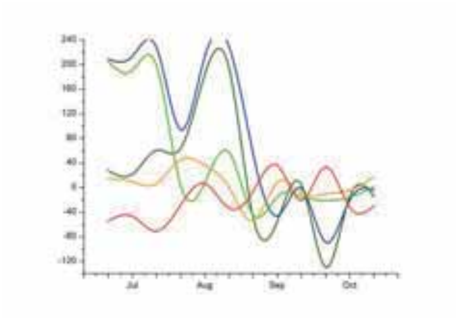
The fraction of cropped arable land was 84%. The uncropped lands were mostly distributed in central Myanmar and Indian states of Punjab, Gujarat, Andhra Pradesh, Maharashtra and Karnataka. The average biomass accumulation potential (BIOMSS) decreased 12% compared to the previous five-years average, resulting from low values in India (-12%), Thailand (-9%), Myanmar (-4%) and Vietnam (-3%).

In more details, up to 20% negative biomass accumulation was observed in southern and western India as well as in northern Thailand and Vietnam. The lower VHIn values mostly concentrated in central India and some scattered low rainfall areas. Altogether, the crop condition is average in this MPZ and does not raise major concerns. Figure 2.4 presents an overview of CropWatch agroclimatic and agronomic indicators.

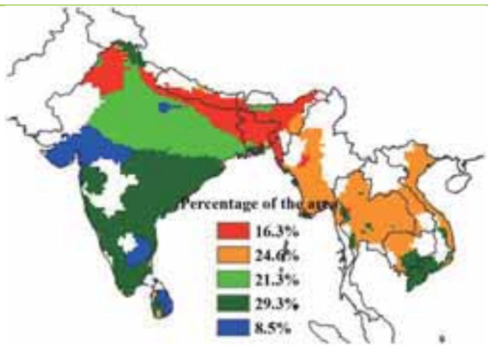
Figure 2.4. South and Southeast Asia MPZ: Agroclimatic and agronomic indicators, July-October 2015



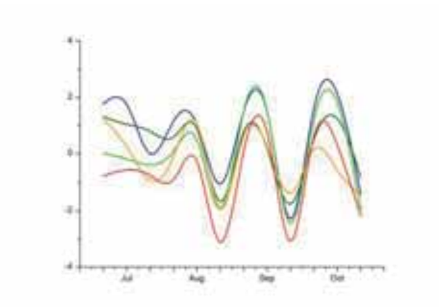
a. Spatial distribution of rainfall profiles



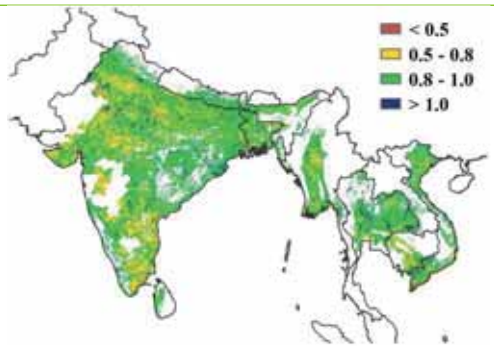
b. Profiles of rainfall departure from average (mm)



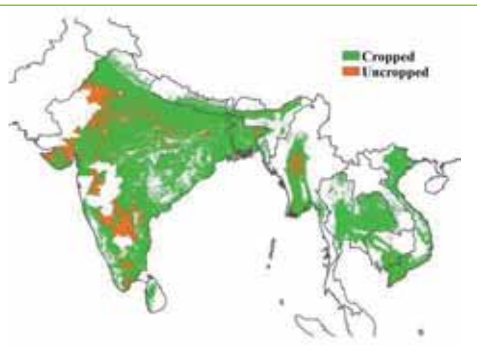
c. Spatial distribution of temperature profiles



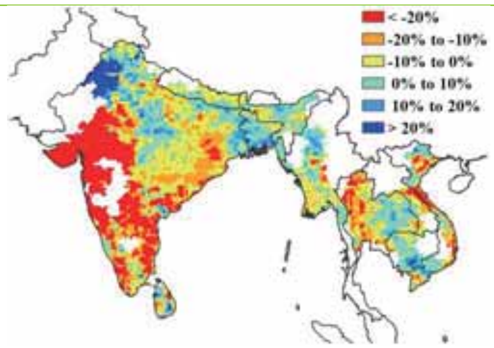
d. Profiles of temperature departure from average (°C)



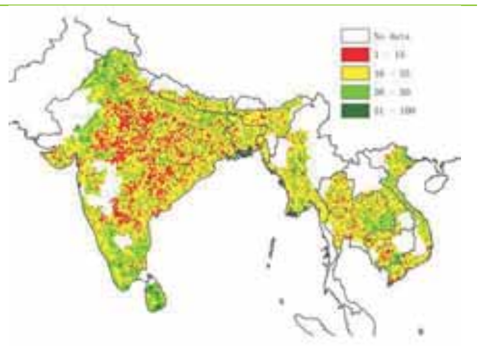
e. Maximum VCI



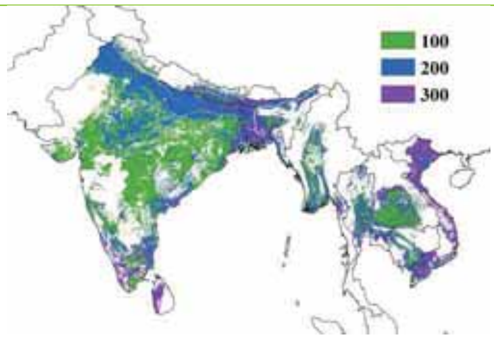
f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum



i. Cropping intensity

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

2.6 Western Europe

Overall, when integrating the findings of the various agroclimatic and agronomic indicators, crop condition was below average in most parts of Western Europe during this reporting period. Figure 2.5 represents an overview of CropWatch agroclimatic and agronomic indicators for this MPZ.

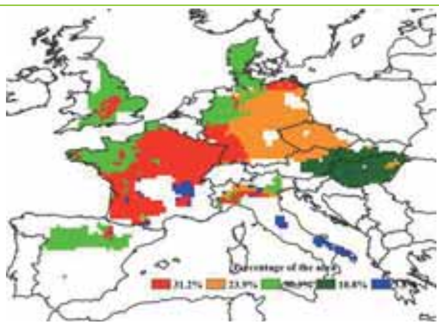
Total precipitation was 15% below the recent average, with exceptional positive departures over most of France and the southwest and the north of Germany from late August to early September, the south-east of France and the east as well as the centre of Italy from late August to October, and in most parts of Hungary after mid September. Temperature showed a decrease of 0.3°C compared to average and radiation was about average. The below average climatic conditions were not beneficial for late crop development and maturation.

Due to the rainfall deficit, the biomass accumulation potential, BIOMSS, was 13% below the recent five-year average. The spatial distribution of BIOMSS shows that the lowest values (-20% and below) occur over most of France, Spain, Germany, Czechia, northern Italy, northwest Austria as well as southern and eastern Germany. The values for minimum VHI confirm the water deficit in those regions over the last four months. In contrast, BIOMSS in most other regions was 10% above average.

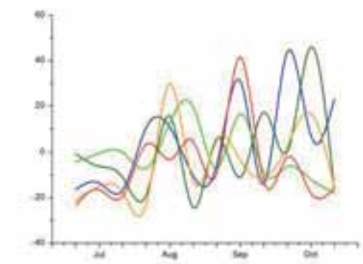
Cropping intensity (125%) was down 2% compared with the five-year-average and 91% of the arable land was cropped between July and October 2014, 1 percentage point lower than the recent five-year average; most uncropped arable land was concentrated in Spain throughout this reporting period. Accordingly, maximum VCI in Spain was lower as well, compared with other regions in the MPZ. Average VCIx for the MPZ was 0.76.

Generally, crop condition in Western Europe was below average. Pixels with low minimum VHI (below 15) are found scattered over most of France, Spain, southern Germany, Czechia and northern Italy. Figure 2.5 presents an overview of CropWatch agroclimatic and agronomic indicators.

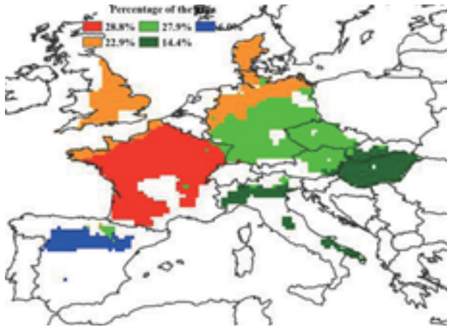
Figure 2.5. Western Europe MPZ: Agroclimatic and agronomic indicators, July-October 2015



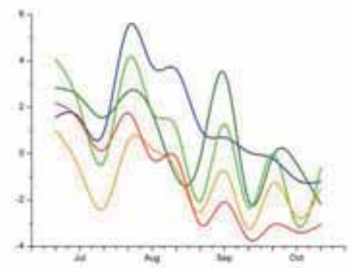
a. Spatial distribution of rainfall profiles



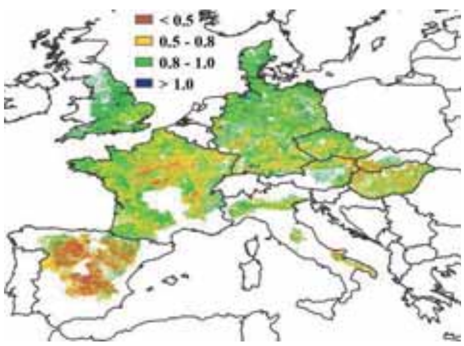
b. Profiles of rainfall departure from average (mm)



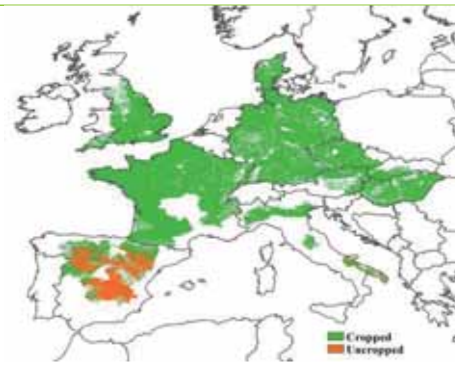
c. Spatial distribution of temperature profiles



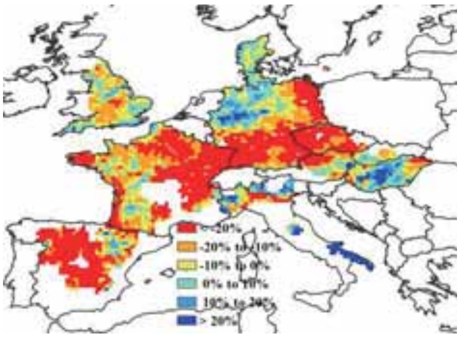
d. Profiles of temperature departure from average (°C)



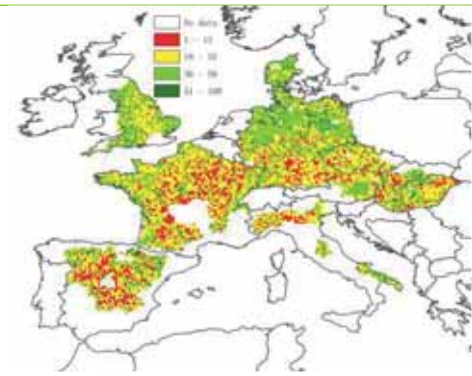
e. Maximum VCI



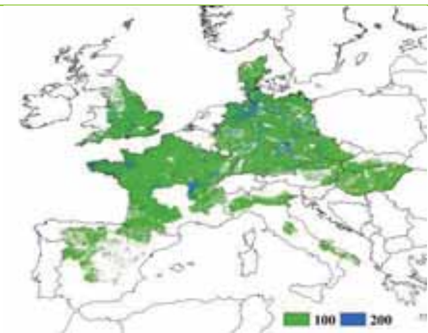
f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum



i. Cropping intensity

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

2.7 Central Europe to Western Russia

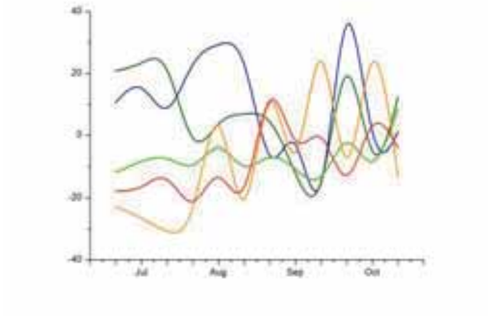
During the current monitoring period, the sowing of winter crops was completed in the Central Europe to Western Russia MPZ under generally unfavorable weather conditions. In this MPZ it was drier and colder than usual, with a 29% decrease in rainfall and a 0.6°C drop of temperature, although PAR displayed an increase of 3%.

As indicated by the rainfall profiles, the western part of the MPZ (including Romania, Belarus, Poland and western Ukraine) showed a significant rainfall deficit in July and August while a diffuse peak occurred in Kirovskaya Oblast, Komi-permyatskiy Okrug and Permskaya Oblast in Russia in mid-August and early October. Temperatures in Romania, Poland, Ukraine, Belarus, and western Russia decreased from west to east, with lowest temperatures in Russia and eastern Ukraine. The scarce rainfall led to a significant drop in potential biomass for the whole MPZ (-20% compared to the five-year average). On the distribution map of the potential biomass, a large positive biomass departure would be expected only for the central and western part of the MPZ.

Accordingly, the VHI-based drought map shows the worst moisture condition to be in the Southern parts of Western Russia and eastern Romania compared to the previous monitoring period, which is confirmed by the Maximum VCI distribution map. 92% of the arable land was cropped from July to August 2015, at the same level as the five-year average. Generally, crop condition of the Central Europe to Western Russia MPZ was unfavorable throughout this monitoring period. Figure 2.6 shows the agroclimatic and agronomic indicators for this reporting period.

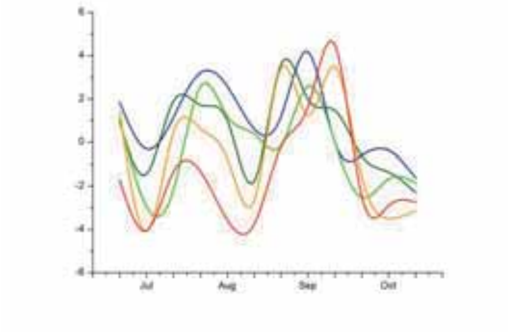
Figure 2.6. Central Europe-Western Russia MPZ: Agroclimatic and agronomic indicators, July-October 2015

a. Spatial distribution of rainfall profiles

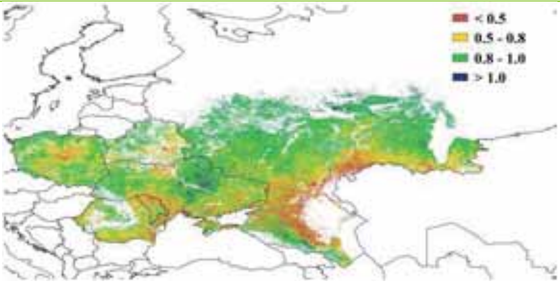


b. Profiles of rainfall departure from average (mm)

c. Spatial distribution of temperature profiles

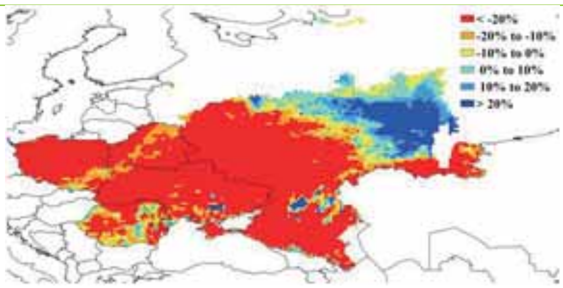


d. Profiles of temperature departure from average (°C)

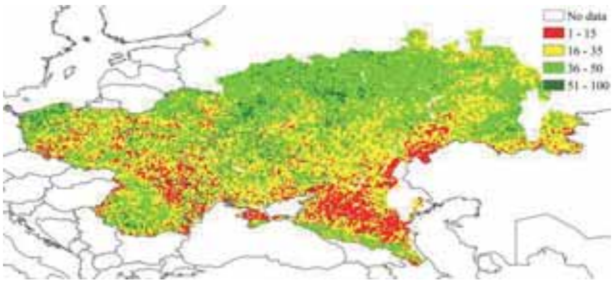


e. Maximum VCI

f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

i. Cropping intensity

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

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 other 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 2015 production estimates for Argentina, Brazil, Canada, and the United States.

3.1 Overview

Section 1.1 of this bulletin stressed that the global patterns of the CropWatch agroclimatic indicators (CWAIs: RAIN, TEMP and RADPAR) anomalies identify well-delimited zones but that the zones mostly do not coincide with, or only imperfectly overlap for, different indicators. This is apparent in figures 3.1 to 3.4.

Figure 3.1. Global map of rainfall (RAIN) by country and sub-national areas, departure from 14YA (percentage), July-October 2015

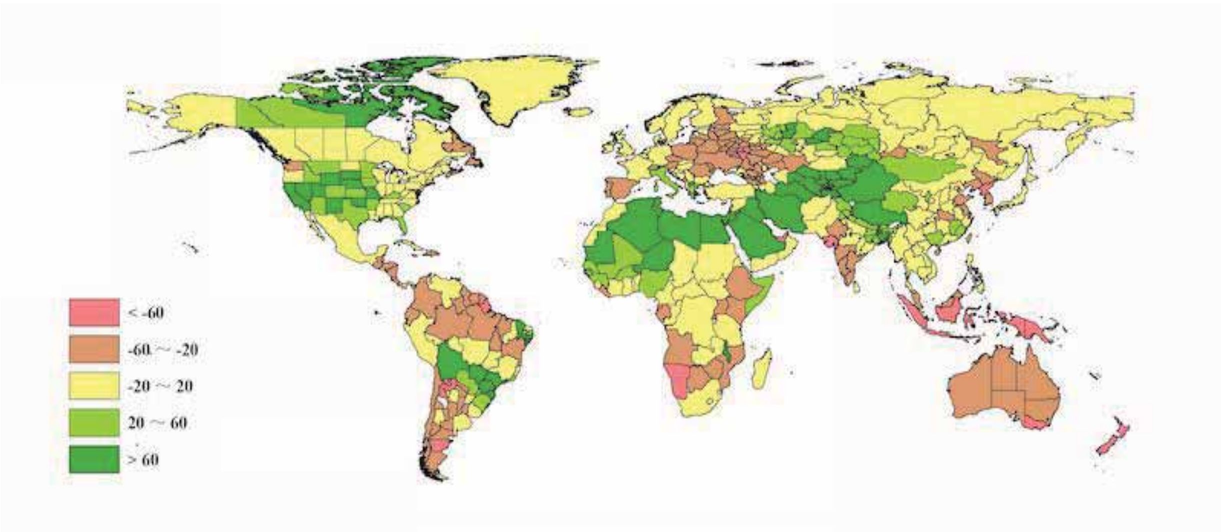


Figure 3.2. Global map of temperature (TEMP) by country and sub-national areas, departure from 14YA (degrees), July-October 2015

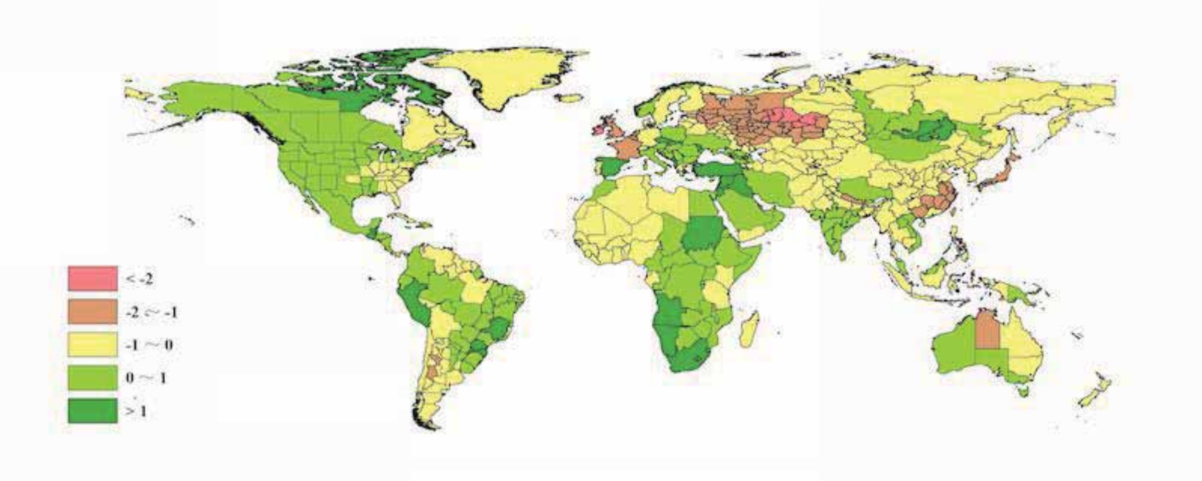


Figure 3.3. Global map of PAR (RADPAR) by country and sub-national areas, departure from 14YA (percentage), July-October 2015

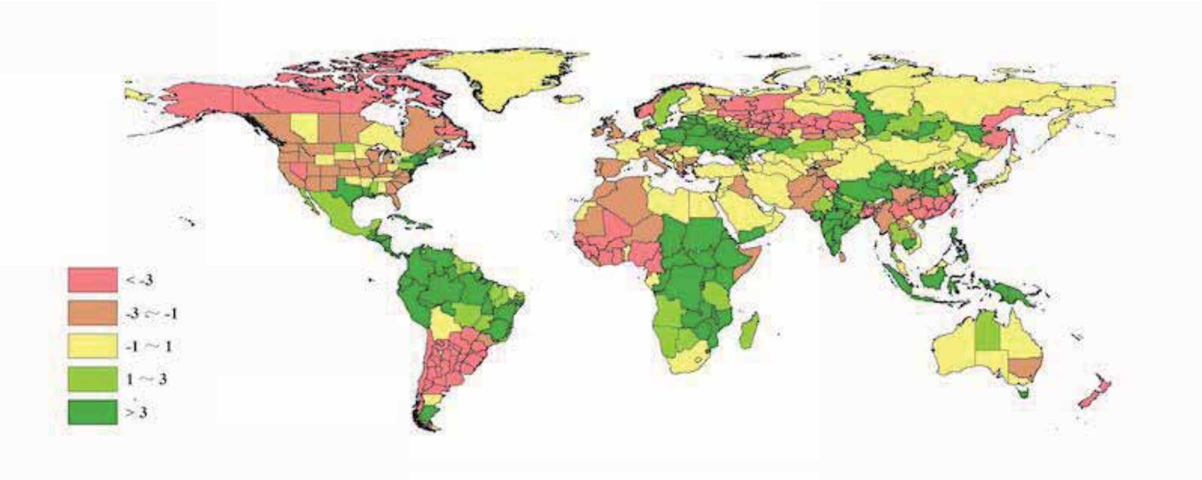
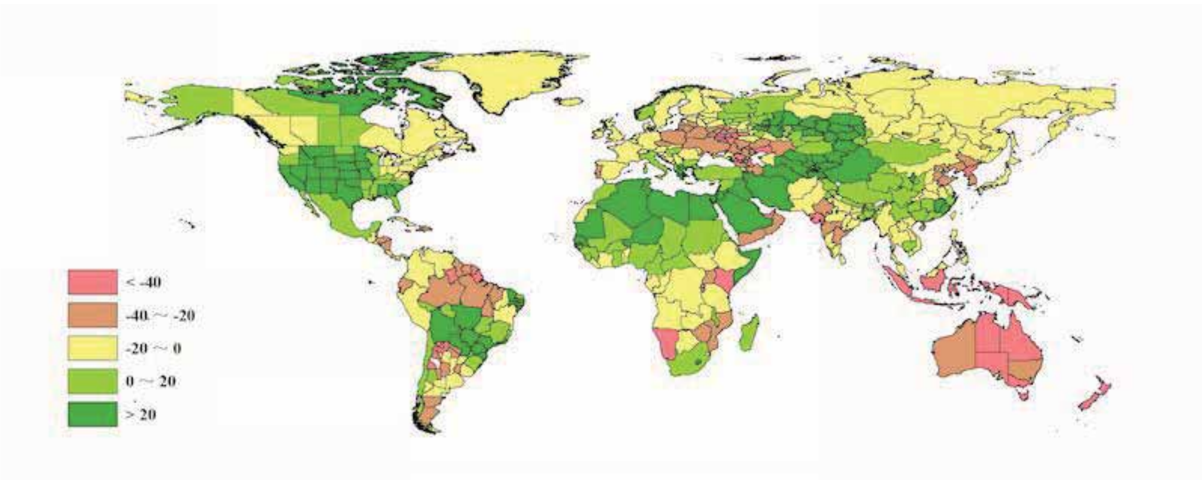


Figure 3.4. Global map of biomass (BIOMSS) by country and sub-national areas, departure from 14YA (percentage), July-October 2015



It has also been noted that the global variations of RAIN are largely compatible with well-known El Niño effects. Table 3.1 below parallels table 1.1 in section 1.1 and lists the twenty most extreme low and high national rainfall departures.

Table 3.1. CropWatch indicators and the anomalies in RAIN (%), TEMP (°C) and RADPAR (%) among some countries sorted by the largest rainfall anomalies

Country	RAIN (mm)	RAIN (%)	TEMP (°C)	RADPAR (%)
Sao Tome Principe (STP)	23	-82	-0.5	0
New Caledonia (NCL)	28	-81	-0.9	1
French Guiana (GUF)	70	-81	-0.5	0
Papua New Guinea (PNG)	118	-80	0.1	11
New Zealand (NZL)	86	-73	-0.4	-4
Samoa (WSM)	111	-71	0	0
Indonesia (IDN)	263	-67	-0.1	11
Korea DPR (PRK)	242	-64	-0.5	3
Portugal (PRT)	79	-59	-0.1	-2
Kenya (KEN)	130	-51	0.0	7
Ukraine (UKR)	116	-49	0.1	7
Ecuador (ECU)	195	-48	0.6	10
Jamaica (JAM)	471	-48	-0.2	7
Korea REP (KOR)	459	-48	-0.5	9
Mauritania (MRT)	706	78	-0.4	-2
Tunisia (TUN)	223	94	-0.8	0
Tajikistan (TJK)	104	146	-0.2	-2
Bolivia (BOL)	516	149	-0.1	-1
Uzbekistan (UZB)	77	156	-0.5	-1
Iraq (IRQ)	112	239	2.0	-1

Some extremely severe departures of rainfall occurred in East Asia, Southeast Asia and in Oceania (NCL, -81%; NZL, -73%, WSM, -71%; PRK, -64%), in Africa (STP, -82%; Kenya, -51%), in Europe (western Mediterranean: PRT, -59%; Ukraine -49%), Latin America and the Caribbean islands (GUF, -81%; ECU and JAM, -48%). The listed countries are part of broader clusters of varying sizes that are clearly visible in figure 3.1.

Some of these countries combine to cover limited areas (such as Portugal, Spain and adjacent Morocco) while others, centered around the south of western Russia and Ukraine, encompass large areas stretching from Switzerland to Karelia (north-west Russia) to the north of the Caspian (Kazakhstan), including the Caucasus, the northern Black Sea and Romania.

Deficit areas also include (1) much of the Southern Cone (Cono Sul) of Latin America (but fortunately avoids many important production areas and includes mostly rangelands and mountainous areas where little is produced) and (2) north-east India (Gujarat, -75%; Rajastan, -27%) and much of peninsular India, south of and including the states Maharashtra (-38%) and Andhra Pradesh (-20%).

Very favourable rainfall conditions (sometimes leading to floods, as in Burkina Faso as mentioned in section 2.2 on the West Africa MPZ and section 5.2 on disasters) occurred over much of north Africa and especially an immense area west and north of the Sahara (MRT, +78%, TUN, +94%), stretching into central Asia (TJK, +146%; UZB, +156%) via the Middle East (IRQ, +139%). This data is represented in figure 3.1. Countries in the area are very different stages of their crop calendar: in western Africa, from July to September (rarely October) the cereals (millet, sorghum) and ground nuts are in late vegetative to harvesting stages; north Africa, the Middle East and Central Asia approach winter cereal planting time at this time. In both cases, the abundant rainfall, beyond the beneficial and sometimes unexpected (surprisingly favourable considering the season) effect on rangelands and crops, has also created favourable conditions for winter crops by replenishing soil moisture reserves. Also part of the large area is north-east India (Bihar, West Bengal, Assam), Bangladesh and Nepal where excessive (abundant and intense) rainfall associated with Indian Ocean cyclones (for more information on cyclone Komen refer to section 5.2) has led to a lot of suffering and crop loss.

Among the thirty major producers listed by CropWatch in the current chapter, the countries with the most favourable rainfall conditions between July and October 2015 include the United States (+22%), Brazil (+24%), Kazakhstan (+47%), Iran (+73%) and Uzbekistan (+156%), as mentioned above. Particularly the semi-arid countries will benefit from abundant soil moisture for their winter crops. Table 3.2 shows the CropWatch agroclimatic and agronomic indicators for July to October 2015, including their departures from the five-year average and the average for countries monitored by CropWatch.

Table 3.2. CropWatch agroclimatic and agronomic indicators for July-October 2015, departure from 5YA and 14YA

Country	Agroclimatic Indicators				Agronomic Indicators		
	Departure from 14YA (2001-2014)				Departure from 5YA (2010-2014)		Current
	RAIN (%)	TEMP (°C)	RADPAR (%)	BIOMSS (%)	CALF (%)	Cropping Intensity (%)	Maximum VCI
Argentina	-13	-0.3	-9	-19	11	-4	0.65
Australia	-45	0.1	-1	-40	8	-4	0.80
Bangladesh	72	-0.7	-8	8	0	1	0.85
Brazil	24	0.6	2	14	10	4	0.77
Cambodia	0	-0.1	3	2	1	3	0.83
Canada	-6	0.4	-1	1	-4	1	0.88
China	1	-0.7	-3	0	0	0	0.87
Egypt	159	0.2	0	62	0	0	0.85
Ethiopia	-20	0.9	6	-17	-4	-4	0.86
France	-18	-1.2	1	-16	0	-4	0.76
Germany	-17	-0.1	1	-15	0	0	0.81
India	-2	0.0	5	-19	-5	4	0.83
Indonesia	-67	-0.1	11	-59	0	-2	0.86
Iran	73	0.2	-1	66	-8	3	0.57
Kazakhstan	47	-0.9	0	34	36	0	0.73
Mexico	-17	0.1	3	0	4	7	0.84
Myanmar	-8	-0.3	-1	-4	-1	3	0.88
Nigeria	21	-0.2	-3	7	-5	0	0.82
Pakistan	10	-1.0	-1	-8	-3	-5	0.76
Philippines	2	-0.1	4	-11	0	0	0.89
Poland	-39	0.3	7	-34	0	1	0.78
Romania	-27	0.8	0	-9	-2	-1	0.72
Russia	-5	-0.8	0	1	1	-1	0.82
S. Africa	-15	1.1	0	7	-16	0	0.64
Thailand	-10	-0.2	2	-9	0	-5	0.91
Turkey	13	1.2	0	4	8	1	0.83
United Kingdom	-5	-1.7	-3	-7	0	5	0.88
Ukraine	-49	0.1	7	-38	0	-1	0.78
United States	22	0.1	-1	20	1	-3	0.84
Uzbekistan	156	-0.5	-1	105	9	0	0.81
Vietnam	-10	0.1	0	-3	0	4	0.88

Note: Departures are expressed in relative terms (percentage) for all variables, except for temperature, for which absolute departure in degrees Celsius is given. Zero means no change from the average value; Relative departures are calculated as (C-R)/R*100, with C=current value and R=reference value, which is the five-year (5YA) or fourteen-year average (14YA) for the same period (July-October).

Altogether the rainfall during the reporting period was unfavourable: the (unweighed) average of RAIN departures over the countries and sub-countries monitored by CropWatch is -20%. It is important to remind readers that CWAIs are computed only for agricultural areas, even if their spatial representation in all the figures of this bulletin follow MRUs (Chapter 1) and political boundaries (Chapter 3). As already noted in Chapter 1, there is a weak negative correlation between RADPAR and RAIN departures from the average, which results in the generally below average RAIN being paralleled by generally above average RADPAR (+3%). This is, somehow, visible in table 3.2 where positive RADPAR departures tend to associate with negative RAIN and vice versa.

The lowest RADPAR departures (figure 3.3) are those of the Southern Cone, the countries in the Gulf of Guinea, Mali, central to north-western Russia (between and including the oblasts of Arkhangelsk and Vologda in the west and Tomsk and Novosibirsk in the east) and south and east China (Yunnan to Zhejiang).

In terms of TEMP, the average departure is just 0.1°C. As very clearly shown in figure 3.2, very large areas of the globe recorded average or above average temperatures, well in line with global warming projections scenarios. During the reporting period, areas with below average temperatures were mostly concentrated in north-western Europe (Benelux, France, Great Britain and especially Ireland with a -2.0°C departure), western Russia (Oblasts of Kurgan, Perm, Sverdlovsk and Tyumen, the Udmurt Republic and the Komi-Permyak Okrug, with departures between -2.1°C and -2.3°C) and eastern Asia (Japan, -1.0°C and Guangxi to Anhui in eastern China, -1.1°C to -1.6°C).

Finally, being based on Lieth's Miami model, the biomass production potential (figure 3.4) is affected by both precipitation and temperature. High positive departures affect the semi-arid regions around the Sahara to Central Asia (Tajikistan, +83% and Uzbekistan, +105%), as mentioned, much of North America and the major agricultural areas in southern Brazil. The most negative departures occur in Southeast Asia (Timor Leste, -94% and Indonesia, -59%), Oceania (New Zealand, -59%), Korea DPR (-43%) and the area from Kazakhstan to Poland (Oblasts of Belgorod, -69%; Voronezh, -63%; Kursk, -60% and Atyrau in Kazakhstan, -44%). In Africa, the least favourable areas include mostly pastoral Namibia (-58%) and Kenya (-43%).

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 April-July 2015 period to the previous season and the five-year average (5YA) and maximum. (b) Maximum VCI (over arable land mask) for July 1 – October 31 2015 by pixel; (c) Spatial NDVI patterns up to July 2015 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.10, and Annex B, tables B.1-B.4, for additional information about indicator values and production estimates by country. Country agricultural profiles are posted on www.cropwatch.com.cn.

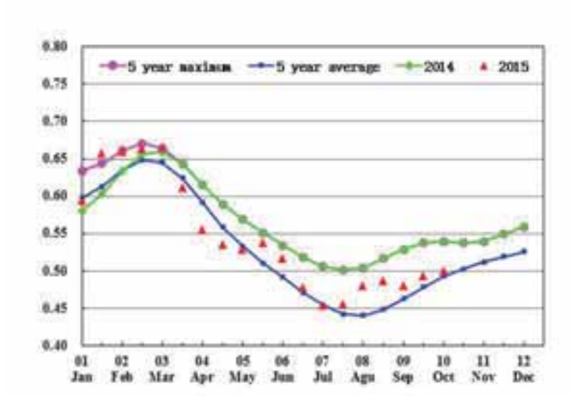
Figures 3.5-3.34. Crop condition for individual countries ([ARG] Argentina- [ZAF] South Africa) for April-July 2015

[ARG] Argentina

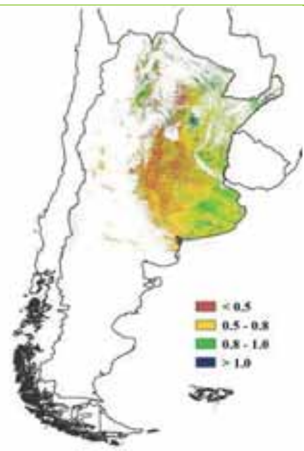
In general conditions for crops from July to October were average in Argentina. Maize and soybean are currently off-season, while wheat was heading to the grain-filling stage at the end of October. Agroclimatic conditions were unfavourable, confirmed by insufficient rainfall and low radiation (RAIN, 13% below average, RADPAR -9%, 19% below average BIOMSS). Similar patterns were found in most provinces except Misiones which saw almost one third above normal rainfall (See Annex A, table A.3). Lack of rainfall is problematic for the planting and emergence of maize and soybean in the coming months. Fortunately key winter wheat producing Buenos Aires did not suffer from water deficit. Agronomic indicators also showed average conditions.

According to the NDVI-based crop development profile, crop condition was slightly above average but well below the same period last year. As shown in NDVI departure from 5-YA clustering and the corresponding profiles, crop condition was above average in southern and eastern Buenos Aires. In contrast, NDVI was well below average in regions between Bahia Blanca and Santa Rosa (see section 2.4 and figure 2.3). VCIx was high in central Buenos Aires where wheat was at the peak of the growing season when other regions' had just ended. In spite of unfavorable meteorological conditions, CALF was 11% above average. Cropping intensity was 4% below average due to persistently high temperature from March to April (May and August bulletins).

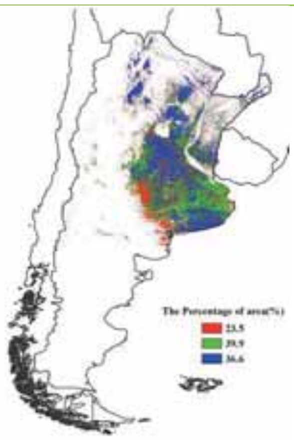
Figure 3.5. Argentina crop condition, July-October 2015



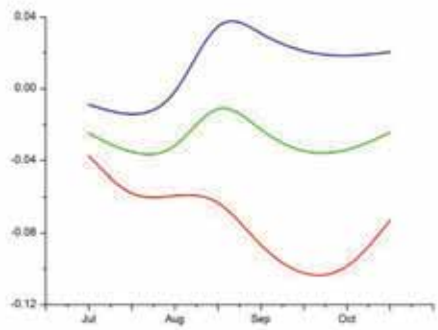
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



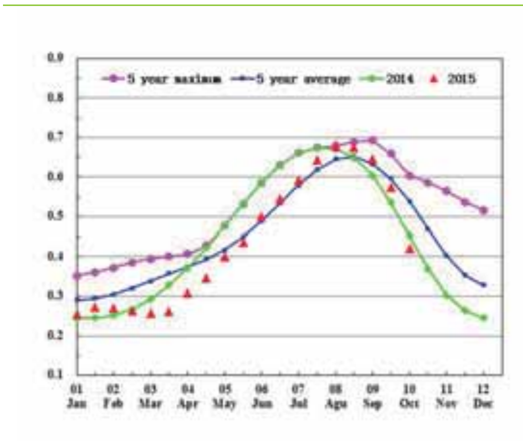
(d) NDVI profiles

[AUS] Australia

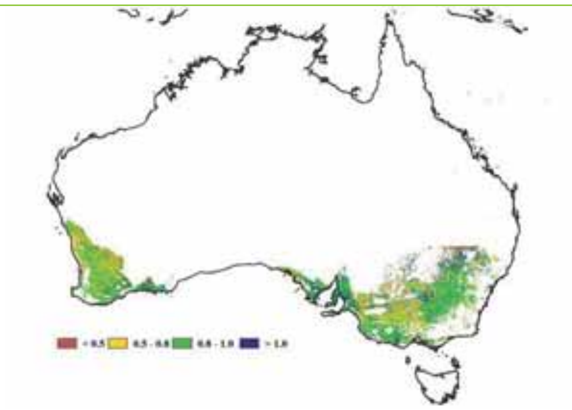
Compared to the last five-year average, the crop condition in Australia shows an overall average level during this monitoring period, which was the main growing season for winter wheat and barley. The spatial NDVI patterns shows that in south-eastern New South Wales, southern south Australia and part of south-western western Australia (32.7% of the arable land), winter wheat and barley conditions were above average from the middle of July to October, while in northern Victoria and part of south-western western Australia (25.9% of the arable land), conditions were well below average throughout the reporting period. The crop condition remained close to average in the southeast of south Australia, south-western Victoria, east of the border area between New South Wales and Victoria and part of south-western western Australia (41.4% of the arable land),

The analysis result is consistent with the situation of the crop condition development graph based on the NDVI, which show that winter wheat and barley, on the whole, grew well in July, attaining the five-year maximum at the end of July and staying close to average in August and September, but deteriorated below average in the harvest season of October. This is possibly due to the negative impact of El Niño that resulted in a 45% decrease of precipitation in the country. Although CALF has increased by 8%, compared to the five-year average, CropWatch estimates that the production of winter wheat and barley in Australia increased by 1% only. (Also see table B.2 in Chapter 5.2.)

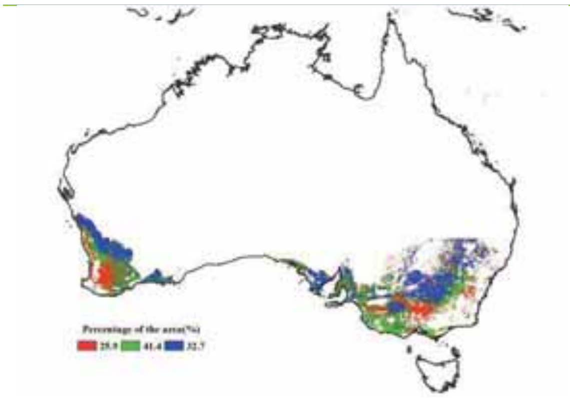
Figure 3.6. Australia crop condition, July-October 2015



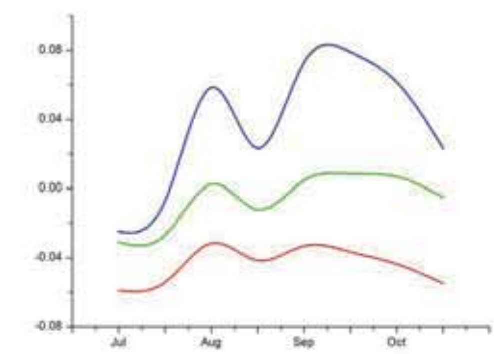
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



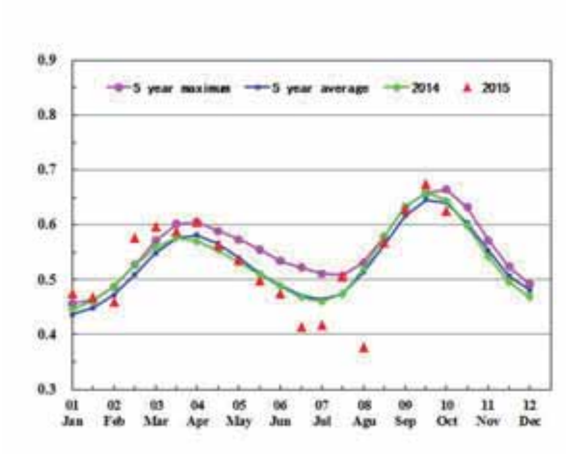
(d) NDVI profiles

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

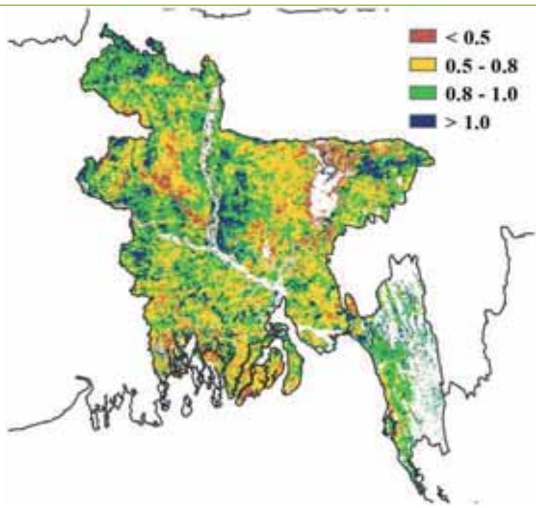
[BGD] Bangladesh

Bangladesh experienced good crop conditions during this monitoring period as a result of excess rainfall (RAIN, +72%) during the growing season, even if floods harmed the standing crops in selected localized areas. Even though the temperature (TEMP) was average and photosynthetically active radiation (RADPAR) was low (-8%) the biomass accumulation potential (BIOMSS) rose to 8% over the recent 5-year average. The cropped arable land fraction (CALF) remained unchanged. The crop condition development graphs (national NDVI curves) show a situation comparable to the previous five-year average. The NDVI values increased from early August to October for the whole country. The maximum VCI ranged from 0.5 to 1, indicating average crop condition except some scattered areas in Sylhet, Dhaka and Rajshahi where the maximum VCI recorded was below 0.5, indicating poor crop condition. Altogether, CropWatch assesses the overall crop condition is average.

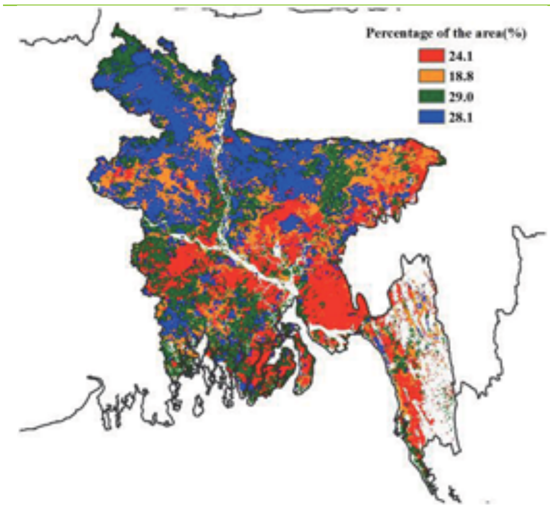
Figure 3.7. Bangladesh crop condition, July-October 2015



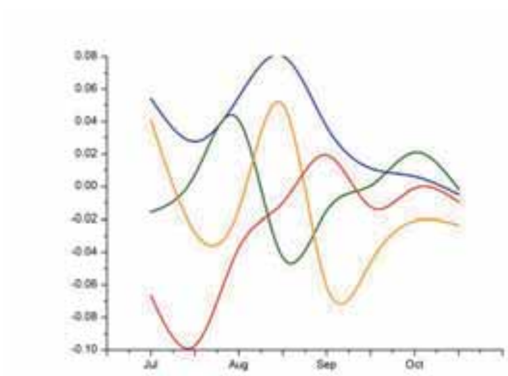
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



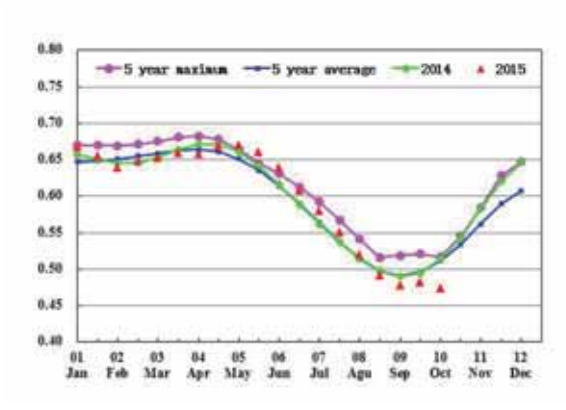
(d) NDVI profiles

[BRA] Brazil

Crop condition was, in general, above average in Brazil during the reporting period. Winter wheat has reached maturity and harvesting will be concluded by the end of the year. The sowing of soybean started at the end of October. In most of central-south Brazil, rice and maize are also at planting stage. In southern Brazil winter wheat benefited from favorable agroclimatic conditions from heading to maturity stage. Rainfall was 325 mm from July to October (24% above average), providing sufficient rainfall for wheat grain-filling and good soil moisture for soybean and maize. Warms temperature and average radiation was also beneficial for winter wheat. However, the continuous rainfall was unfavorable for the harvesting and drying of wheat after maturity especially in Mato Grosso do Sul, Parana, and Sao Paulo where rainfall was double the average. Heavy rainfall also hampered the sowing of maize and soybean. According to Safras and Mercado, soybean planting progress reached 56% by November 13 against the historical average of 68%.

Spatial patterns and NDVI departure profiles compared to the five-year average indicate the above average conditions in southern Brazil except for north-western Rio Grande do Sul. Comparing the peak NDVI to the recent five years, the crop condition in central Parana and eastern Rio Grande do Sul exceeded five year's maximum. Cropped arable land fraction at national scale is estimated at 92%, 10 percentage point above average. Cropping intensity for 2015 is 183% (or 4% above the previous five years average). Winter wheat production is revised at 6.9 million tons using the most updated data, about 3% above previous forecast. Table B.3 in Annex B presents the estimated production outputs for 2015.

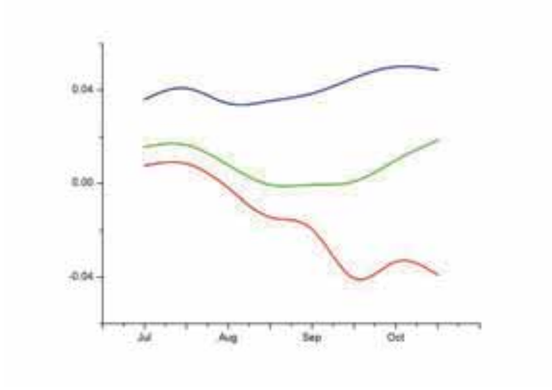
Figure 3.8. Brazil crop condition, July-October 2015



(a) Crop condition development graph based on NDVI

(b) Maximum VCI

(c) Spatial NDVI patterns compared to 5YA



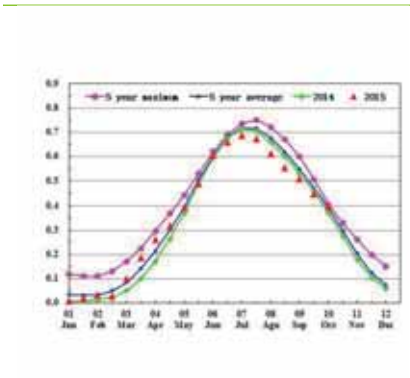
(d) NDVI profiles

[CAN] Canada

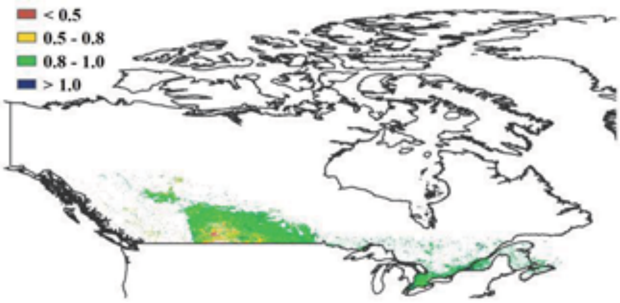
According to CropWatch indicators the condition of crops was below average during this monitoring period. The drought in Canada, especially in Alberta and Manitoba during the previous quarter did not improve much, with the current period recording a negative rainfall departure (6% below average) with temperature slightly higher than normal (+0.4°C), and a 1% increase in radiation.

For the major crop agricultural provinces in Canada, water deficit continued in Alberta with a negative rainfall departure (-9%) that resulted in a -8% drop in biomass production potential. In Manitoba, rainfall was above average (+14%) but still insufficient to compensate the water deficit of the last monitoring period. In other major provinces of Canada, rainfall was average with a 1% positive departure. The three provinces that produce 80% of Canada's output suffered poor weather and as a result lower crop production is forecast. The unfavorable conditions are confirmed by the NDVI development profile that remained below average after June as well as the NDVI clusters and profile which show that crop condition gradually worsened after mid-July. Due to continuous water deficit, the fraction of cropped arable land decreased by 4% compared to last 5 years average. Overall, CropWatch forecasts below average output in Canada this season.

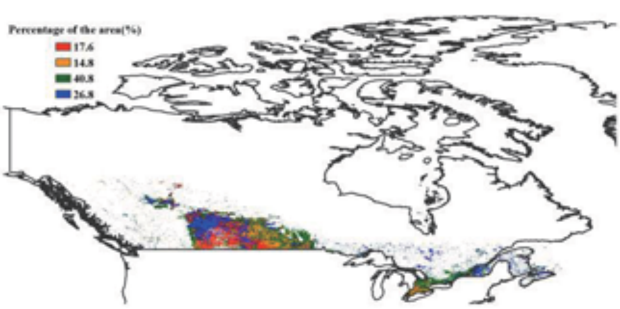
Figure 3.9. Canada crop condition, July-October 2015



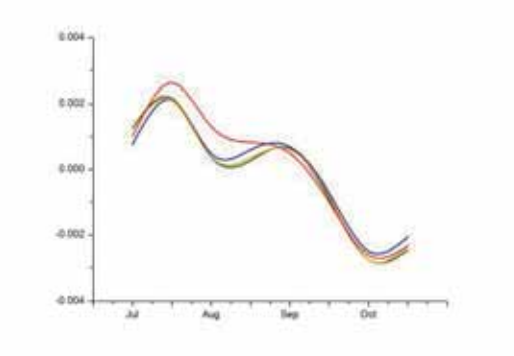
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

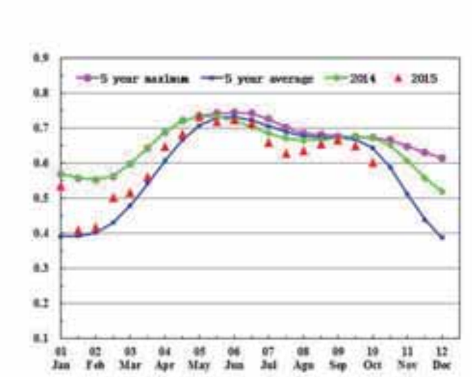
[DEU] Germany

The crops in Germany showed below average condition during the reporting period from July to October. The country's spatial NDVI patterns indicate a situation that on the whole is less favourable than the five-year average, except for limited patches in the central-east and northern Germany (Saxony, Lower Saxony, Sachsen-Anhalt and Mecklenburg-Vorpommern).

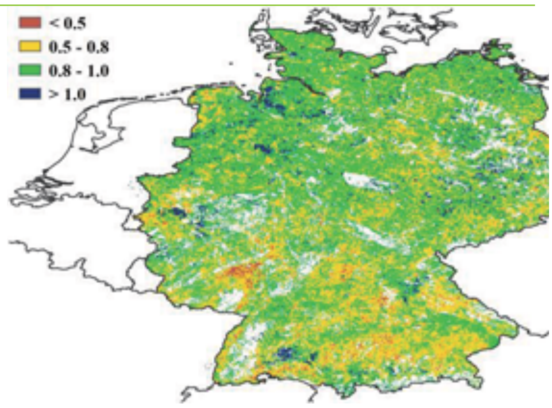
This spatial pattern is also reflected by the maximum VCI in Lower Saxony and Sachsen-Anhalt, with a VCIx over 0.8. According to the crop condition map based on NDVI, Germany suffered dry conditions compared with the five-year average throughout the reporting period.

The CropWatch RAIN indicator decreased by 17%, with TEMP around average (-0.1°C). Although RADPAR increased by 12% compared with the previous average, BIOMSS decreased by 15%. Due to normal temperatures but less rainfall, the agronomic indicators show poor condition for most summer crop areas of Germany except the north-east.

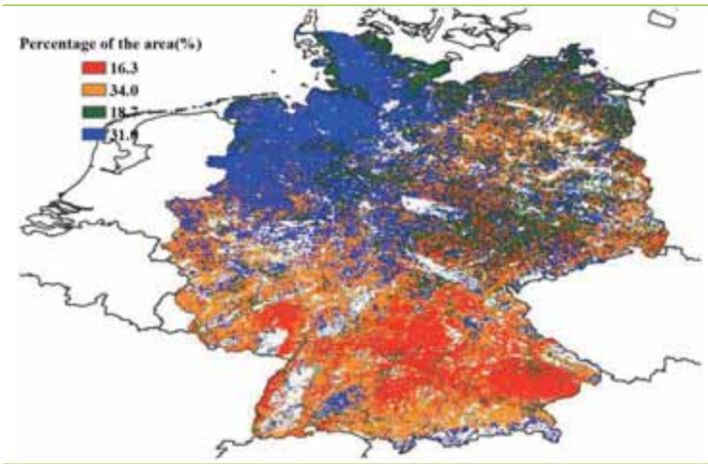
Figure 3.10. Germany crop condition, July-October 2015



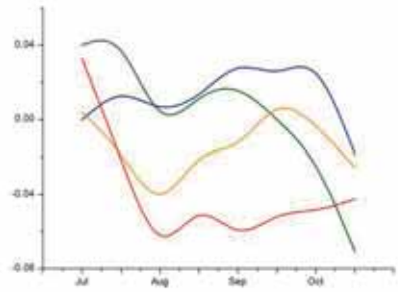
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

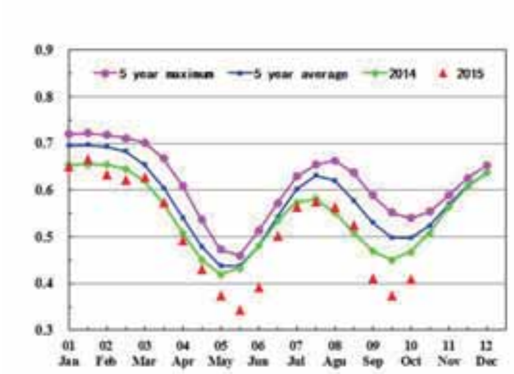
ARG AUS BGD BRA CAN DEU **EGY** ETH FRA GBR IDN IND IRN KAZ KHM MEX MMR NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF

[EGY] Egypt

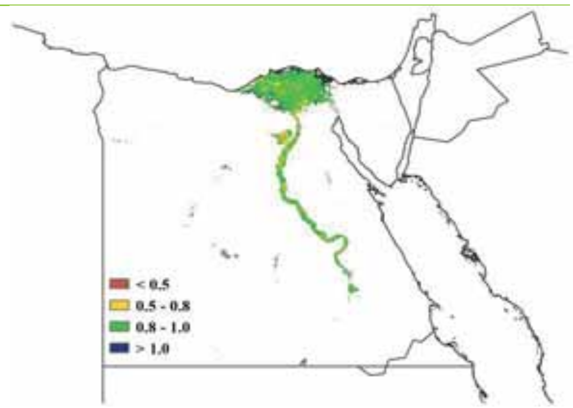
During August and through to early October, poor crop condition occurred in Egypt, particularly towards the end of September according to the crop condition development graph.

The CropWatch Agroclimatic Indicators showed that rainfall (+159%) was far above average but temperature (+0.2°C) and RADPAR were near average. The cropped arable land fraction (CALF) and the cropping intensity were stable during the reporting period. Considering the above analyses, we infer that lower-than-average summer crop condition may be related to non-climatic factors, such as disease and insect attacks. According to NDVI profiles and spatial NDVI patterns, 67% of croplands were continuously below the average level in the Nile valley, north-western Egypt and the central and southern Delta. Crop yields in Egypt are just fair and below the recent five-year average.

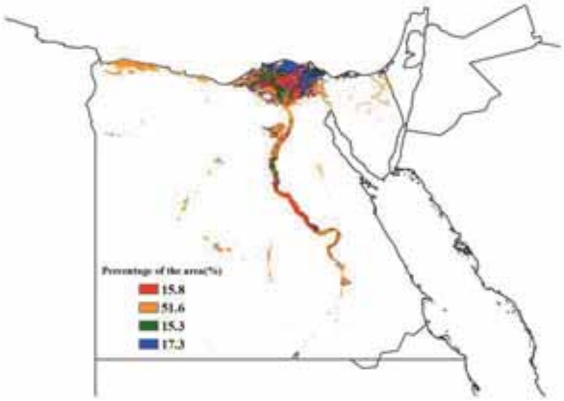
Figure 3.11. Egypt crop condition, July-October 2015



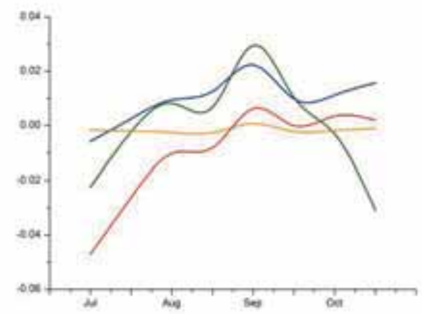
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



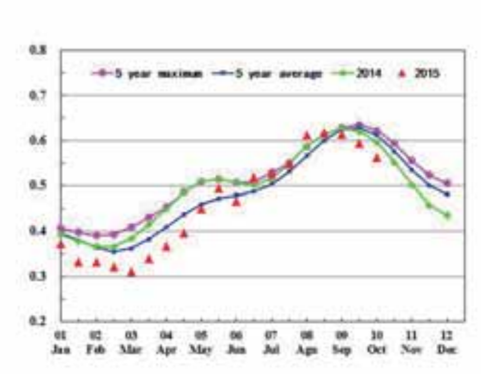
(d) NDVI profiles

[ETH] Ethiopia

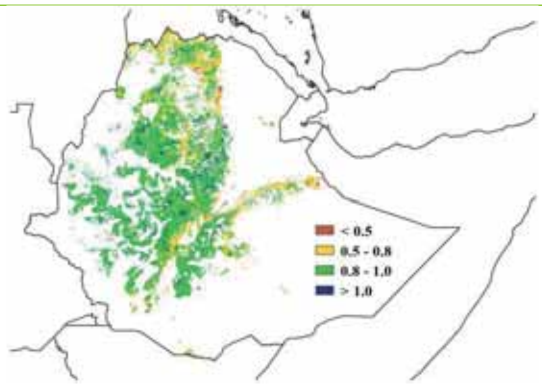
As already mentioned in the previous CropWatch bulletin, conditions were largely unfavorable during the Belg season before August when the early crops are harvested. The current reporting period mostly covers the early main season Meher crops that will be harvested until December. Overall, NDVI was well below the recent 5-year average until June, above average until August but then it dropped below average again until October. At the national level, July to August rainfall was 20% below average. A positive sunshine anomaly (+6%) combined with above average temperature (+0.9°C) has resulted in increased crop water requirements, which has further exacerbated crop water requirements and stress. This resulted in an estimated drop in biomass production potential of 17%. In spite of a fair VCIx value of 0.86, the agronomic indicators include a decrease of 4% for both cropped arable land and cropping intensity, two negative signs.

NDVI clusters and the maximum VCI map provide additional detail about regional spatial differences. Altogether, conditions are favourable in about 35% of agricultural areas and average in 39% of the croplands. Crop condition has been deteriorating constantly since July in the remaining areas (22% of cropped areas) corresponding essentially to (1) most of Tigray, where the growing season is normally short and ending in September; (2) scattered areas in East Amhara especially in the eastern parts of North Wollo and East Gojam and (3) north-east SNPP and adjacent areas in Oromia (east Shewa) as well as other areas in Oromia such as the east of Arsi and the northern parts of East and West Hararghe. The region described in (2), Amhara, includes some of the major wheat and teff producing areas whose first season starts in February (the Belg season, which mostly failed this year) and a main season from June to October. In the east of the region described in (3), Hararghe, the season is long but reliable rainfall occurs only in July to August. While large areas of the country were able to grow fair crops, about 25% suffered from dry conditions, resulting in below average output expectations and poor rangeland conditions.

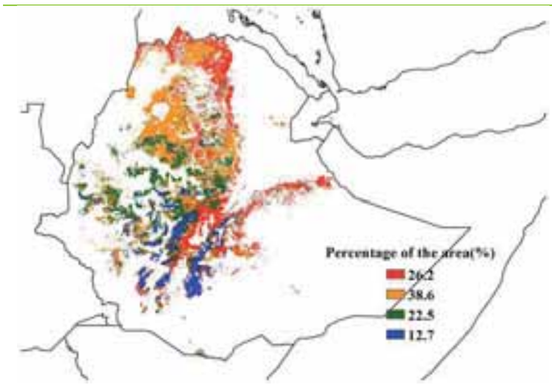
Figure 3.12. Ethiopia crop condition, July-October 2015



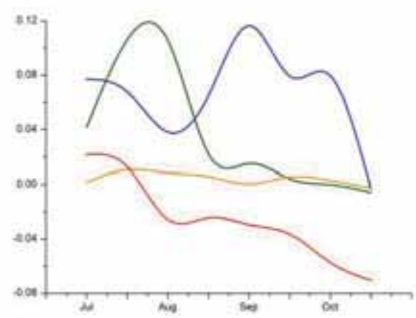
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

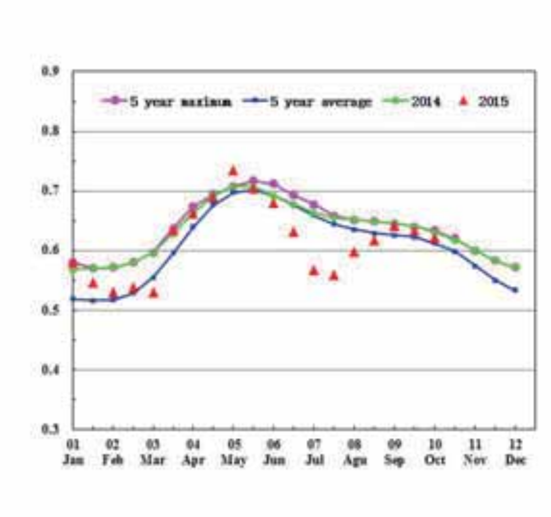
[FRA] France

Crops in France showed generally unfavorable conditions during the reporting period from July to October. At this point in time, summer crops have already been harvested. As shown by the NDVI profiles, national NDVI values were well below average and even 30% lower than average in July and August, after which they were close to the 5-year average from September to October.

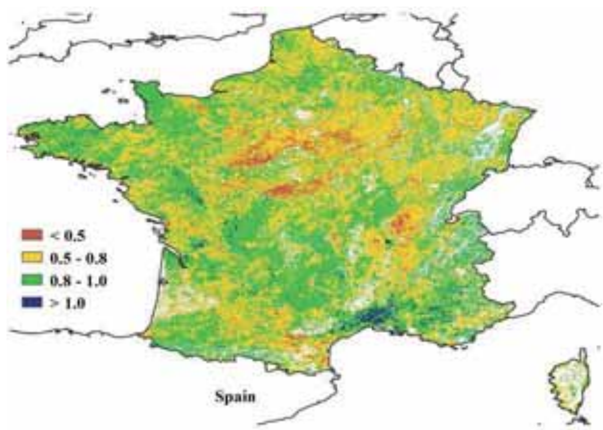
According to the spatial NDVI patterns, about 70% of the country suffered from poor crop and vegetation conditions in comparison to the recent five-year average. The same patterns are reflected in the maximum VCI map, with a VCIx below 0.5 in some areas. The CropWatch RADPAR indicator exceeded average by 1%, however, TEMP and rainfall decreased by 1.2°C and 18%, respectively, compared with average, resulting in a BIOMSS drop of 16% below the recent five-year average.

Generally, due to the deficit of rain, the agronomic indicators mentioned above indicate unfavorable condition for most summer crop areas of France, with average or below average yields.

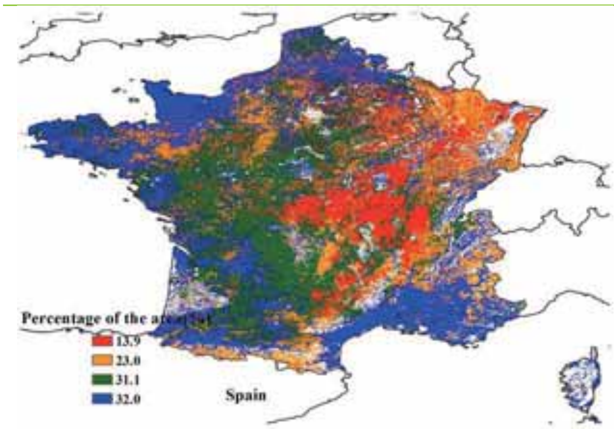
Figure 3.13. France crop condition, July-October 2015



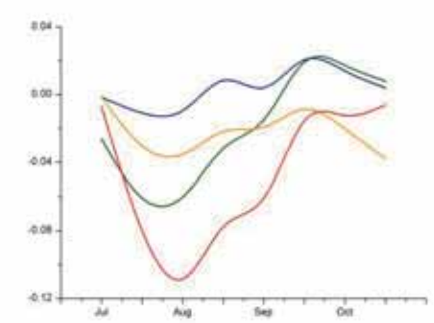
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA

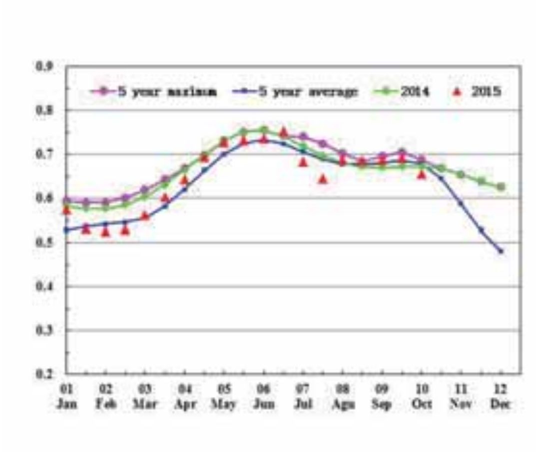


(d) NDVI profiles

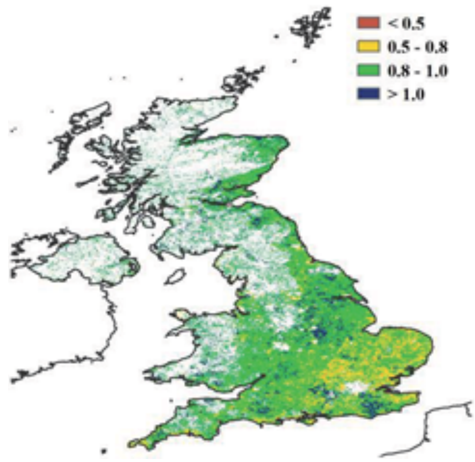
[GBR] United Kingdom

Crops in the United Kingdom showed average conditions during this reporting period. Currently, summer crops have been harvested, and winter crops (wheat and barley) are at the planting stage. Compared to averages, the CropWatch agroclimatic indicators show that rainfall over the reporting period was below average (RAIN, -5%), with slightly below average radiation (RADPAR, -3%) and temperature (TEMP, -1.7°C). With water stress and low temperatures, BIOMSS decreased by 7% compared to the five-year average at the national scale. As a result of adequate rainfall from late July to late august, the national NDVI values were average and above the five-year average from late July to early September according to the crop condition development graph. For early July and late September, due to reduced rainfall and colder weather, the national NDVI values dropped to below average. Spatial NDVI patterns compared to the five-year average show low values from late September (1) along the eastern and southern coast, including south of Dorset and Hampshire, east of Lincolnshire, Yorkshire and Grampian, southeast of Tayside and Lothian and low values from July in (2) Worcestershire, Warwickshire, Staffordshire, Northamptonshire, Leicestershire and Gloucestershire. Corresponding NDVI departure cluster profiles and appropriate rainfall from late July to October indicate above average NDVI values over the country for over 76% of arable land (Oxford, Cambridge, York, Birmingham, Edinburgh). The spatial pattern is also reflected by the maximum VCI in the different areas, with a VCIx of 0.8 for the country overall.

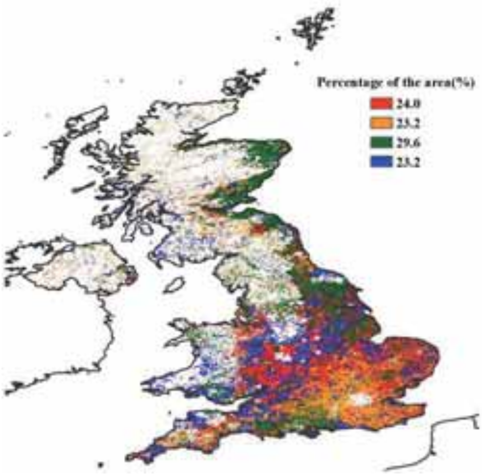
Figure 3.14. United Kingdom crop condition, July-October 2015



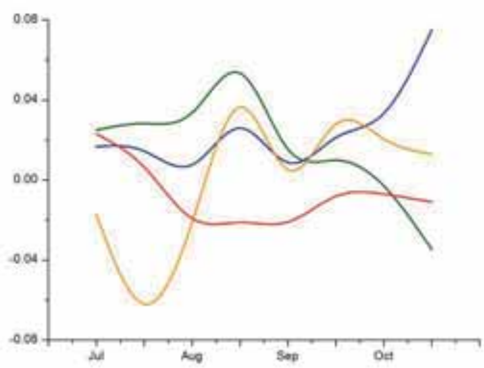
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA

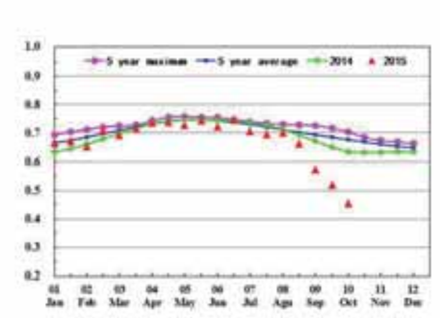


(d) NDVI profiles

[IDN] Indonesia

Indonesia suffered from unfavorable crop conditions from August to October, while the dry season maize and rice were entering reproductive or early ripening stage. Compared with the recent average, precipitation was very significantly below average (-67%) as a result of the on-going El Niño. Corresponding with the sharp drop in rainfall, PAR displays an increase of 11%. As a result of the lack of rain, the rain-fed biomass accumulation potential dropped (-59%). Dry weather delayed the planting of the main seasonal crops in 2016. This information is consistent with the NDVI profile, which shows that the average NDVI was below the five-year average during this monitoring period. Contrasting NDVI clusters are observed with mostly below average conditions in central Sumatra (including Riau and Jambi) in September and October. In conclusion, rice and maize production of Indonesia are well below average in 2015.

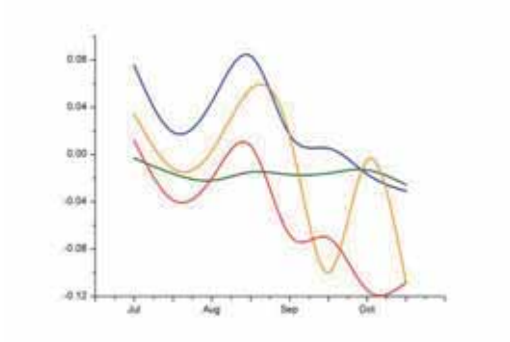
Figure 3.15. Indonesia crop condition, July-October 2015



(a) Crop condition development graph based on NDVI

(b) Maximum VCI

(c) Spatial NDVI patterns compared to 5YA

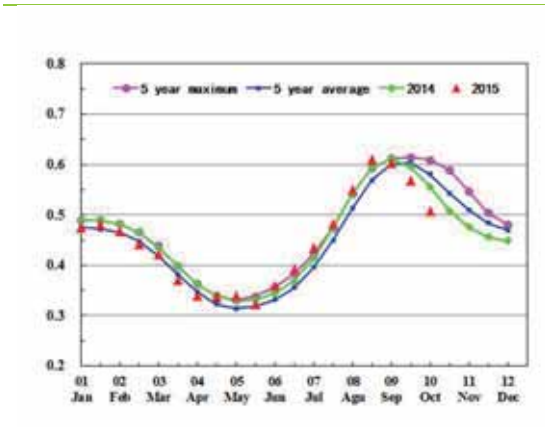


(d) NDVI profiles

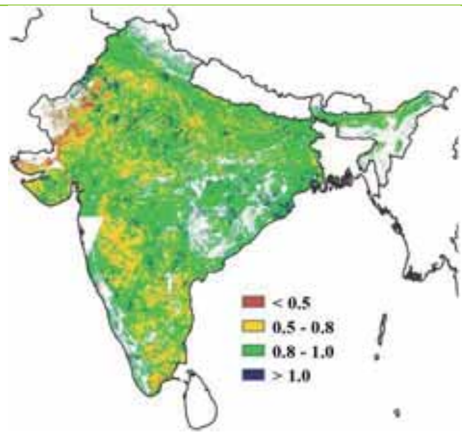
[IND] India

The current monitoring period corresponds to the rain-fed Kharif season: crop condition was poor for India. The cropped arable land fraction (CALF) and biomass accumulation potential (BIOMSS) dropped below average by 5% and 19% respectively. Over the country a slight RAIN deficit of 2% was recorded. The close to average national rainfall hides the large disparity of sub-national values: Andhra Pradesh (-20%), Gujarat (-78%), Goa (-67), Kerala (-40%), Karnataka (-36%), Maharashtra (-38%), Madhya Pradesh (-10%), Puducherry (-40%), Rajasthan (-27%) and Tamil Nadu (-21%). The states that recorded above average RAIN include Assam (+23%), Bihar (+40%), Chhattisgarh (+16%), Himachal Pradesh (+55%), Haryana (+11%), Jharkhand (+21%), West Bengal (+59%), Tripura (+112%), Punjab (+20%), Mizoram (+54), Meghalaya (+35%) and Sikkim (+27%). The temperature (TEMP) was unchanged compared with average while photosynthetically active radiation (RADPAR) increased by 5%. Below average rainfall in the key growing stages of Kharif crop triggered the poor crop condition for the country. The national NDVI profile indicates that crop development was below the average of the previous five years during September and October. In Rajasthan, Haryana and Uttar Pradesh the NDVI started decreasing from early September and reached the minimum value in early October; however it gained again later this month. The NDVI value remained below average throughout the monitoring period in the states of Bihar, Karnataka, Gujarat and west Bengal as evidenced by NDVI clusters and profiles. The maximum VCI indicates that the least favorable crop condition occurred in Gujarat and Rajasthan. Overall, according to Crop Watch indicators, the crop condition was below average and reduced output for Kharif crops is expected.

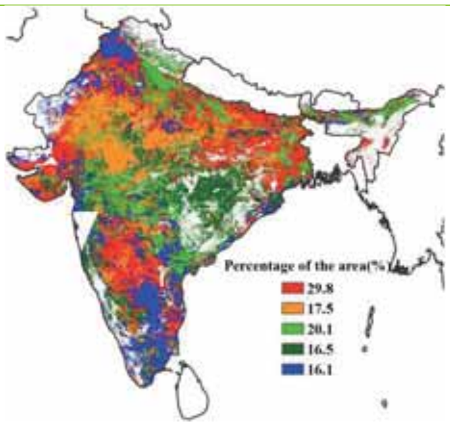
Figure 3.16. India crop condition, July-October 2015



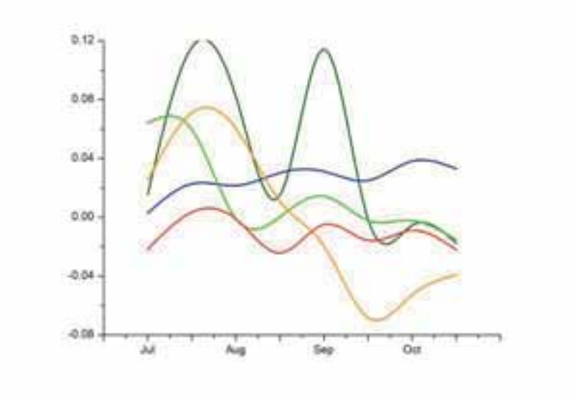
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



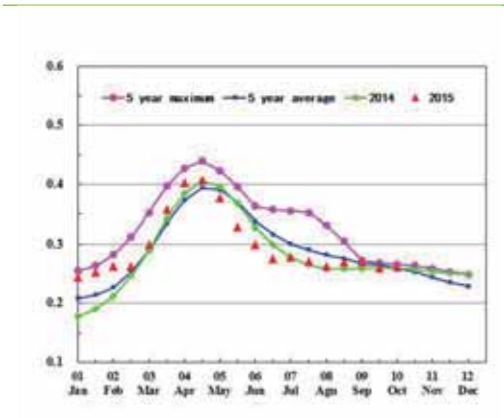
(d) NDVI profiles

[IRN] Iran

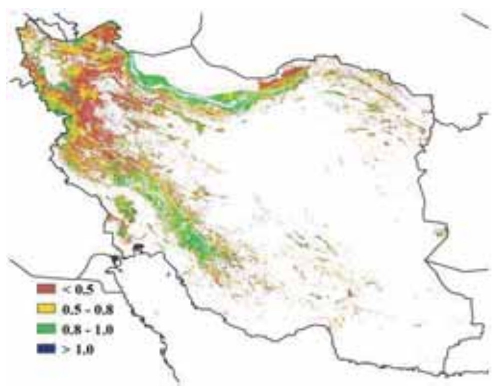
The crop condition in Iran was below average in July, and recovered to average during this monitoring period starting from August. The summer crops (potatoes and rice) were harvested in September, while winter wheat and barley were sown. Accumulated rainfall (+73%) was very abundant and temperature was close to average throughout the monitoring period, while the accumulated RADPAR was less (-2%). CropWatch agroclimatic indices for the current season show rather favorable conditions for crop growth, which is confirmed by the increase of the BIOMSS by 66%.

Crop condition in most of the north-western region was close to the five-year average during the whole monitoring period. The major rice producing areas (Mazandaran and Gilan provinces in the central north region) experienced favorable conditions. Crop condition was below the recent five-year average in the Khuzestan and Fars provinces of the south-western region. Overall, the outcome of summer crops was fair, and rice output is expected to be above average.

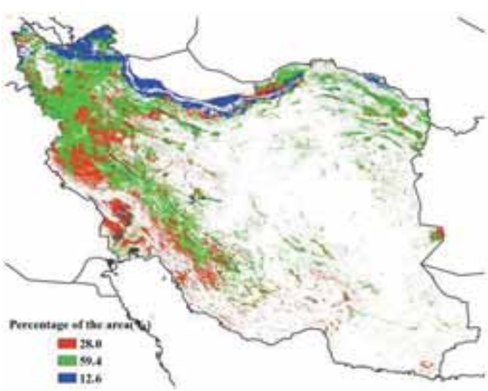
Figure 3.17. Iran crop condition, July-October 2015



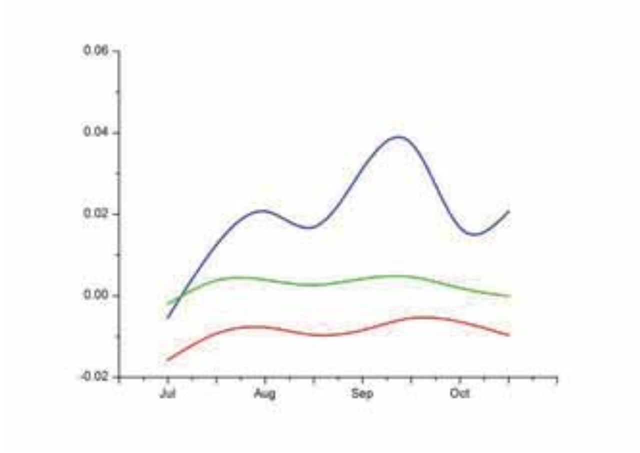
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



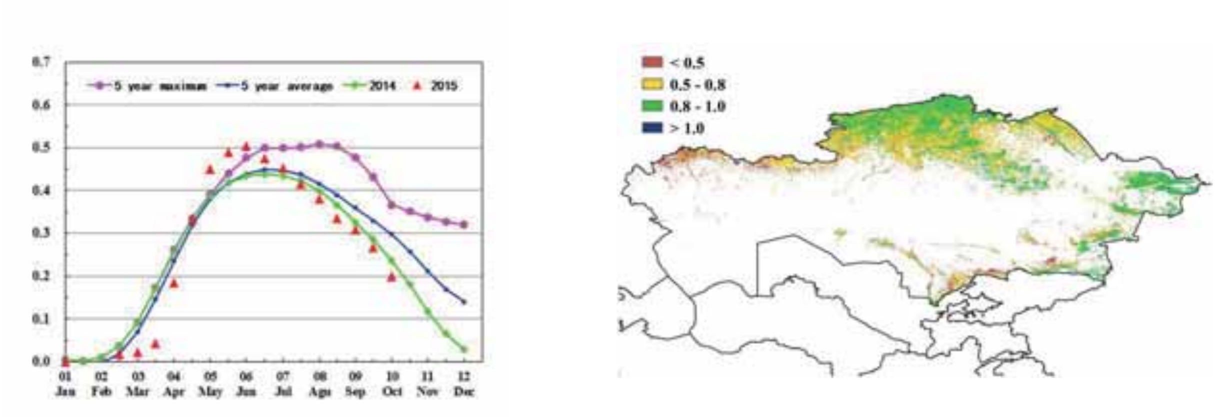
(d) NDVI profiles

[KAZ] Kazakhstan

For this monitoring period, crop condition was generally unfavorable during the growing and harvesting stage of spring barley and wheat. Among the CropWatch agroclimatic indicators, RAIN was above average (47%), TEMP below (-0.9%) and RADPAR was average. The combination of the factors resulted in an increase of the biomass production potential above over the average of the recent five years. The maximum VCI indicates that crop condition was below average (pixel value below 0.5) in the north-west and in the south of the country.

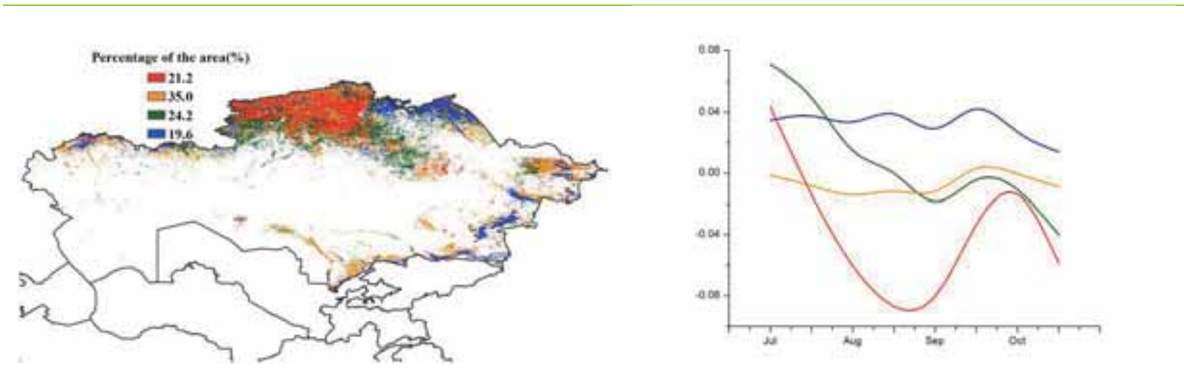
Spatial NDVI patterns and profiles show that crop condition in 21% of the agricultural areas was below average in August and September, and then again at the end of October, mainly in the north (especially in Severo-kazachstanskaya, Akmolinskaya, Kustanayskaya and Karagandinskya). 21% of the agricultural areas were below average in late of October in parts of Severokazachstanskaya, Kustanayskaya, Akmolinskaya, Pavlodarskaya, Aktyubinskya, Karagandinskya and Voskochno-Kazachstanskaya. The poor crop condition in these areas resulted from uneven rainfall distribution in time and space. In 19.6% of the agricultural areas, including some of the major agricultural areas, crop condition was persistently above average thanks to satisfactory rainfall in the east of Severo-kazachstanskaya, north Pavlodarskaya as well as in scattered eastern areas bordering China. According to the crop condition development graph, overall crop condition was below both last year's and the five-year average from August. However, thanks to a spectacular increase in cropped arable land (+36%) the output of summer crops is bound to increase.

Figure 3.18. Kazakhstan crop condition, July-October 2015



(a) Crop condition development graph based on NDVI

(b) Maximum VCI



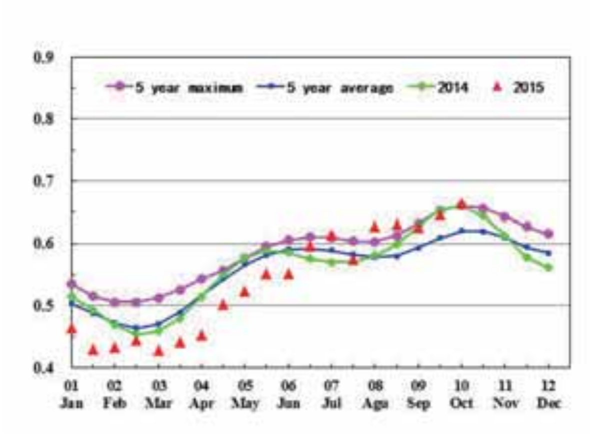
(c) Spatial NDVI patterns compared to 5YA

(d) NDVI profiles

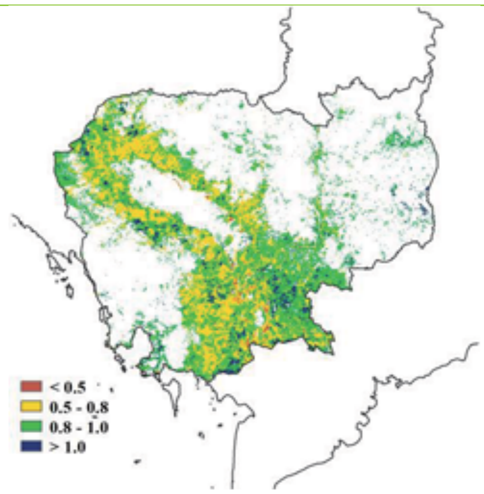
[KHM] Cambodia

Crops in Cambodia displayed around average conditions over the reporting period, which coincides with the planting of the main paddy crop. Overall, rainfall over the period has been average (0% departure) over much of the country. Climatic indicators and biomass monitoring by CropWatch indicate that the country enjoyed favorable PAR with values about 3% higher than the five-year average, as well as a 2% increase of biomass accumulation. Crop condition, which was below average during mid-July, soon recovered in the following two months. The maximum VCI was between 0.5 and 1, showing average crop conditions. NDVI profiles show that crop condition was slightly above average in 12.6% of the cropped areas, and average in 55.3% of croplands. Overall crop prospects for the country are optimistic.

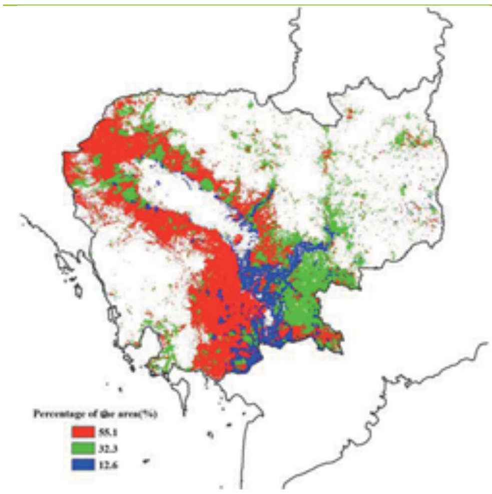
Figure 3.19. Cambodia crop condition, July-October 2015



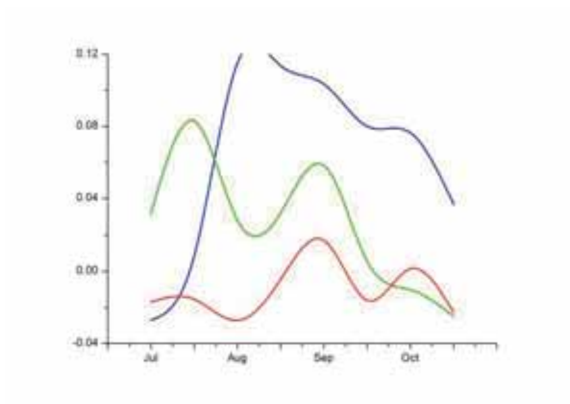
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



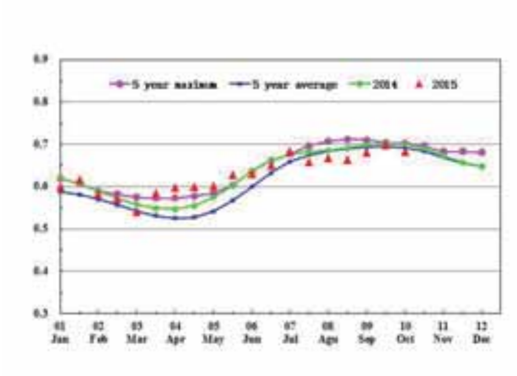
(d) NDVI profiles

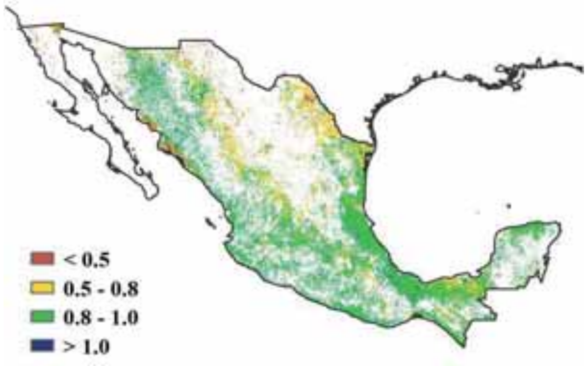
[MEX] Mexico

During August through to early October, maize and sorghum were being harvested while planting of wheat was on-going in Mexico. Overall, crop condition was close to the recent 5-year average.

The CropWatch Agroclimatic Indices show that rainfall (-14%) was below average while temperature (+0.1°C) and RADPAR (+3%) were slightly above. Compared to the average level for the same time of the recent five years, the cropped arable land fraction (CALF) and the cropping intensity in 2015 increased by 4% and 7%, respectively. The NDVI profiles and spatial NDVI patterns indicate that crop condition for about 65% of arable land was below average after early September, mainly in northern and central Mexico. On the other hand, 34.6% of crops were continuously above the average level, in south-eastern and western regions. CropWatch estimates that crop production will be close to the five-year average.

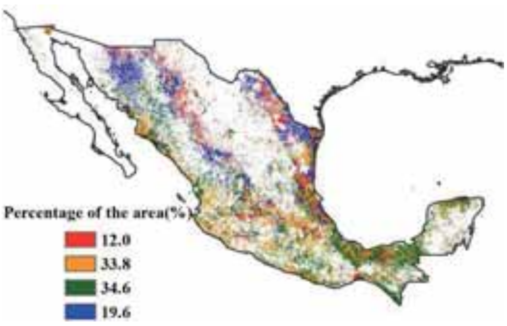
Figure 3.20. Mexico crop condition, July-October 2015

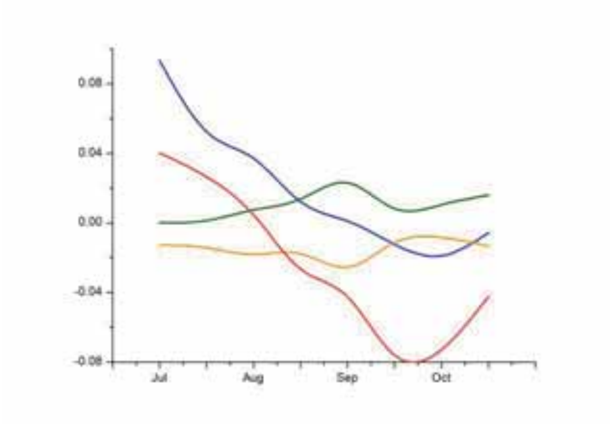




(a) Crop condition development graph based on NDVI

(b) Maximum VCI





(c) Spatial NDVI patterns compared to 5YA

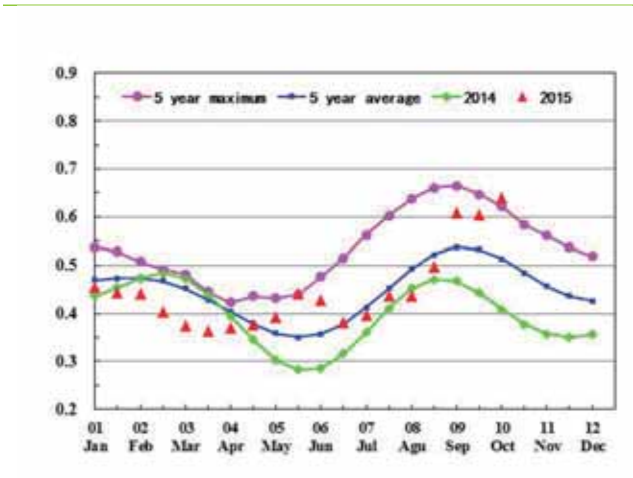
(d) NDVI profiles

[MMR] Myanmar

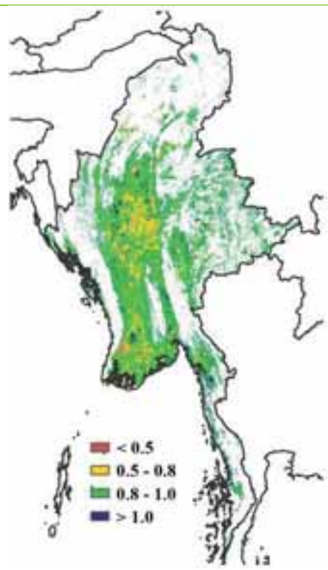
Even though the rainfall (RAIN, -8%), temperature (TEMP, -0.3°C) and photosynthetically active radiation (RADPAR, -1%) were below average, the crop condition in Myanmar throughout this monitoring period remained average. The fraction of cropped arable land (CALF) decreased by 1% while biomass accumulation potential (BIOMSS) decreased by 4% compared to the previous five-year average.

The national NDVI profile was above average and even close to previous five-year maximum in September and October. Following the severe floods in July, the assessed crop condition is average, and the national NDVI profiles were generally average. National NDVI profiles dropped sharply in the coastal area of Yangon and Mon in the middle of August but recovered in early September. The NDVI profile in the low-lying area of Bago and Ayeyarwaddy decreased in mid September and then sharply increased from early October onwards. The maximum VCI ranged from 0.5 to 1 over the country indicating good crop condition. Overall, CropWatch assesses the crop condition and production outlook as average.

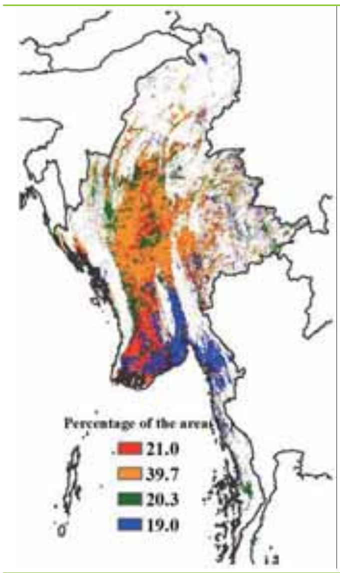
Figure 3.21. Myanmar crop condition, July-October 2015



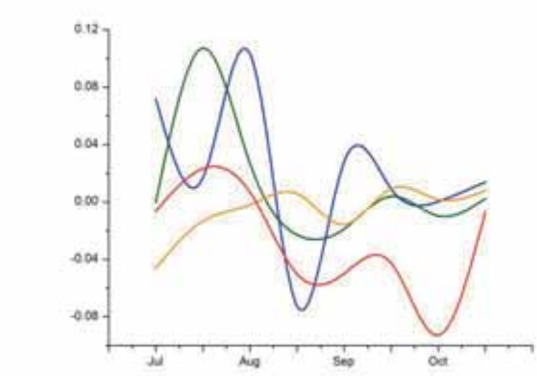
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

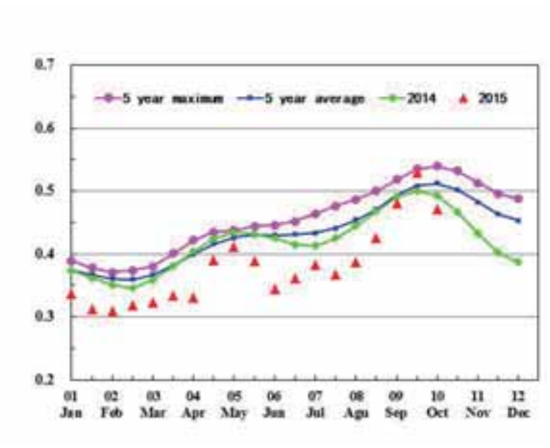
[NGA] Nigeria

The CropWatch rainfall indicator for Nigeria from July to October exceeded the recent average by 21%, accompanied by a drop in RADPAR of 3%, resulting in an estimated biomass potential increase of 7% compared with the last five years. From July to August, however, national NDVI was below the recent 5-year reference values, reaching values closer to average at the time of the cereal harvest in the northern, Sahelian regions, also the time of the harvest of the first maize crop in central and southern regions. CALF decreased 5% while the cropping intensity remained stable at a favourable average VCIx of 0.82

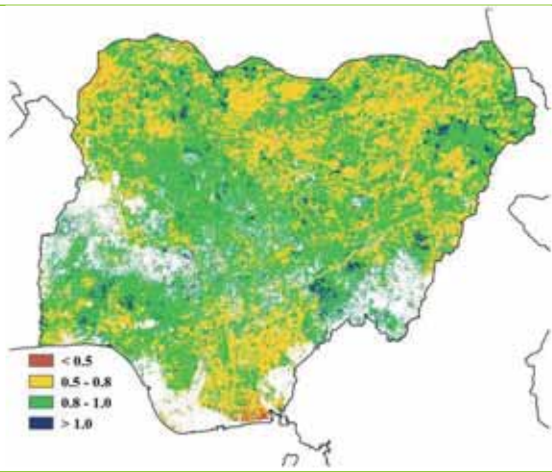
NDVI clusters show above average and average conditions in the central Guinean maize belt and the northern Sahelian regions where sorghum and millets replace maize due to the drier climate. The two mentioned areas approximately coincide with the northern half of the country: in 34% of the country crops were average or above average, 48% was slightly below average in July and August at the time of harvest. In the south, conditions were approximately average at the time of the harvest of the first crops but generally less favourable at the time of planting of the second crop that will be harvested in December and January 2016.

Agroclimatic indices, NDVI and VCIx describe a situation of mixed cereal crop condition, mostly favourable in the north and mixed in the south where, however, cassava and yams are the main staples.

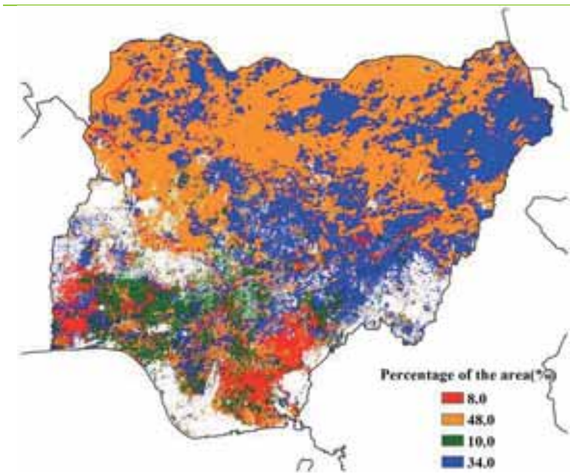
Figure 3.22. Nigeria crop condition, July-October 2015



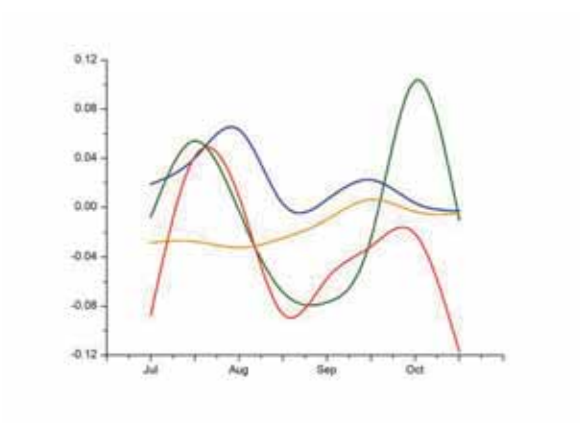
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

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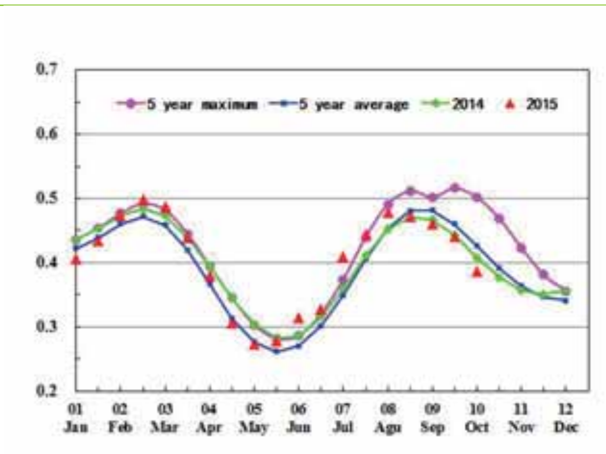
[PAK] Pakistan

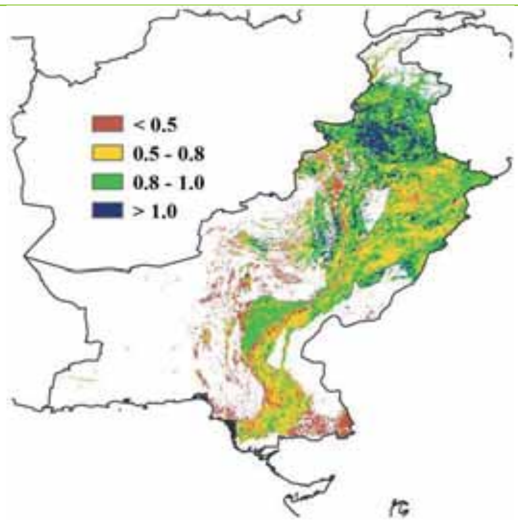
This monitoring period from July to October covers the growing and harvesting stages of summer crops (sugarcane, cotton, rice and maize), as well as the sowing of barley and winter wheat. Compared with average conditions, agroclimatic indicators show an increase of rainfall (+10%), a drop in temperature (-1°C) and radiation (-1%), resulting in a biomass production potential is below the five-year average (-8%). The fraction of cropped arable land (CALF) and cropping intensity decreased (-3% and -5% respectively).

The average NDVI development profiles indicate that crop condition was better than during the five-year average in the beginning of July but from the beginning of August a decline started that continued until October. The lowest maximum VCI values (<0.5) occur in the north of Balochistan, the south of Khyber Pakhtunkhwa and south of Sindh. According to the spatial NDVI patterns and profiles, 41.3% of the cropped area displayed above average conditions throughout the monitoring period from July to October (north Punjab and central Khyber Pakhtunkhwa). 43.6% of cropped areas show average conditions throughout. The remaining 15.1%, mostly in the Sindh area, show poor conditions. Altogether, crop condition is estimated to be fair.

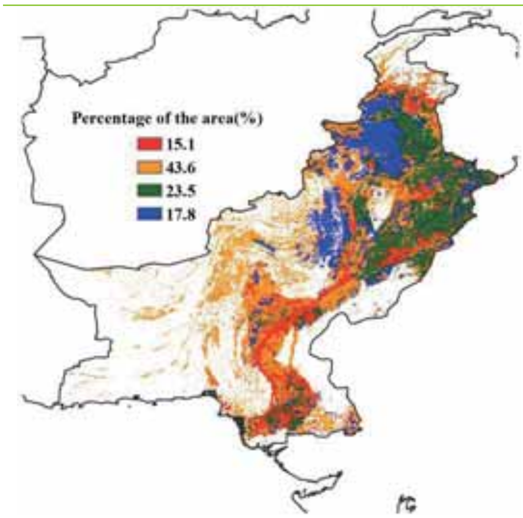
Figure 3.23. Pakistan crop condition, July-October 2015



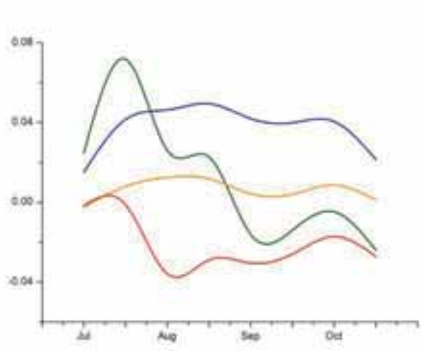
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA

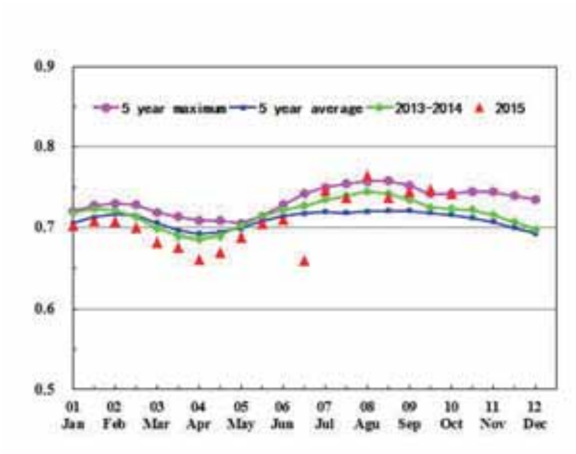


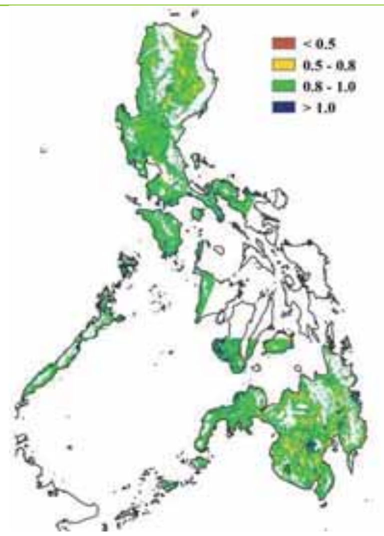
(d) NDVI profiles

[PHL] The Philippines

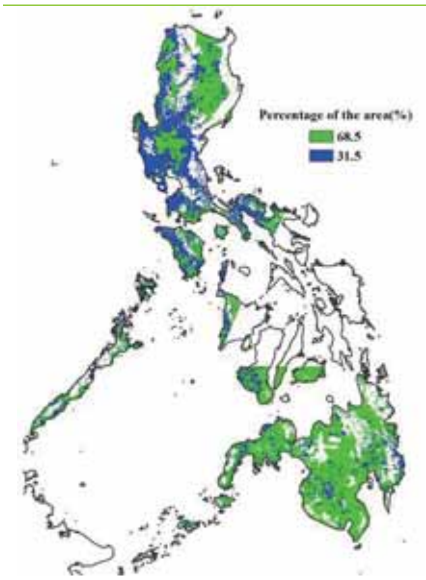
The crops in the Philippines generally showed average conditions between August and October (VCIx is 0.89) although the biomass decreased by 11% compared to the most recent five years. Harvesting of the main season paddy crop is currently underway. Soil moisture is plenty, and conducive to the sowing of the secondary season crop. As illustrated by above average indices for rainfall (+2%) and PAR (+4%), the secondary season maize and rice planted from October enjoyed good initial conditions. In mid-October, Typhoon Koppu affected the Philippines and caused torrential rainfall mainly in Aurora province, flooding some arable land. However, the impact on crop growth was limited according to the NDVI profiles: crop condition reached the recent five-year maximum level in October. According to NDVI clusters, crop condition decreased from north to south in August, with favorable conditions in Luzon and poor conditions in Mindanao. From September, however, the difference between north and south narrowed and NDVI values were average throughout the country. Average production can be expected for this year.

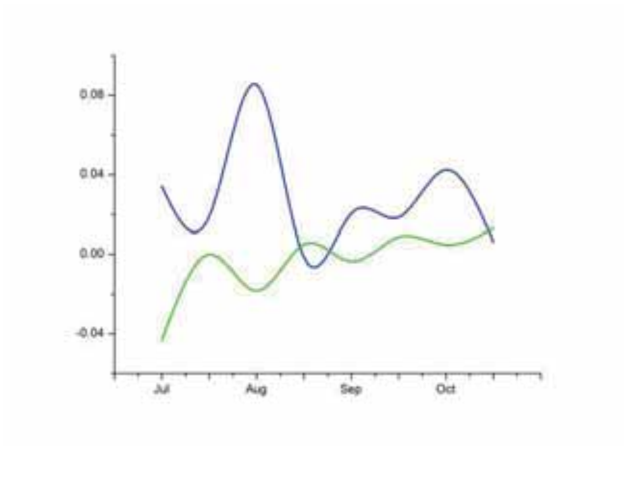
Figure 3.24. Philippines crop condition, July-October 2015





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





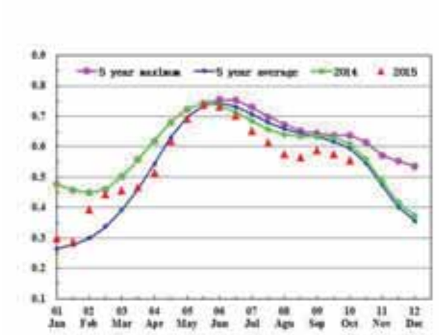
(c) Spatial NDVI patterns compared to 5YA (d) NDVI profiles

[POL] Poland

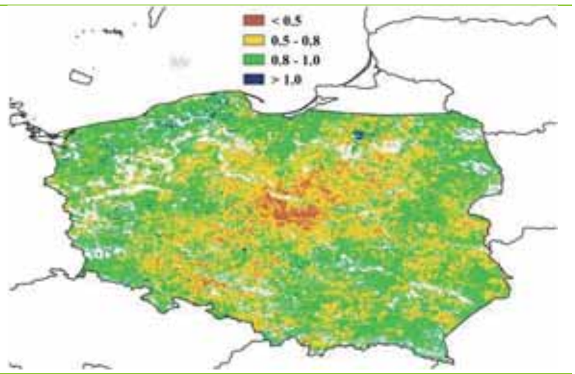
In Poland the winter wheat and maize harvests start from July, and winter wheat is sown from the second half of September. The cropped arable land fraction (CALF) during this monitoring period is same as the average from the last five years. From July to October, the rainfall departure was -39% and the temperature increased 0.3°C above average. RADPAR was above the recent average (+7%) and the potential biomass dropped significantly due to insufficient rainfall.

As shown in the NDVI crop condition development graph, the NDVI in Poland markedly decreased compared with the last five-year average during this monitoring period. Poland suffered drought due to the exceptionally hot weather and record low rainfall. In the center, south and east of Poland, including Dolnoslaskie, Opolskie, Lodzki, Slaskie, Mazowieckie, Swietokrzyskie, Malopolske, Lubeiskie and Podkarpackie, the NDVI dropped sharply from August. The grain filling of winter wheat and the flowering of maize were seriously affected by the water stress. The sowing and germination of winter wheat suffered as a result of this too. The VCIx in Poland during this monitoring period is 0.78, and the final assessment and outlook for Poland are poor.

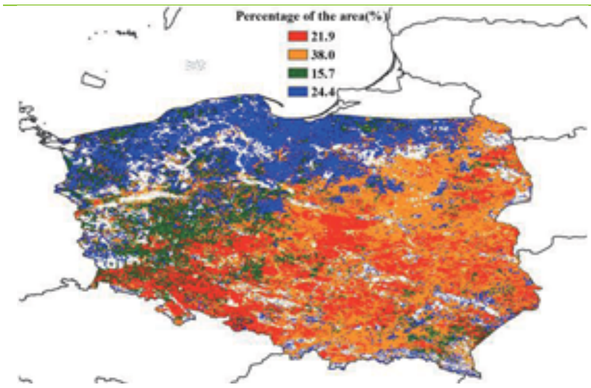
Figure 3.25. Poland crop condition, July-October 2015



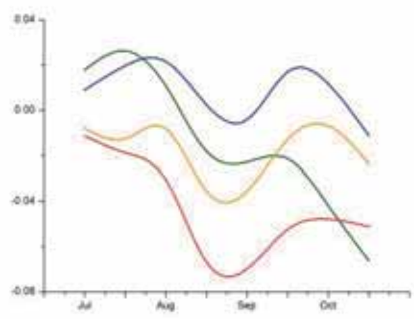
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

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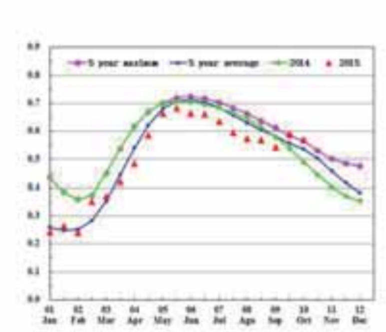
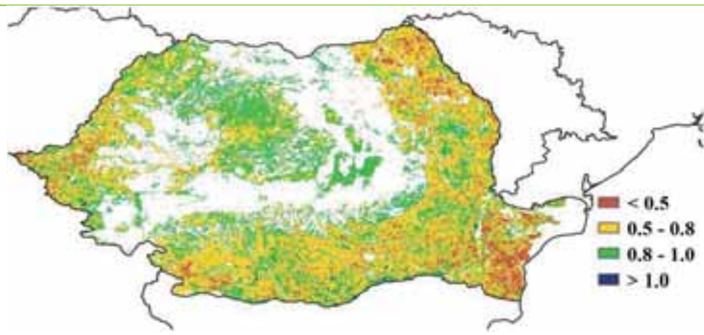
[ROU] Romania

The monitoring period covers the harvest of winter wheat from July, and the subsequent sowing of the 2015-16 crop. The maize harvest begins from September. During this monitoring period, cropped arable land dropped 2% compared with the last five-year average. Overall, the temperature increased over average (+0.8°C) while rainfall dropped 27%. Due to the dry weather, the potential biomass accumulation decreased 9% compared with the average of the last five years.

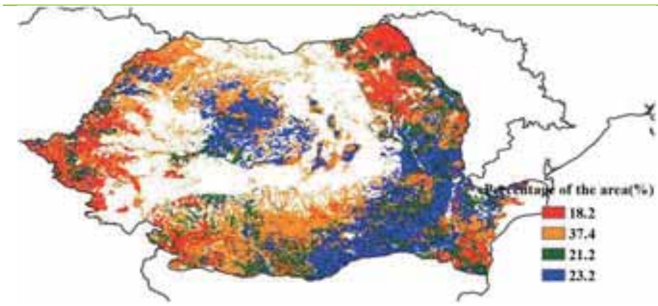
During this monitoring period, as shown in the NDVI development graph, the condition of crops was below the last five years' average from July and close to the average from the end of September. In the west, south and northeast of Romania including Timis, Hunedoara, Mehedinti, Botosani and Neamt, NDVI values seriously departed from average, which will negatively affect the winter wheat and maize yield there. In the center and south-east of Romania, including Alba, Cluj, Giurgui, and Calarasi, crop penology was advanced due to warm weather. The VCIx in Romania during this monitoring period was 0.72 due to the dry and hot weather; the final assessment for Romania's output is below expectations.

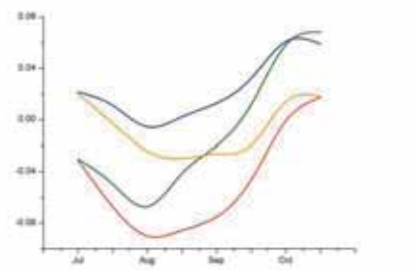
Figure 3.26. Romania crop condition, July-October 2015





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





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

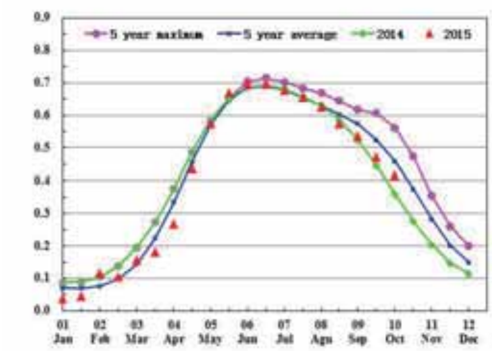
ARG AUS BGD BRA CAN DEU EGY ETH FRA GBR IDN IND IRN KAZ KHM MEX MMR NGA PAK PHL POL ROU **RUS** THA TUR UKR USA UZB VNM ZAF

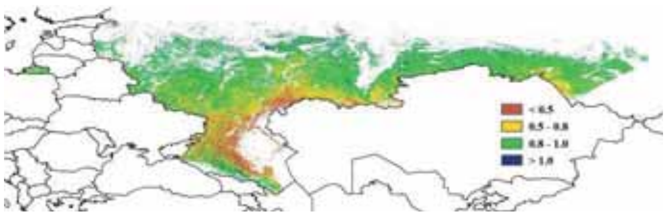
[RUS] Russia

Russia experienced average climate conditions between July and October. The spring wheat and maize harvest begins from August and the winter wheat planting starts in August. Cropped arable land increased 1% compared to the last five-year average. Russia experienced slightly dry and cold conditions during the reporting period. Precipitation below the recent average (-5%) and the temperature was significantly lower than average (-0.8°C) The BIOMSS index rose 1% over the last five-year average.

As shown in the NDVI development graph, crop condition was close to last year's and slightly below the last five-years average. In the Caucasus and south of Siberian Federal District including Krasnodarskiy Kray, Stavropolskiy Oblast, Bashkortostan Republic, Chelyabinskaya and Kurganskaya Oblasts, due to the cold weather (temperature departure below -1°C), the NDVI sharply decreased before October compared with the last five years. In middle of Central Federal District and Volga Federal District, including the Oblasts of Rostov and Voronezh, the NDVI was higher than the last five-years average from July and returned to normal after August. The VCIx in Russia during this monitoring period was 0.82 and the final assessment for Russian crops is average.

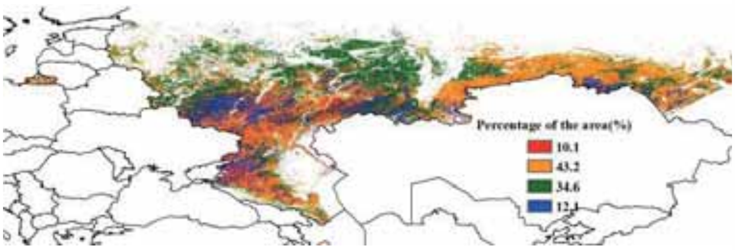
Figure 3.27. Russia crop condition, July-October 2015

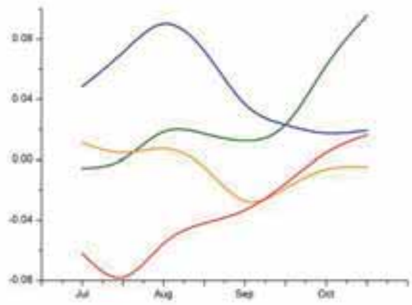




(a) Crop condition development graph based on NDVI

(b) Maximum VCI





(c) Spatial NDVI patterns compared to 5YA

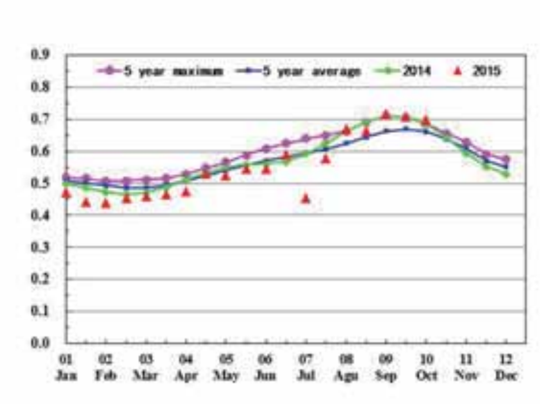
(d) NDVI profiles

[THA] Thailand

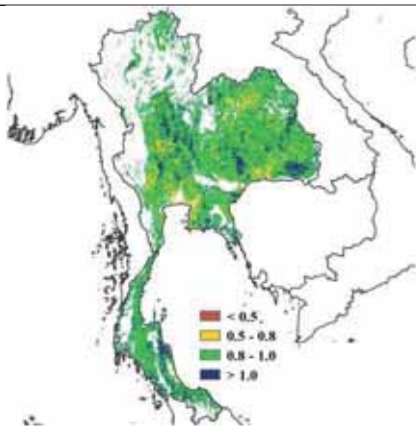
Rice is Thailand's main crop; the harvest of the first crop started in September and will go into December. The second rice matures from April to June. In addition, the first crop of maize normally starts in May and matures in August and September. The second maize is a short-cycled crop grown in the same regions (September to December). According to agroclimatic and agronomic indicators, RAIN and BIOMSS decreased by 10% and 9%, respectively. RADPAR was slightly above the average value. There was little change in temperature and CALF.

As shown in figure (a)**,** the national NDVI curve was below the five-year average from January to July, reaching its minimum in July (about 0.45), then increasing and reaching the average in August. Below-average rain in May is the major reason for the NDVI fluctuation, which delayed sowing of the main season rice. However, favorable rains in early July stimulated growth, which may offset the effect of late planting: there was an obvious improvement of crop condition after July. High VCIs are widely seen by central Thailand's rivers; they indicate favourable crop condition with maximum values occurring over the Chao Phraya river system (VCIx>1). Altogether, the production prospects of rice and maize are favorable.

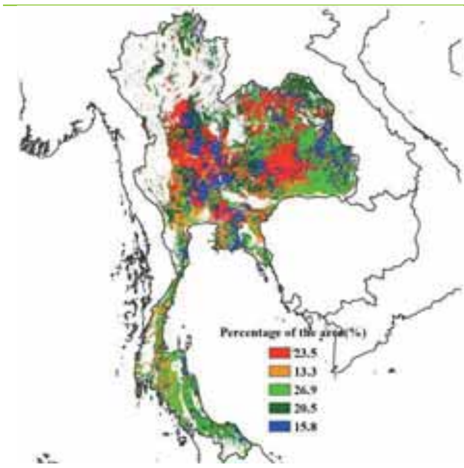
Figure 3.28. Thailand crop condition, July-October 2015



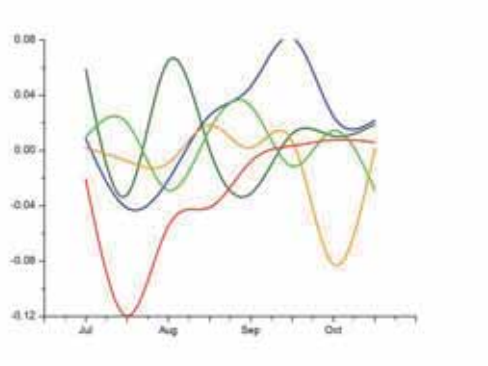
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

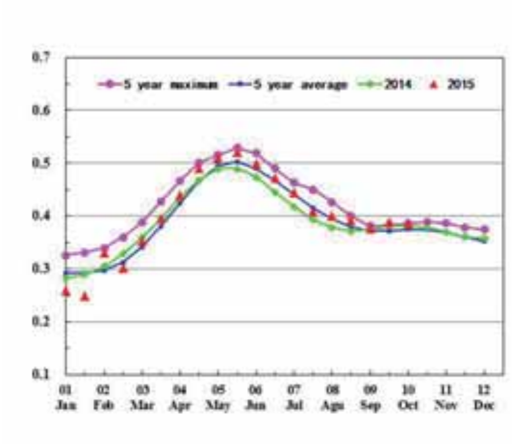
ARG AUS BGD BRA CAN DEU EGY ETH FRA GBR IDN IND IRN KAZ KHM MEX MMR NGA PAK PHL POL ROU RUS THA **TUR** UKR USA UZB VNM ZAF

[TUR] Turkey

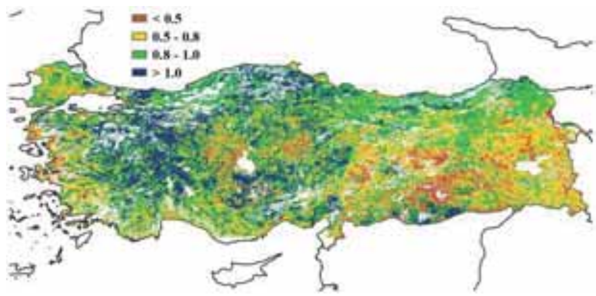
The crop condition from July to October 2015 was generally close to average in Turkey. Summer crops' harvest was completed during the monitoring period, and winter wheat and barley were sown from September onwards. Accumulated rainfall (+13%) and temperature (+1.2°C) were above average, while the accumulated RADPAR was close to average. The agro-climatic conditions resulted in a BIOMSS increase of 4% above the average of the previous five years. The maximum VCI (0.83) was above average, and CALF significantly increased by 8% compared to the recent five-year average. The indicators imply production levels for summer crops comparable with the recent five-year average.

Crop condition in most of the Aegean, Mediterranean and the south-eastern Anatolia regions was above the recent five-year average, but crop condition was below average in the most of northern and southern Anatolia. Poor growing conditions concentrated in the Ardahan and Kars provinces in Eastern Anatolia and most of Marmara regions during the whole monitoring period. Overall, the outcome for the summer crops is expected to be favorable.

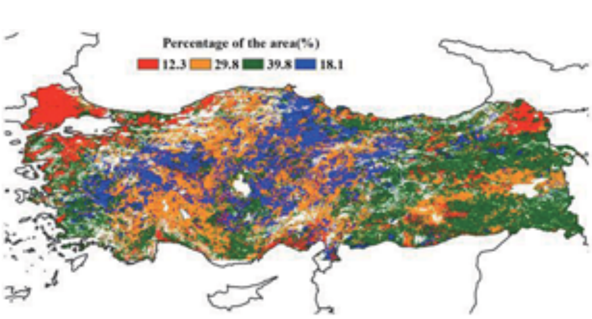
Figure 3.29. Turkey crop condition, July-October 2015



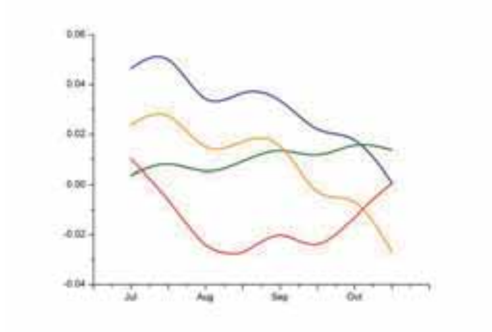
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



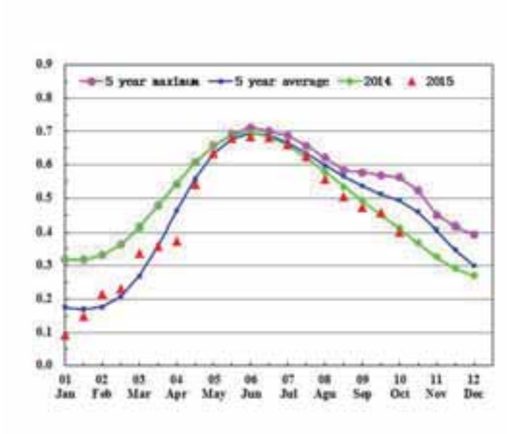
(d) NDVI profiles

[UKR] Ukraine

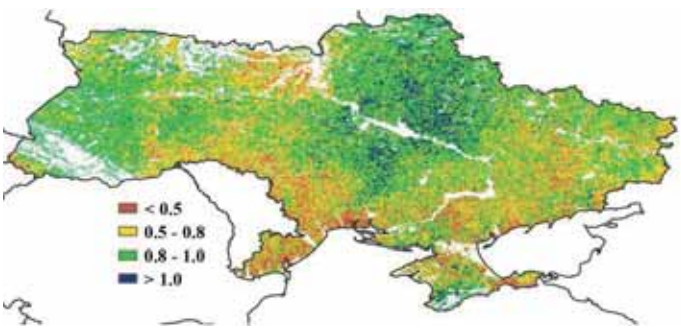
Ukraine's crop condition was unfavourable during this monitoring period. The winter wheat's harvest was completed before August and seeding began in September, while the maize harvest started in August. Weather conditions were characterized by poor rainfall from July to October (down 49% compared with average), while PAR was above average (+7%). The resulting potential biomass drop is 38%. According to the spatial NDVI patterns compared to the recent five years, most pixels' VCIx value in Chernihivs'ka, Sums'ka, Poltavs'ka and Cherkas'ka in central Ukraine is larger than 1, which indicates rather good crop condition in this area.

Western Ukraine, however, underwent unfavorable conditions from July to September, including Vinnyts'ka, Khmel'nyts'ka, Ternopil's'ka and Zhytomyrs'ka, then recovered to average in October. As shown in the crop condition development graph, the July-October NDVI was lower than the recent five years due to the continuous drought. As most of the winter wheat has been harvested before August, the yield of wheat wouldn't be affected. The maize yield of 2015 is expected to drop in Ukraine.

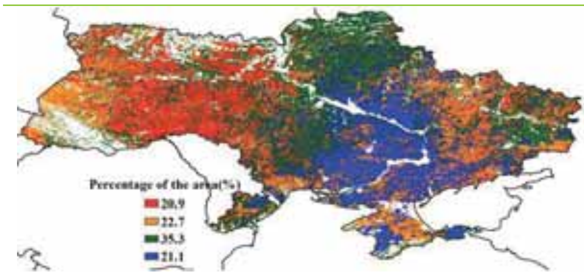
Figure 3.30. Ukraine crop condition, July-October 2015



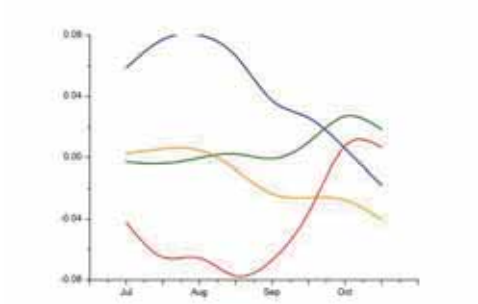
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

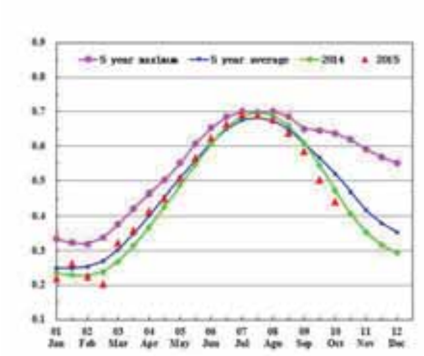
[USA] United States

In general, CropWatch indicators show that crop condition was below last year's during the reporting period, which covers heading, filling and the harvest of summer crops. Overall, weather conditions were favorable with rainfalls 22% above average, a slight temperature anomaly (-0.1°C) and a 1% drop in radiation compared to the average.

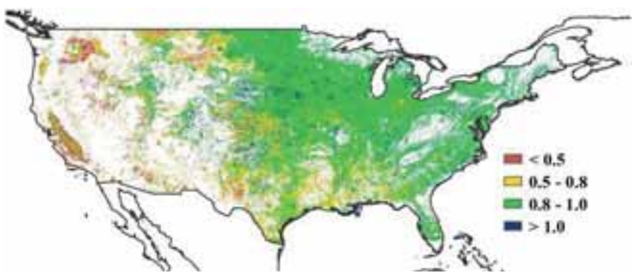
Maize and soybean are the major crops in the United States during the reporting period. Except for Indiana (-18 %) and Ohio (-15%), other major maize producing states received average or above average rainfall, including Illinois (+5%), Iowa (+43%), Kansas (+42%), Minnesota (+43%), Missouri (+77%), Nebraska (+88%) and Wisconsin (+18%). Since most maize is rain-fed in the United States, the potential biomass accumulation responds directly to rainfall, increasing by 34%, 11%, 43%, 34% and 51% over the average of the previous five years, respectively, in Iowa, Illinois, Missouri, Minnesota and Nebraska. In spite of favourable weather conditions, NDVI showed a negative departure in spring wheat production states, especially in North Dakota and Montana, which may have been caused by early drought. NDVI was below average in the main rice production in areas in the south-eastern United States, probably resulting in lower rice production this year.

Indicators are difficult to reconcile in the US this year: although biomass potential shows a 20% positive departure from the average of the last five years, CALF increased 1% and VCIx was 0.84, the NDVI development profiles show crop conditions below those last year. Low to average crop production can be expected in the United States this year.

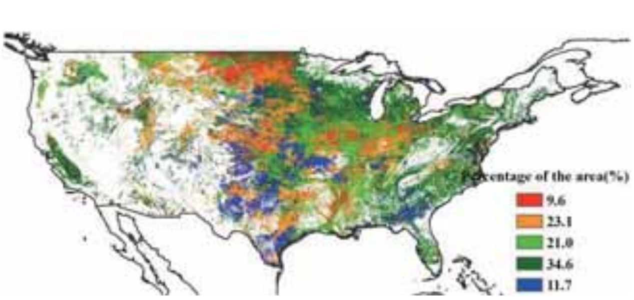
Figure 3.31. United States crop condition, July-October 2015



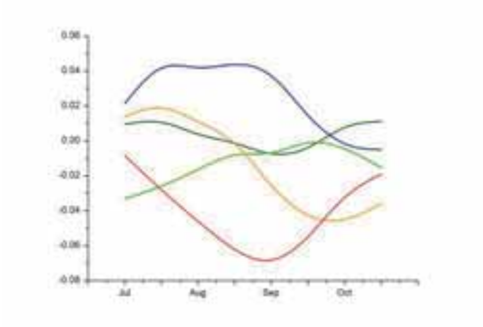
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



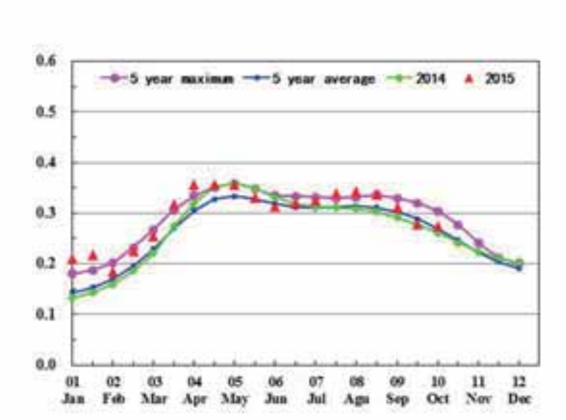
(d) NDVI profiles

[UZB] Uzbekistan

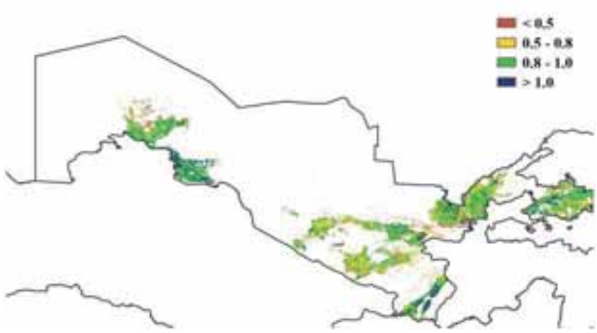
This monitoring period covers the harvesting and sowing stages of winter wheat, as well as the growing and harvesting stages of maize. Winter wheat, which is the most important crop in Uzbekistan, was harvested in June and the next season crop is currently being planted.

Crop condition was generally favorable. Among the CropWatch agroclimatic indicators, RAIN was well above average (156%), and TEMP and RADPAR below average by 0.5% and 1%, respectively. The combination of the factors resulted in high BIOMSS (+105%) compared to the five-year average. From July to late September, judging by the spatial NDVI patterns and profiles, the whole country experienced good conditions. Crop condition in the whole country was at least average throughout the entire monitoring period. CropWatch estimates that the wheat production increased 7% compared with the previous season, mainly due to an increase in CALF that reached 9%.

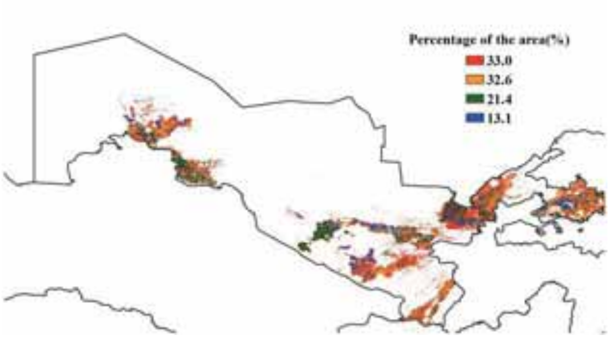
Figure 3.32. Uzbekistan crop condition, July-October 2015



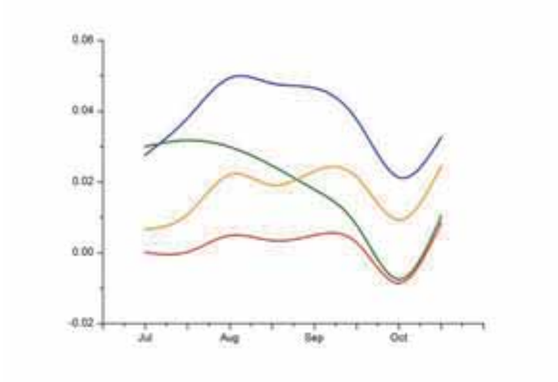
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



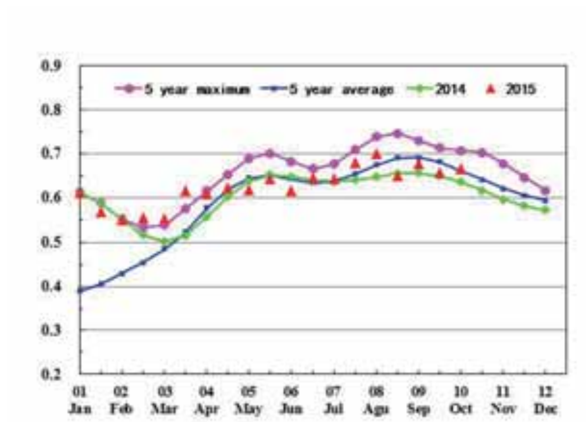
(d) NDVI profiles

[VNM] Vietnam

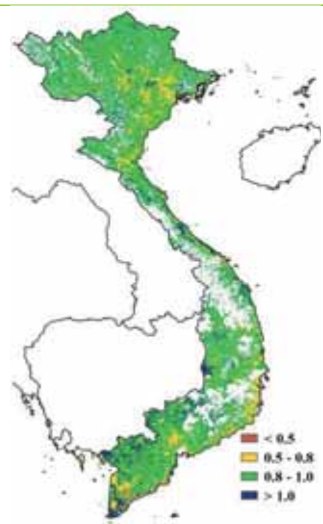
The harvesting period of summer and autumn rice has been completed, while the 10th month rice was still growing at mid-October. The crop condition from July to October was slightly lower than the recent five-years average. For the period under consideration, most CropWatch agroclimatic and agronomic indicators show average conditions or a slight drop below the average: RADPAR (0%), TEMP (+0.1°C), BIOMSS (-3%), and RAIN -10%).

Spatial NDVI profiles show that the crop condition was mostly above average in the Red River delta (including Lang Son and Cao Bang). Other areas recorded about average NDVI, especially in the middle mountain area and the south. NDVI profiles show that crop condition was above average in 21.7% of the major rice plantation area, mainly the Mekong River delta from September to October, with VCIx ranging between 0.8 and 1. Based on CropWatch indicators, the crop situation in Vietnam is considered to be satisfactory and close to average.

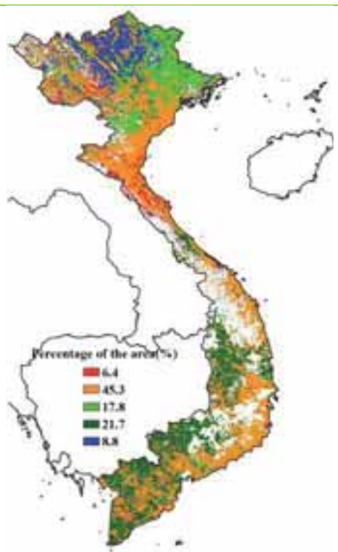
Figure 3.33. Vietnam crop condition, July-October 2015



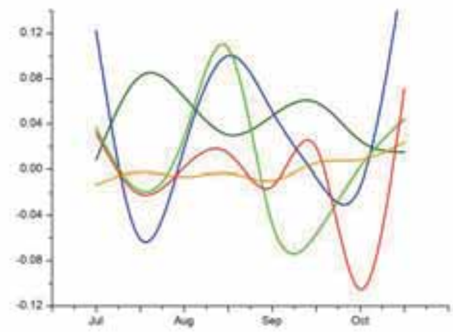
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



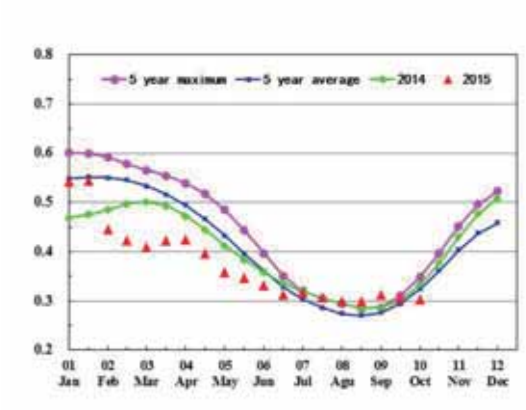
(d) NDVI profiles

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**

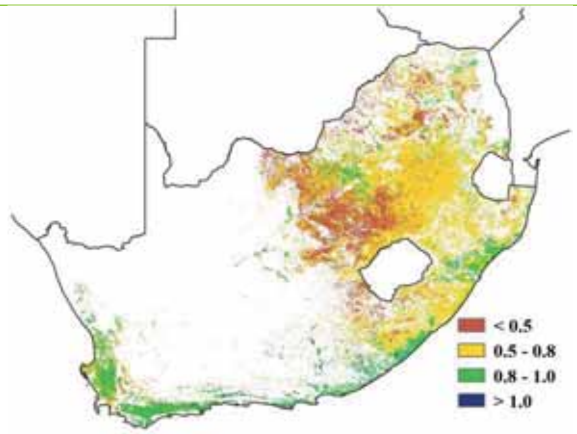
[ZAF] South Africa

In South Africa, the major summer crops, including maize, millet, sorghum and soybean, and winter cereals (such as barley and wheat) are harvested roughly during the period from May to June and the period from October to November, respectively. Therefore, maize, millet, sorghum, and soybean have already been harvested at the end of this reporting period, while barley and wheat are in their growing stage. Compared with the averages, rainfall, biomass accumulation and CALF have decreased significantly: 15% for rainfall, 7% for the biomass accumulation and 16% for CALF. Temperature was 1.1°C higher than average, and RADPAR remained close to the reference value. The NDVI values were lower than the five-year average in the first half of the year, after which it was close to the average; it exceeded the average value during this monitoring period, which can be explained by growing barley and wheat crops. Low VCIs mostly occurred in the Northern areas but the minimum VCI occurred in the Free State and North West province. In contrast, the southern coastal areas showed relative high VCIs values (0.8-1.0) in the main winter crop zones. According to figures (c) and (d), low NDVI occurred in South Africa, it shows production of winter cereals in the southern Mediterranean region (the major wheat zone), is expected to poor to fair. However, the main sugarcane zones in the Eastern Cape and the KwaZulu-Natal presented relative high NDVI values as well as the major citrus growing areas along the coast from the KwaZulu-Natal to the Eastern Cape and the Southern West Cape. Overall crop prospects are optimistic.

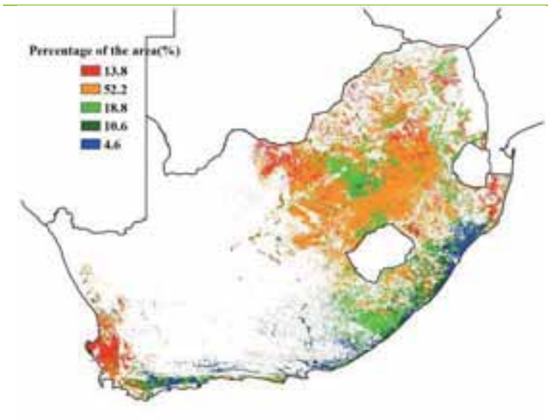
Figure 3.34. South Africa crop condition, July-October 2015



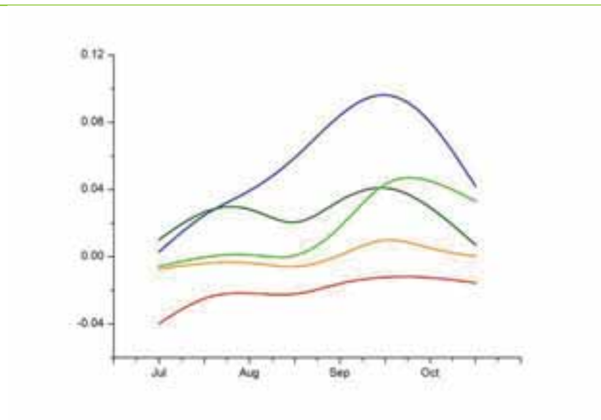
(a) Crop condition development graph based on NDVI



(b) Maximum VCI



(c) Spatial NDVI patterns compared to 5YA



(d) NDVI profiles

Chapter 4. China

Chapter 4 presents a detailed analysis for China, focusing on the seven most productive agro-ecological regions of the east and south. After a brief overview of the agroclimatic and agronomic conditions over the monitoring period (section 4.1), a new bulletin section (4.2) describes the situation with pests and diseases that are affecting agricultural crops in China. Section 4.3 then presents an outlook for 2015 production of maize, rice, wheat, and soybean, while section 4.4 presents analyses by region. Additional information on the agroclimatic indicators for agriculturally important Chinese provinces are listed in table A.11 in Annex A.

4.1 Overview

Average conditions prevailed during the monitoring period (rainfall, +1%; temperature -0.7°C and RADPAR, -3%), resulting in average potential biomass (BIOMSS). TEMP was low in all seven regions in China; the largest decrease (-1.3°C) in the Lower Yangtze region was associated with abundant rainfall while in other regions, temperature was just slightly lower than average. RAIN was significantly lower than expected in in Huanghuaihai (-30%), the Northeast region (-24%) and the southern islands (Hainan, -41%; Taiwan, -25%) while extremely high precipitation was recoded over Xinjiang (+173%). Almost all of the major agricultural areas of China suffered from low temperatures during mid-August, September and late-October.

Table 4.1. CropWatch agroclimatic and agronomic indicators for China, July-October 2015, departure from 5YA and 14YA

Region	Agroclimatic indicators			Agronomic indicators			
	Departure from 14YA (2001-14)			Departure from 5YA (2010-14)			Current
	RAIN (%)	TEMP (°C)	RADPAR (%)	BIOMSS (%)	CALF (%)	Cropping intensity (%)	Maximum VCI
Huanghuaihai	-30	-0.4	5	-23	-1	0	0.85
Inner Mongolia	5	-0.3	1	-5	0	-2	0.80
Loess region	0	-0.3	7	-5	5	2	0.80
Lower Yangtze	17	-1.3	-8	11	0	-2	0.89
Northeast China	-24	-0.1	1	-22	-1	0	0.83
Southern China	26	-0.4	2	6	0	-3	0.88
Southwest China	-3	-0.7	-7	3	0	1	0.90

Note: Departures are expressed in relative terms (percentage) for all variables, except for temperature, for which absolute departure in degrees Celsius is given. Zero means no change from the average value; relative departures are calculated as (C-R)/R*100, with C=current value and R=reference value, which is the five (5YA) or fourteen-year average (14YA) for the same period (July-October).

Figures 4.1-4.6 illustrate the distribution and profiles of rainfall (RAIN) and temperature (TEMP) indicators, as well as the fraction of cropped arable land (CALF), maximum vegetation condition index (VCIx), cropping intensity, and minimum vegetation health index (VHIn). Indicator values are also provided in table 4.1.

Figure 4.1. China spatial distribution of rainfall profiles

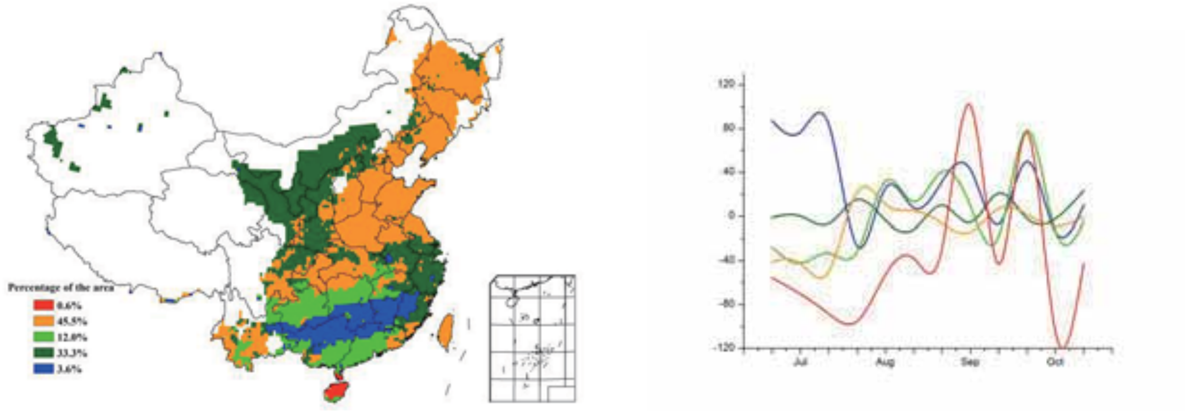


Figure 4.2. China spatial distribution of temperature profiles

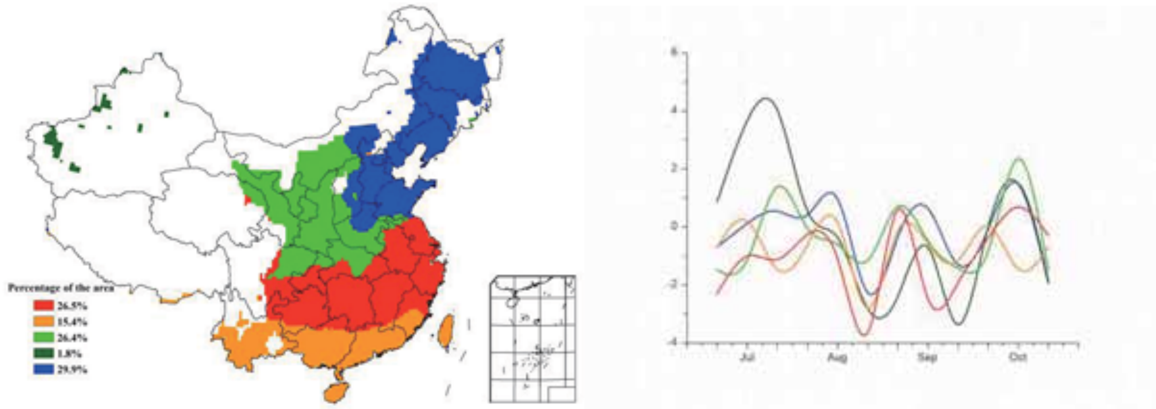


Figure 4.3. China cropped and uncropped arable land, by pixel

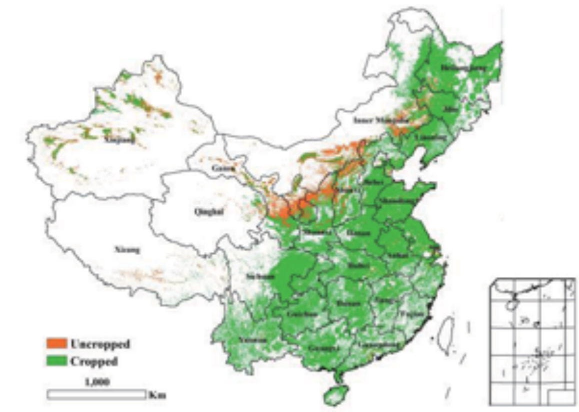


Figure 4.4. China maximum Vegetation Condition Index (VCIx), by pixel

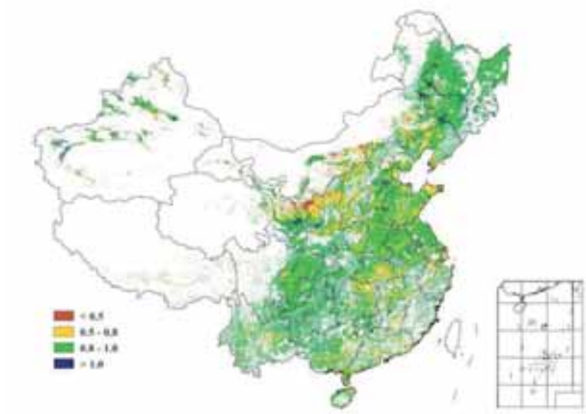
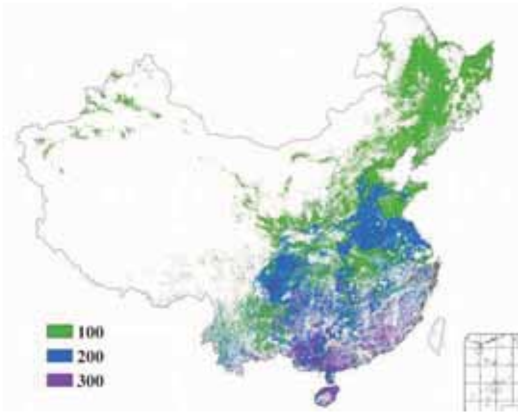


Figure 4.5. China minimum Vegetation Condition Index (VCIx), by pixel

Figure 4.6. China cropping intensity



High VCIx values occurred mostly in southern China and in the north-east region. Low VCIx values occur mainly in central and northern China, particularly in the centre of Ningxia and the north of Shaanxi provinces. Crop condition in the north-east was above average (VCIx at 0.87), though agroclimatic conditions are average. At the regional and provincial scales, BIOMSS was above average in the Lower Yangtze (+11%) and low in the north-east (-22%), Huanghuaihai (-23%) and especially Hainan (-28%).

During the monitoring period the cropped arable land fraction (CALF) remained stable in comparison with last year; for four of the seven monitored regions, CALF was about equal to the five-year average; slightly negative values are only recorded for the north-east and Huanghuaihai regions (-1%); in the Loess region, the CALF increased by 5%, indicating that more arable land was cultivated. Cropping intensity increased by 2% and 1% in the Loess and south-western regions, respectively, but was average in the north-east and Huanghuaihai regions; it decreased in the other three regions. Uncropped land was mainly located in the northwest of China.

Minimum VHI indicates that almost all provinces in central and eastern China suffered from water stress, including the south-east of Sichuan, central Jiangsu, central Liaoning, and the west of Hebei (figure 4.6).

4.2 Impact of pests and diseases

The impact of pests and diseases was relatively moderate during September 2015 in the main rice regions of China. For Southern China and the middle and lower reaches of the Yangtze River, most of late rice is at milking or milk ripeness stages; therefore, migratory pests and epidemic diseases still constitute a threat to rice yield.

The distribution of the rice plant hopper during September 2015 is shown in figure 4.7 and table 4.2. The total area affected with plant hopper has reached 6 million ha, with the pest mostly occurring in Huanghuaihai, Southern China, middle and lower reaches of the Yangtze River. The most severely affected areas include central Hubei, southern and central Hunan, southern and central Jiangxi, and eastern Henan.

Figure 4.7. Distribution of the rice planthopper

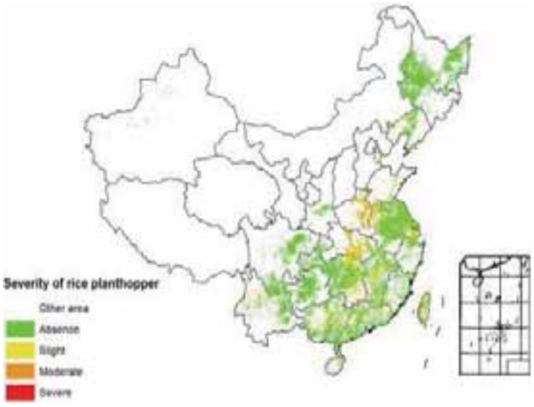


Table 4.2. Areas in China affected by rice planthopper, September 2015

Region	Area (thousand hectares)					
	Absence	Slight	Moderate	Severe	Total	Occurrence ratio
Huanghuaihai	593.3	689.3	330.7	4.7	1618.0	63.3%
Inner Mongolia	273.3	19.3	1.4	0	294.0	7.0%
Loess Region	131.3	10	2.0	0	143.3	8.4%
Lower Yangtze	5409.3	3395.3	636.0	28.7	9469.3	42.9%
Northeast China	4184.0	67.3	4.0	0	4255.3	1.7%
Southern China	1849.3	385.4	14.0	6	2254.7	18.0%
Southwest China	4537.3	219.4	57.3	10.7	4824.7	6.0%

Rice sheath blight (figure 4.8 and table 4.3) damaged around 8.6 million ha in the whole country, with the disease mostly found in Huanghuaihai, Southern China, and the middle and lower reaches of the Yangtze River. Damage was most severe in eastern and central Hubei, southern and central Hunan, southern and central Jiangxi, eastern and central Guangxi, northern and central Guangdong and eastern Henan.

Figure 4.8. Distribution of rice sheath blight in China, September 2015

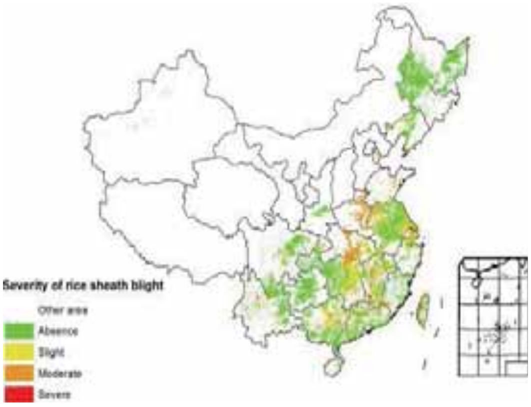


Table 4.3. Areas in China affected by rice sheath blight, September 2015

Region	Area (thousand hectares)					
	Absence	Slight	Moderate	Severe	Total	Occurrence ratio
Huanghuaihai	358.0	490.7	733.3	36.0	1618.0	77.9%
Inner Mongolia	238.7	48.6	6.7	0.0	294.0	18.8%
Loess Region	128.7	6.0	7.3	1.3	143.3	10.2%
Lower Yangtze	3439.3	3588.0	2102.7	339.3	9469.3	63.7%
Northeast China	4102.7	126.0	26.6	0.0	4255.3	3.6%
Southern China	1606.7	459.3	94.0	94.7	2254.7	28.7%
Southwest China	4277.4	373.3	144.0	30.0	4824.7	11.3%

Rice leaffolder (figure 4.9 and table 4.4) damaged around 5 million ha in the country, mostly in Huanghuaihai, as well as middle and lower reaches of the Yangtze River. Damage was most severe in central Hunan, most of Jiangxi and central Guangxi.

Figure 4.9. Distribution of rice leaffolder in China, September 2015

Table 4.4. Areas in China affected by rice leaffolder, September 2015

Region	Area (thousand hectares)					
	Absence	Slight	Moderate	Severe	Total	Occurrence ratio
Huanghuaihai	1125.3	235.4	241.3	16	1618	30.4%
Inner Mongolia	245.3	34.7	14	0	294	16.6%
Loess Region	137.3	2.7	2	1.3	143.3	4.2%
Lower Yangtze	5870	1970	973.3	656	9469.3	38.0%
Northeast China	4129.3	81.3	44.7	0	4255.3	3.0%
Southern China	1794	242	98	120.7	2254.7	20.4%
Southwest China	4450.7	260	89.3	24.7	4824.7	7.8%

4.3 Crop production

By the end of October, the harvest of maize, rice, wheat and soybean was over. Table 4.5 lists their revised 2015 production estimates. Table 4.6 provides additional detail about production for different rice cropping seasons.

Table 4.5. China, 2015 maize, rice, wheat and soybean production and percentage difference with 2014, by province

	Maize		Rice		Wheat		Soybean	
	2015	**Δ(%)**	**2015**	**Δ(%)**	**2015**	**Δ(%)**	**2015**	**Δ(%)**
Anhui	3598	-1	17369	1	11245	-1	1109	1
Chongqing	2162	3	4887	2	1118	0		
Fujian			2881	2				
Gansu	4815	5			1607	-1		
Guangdong			11037	0				
Guangxi			11268	3				
Guizhou	4952	-1	5219	1				
Hebei	17251	6			10730	1	180	5
Heilongjiang	25920	-1	20304	0			4581	0
Henan	16775	5	3940	1	25992	1	774	5
Hubei			16001	1	4328	-3		
Hunan			25353	0				
Inner Mongolia	14263	-1					827	-1
Jiangsu	2249	1	16970	2	9606	1	792	1
Jiangxi			17415	0				
Jilin	24295	1	5069	1			669	1
Liaoning	12755	-1	4831	3			516	1
Ningxia	1726	-4	542	-1				
Shaanxi	3640	-6	1053	1	3997	1		
Shandong	18824	3			22881	5	677	3
Shanxi	8771	-9			2109	1	173	-8
Sichuan	7178	1	14886	1	4673	2		
Xinjiang	6634	3						
Yunnan	5816	4	5316	0				
Zhejiang			6455	0				
Sub total	**181625**	**1**	**190795**	**1**	**98286**	**1**	**10298**	**1**
Other provinces*	12109	3	11531	-4	15639	2	2715	-5
National total*	**193734**	**1**	**202325**	**1**	**121613**	**2**	**13014**	**-1**

Note: * production of Taiwan province is not included.

The production of maize is revised to 193.7 million tons (an increase of 1% from 2014), about 900 thousand tons up from the CropWatch August forecast. Rice and wheat production remained the same as in the August forecast, with their production increased by 1% and 2% compared with the previous season, respectively. Soybean is revised up to 13.0 million tons (323 thousand tons higher than the previous CropWatch forecast) but this is still a decrease of 1% due to a reduction in planting area. For rice, single rice production is revised to 131.5 million tons, an increase of 1% compared with the previous year, and 1.34 million tons up from the previous forecast. The upward revision is mainly due to favorable conditions at late growing stages. Early rice and late rice production remain the same as in the forecast issued by CropWatch in August.

Compared to August, the forecast for maize production in Inner Mongolia, Jilin and Shandong was revised upwards by more than 200 thousand tons mainly due to the revised yield. In contrast, recent remote sensing data show a deterioration compared to the August estimates in Xinjiang and Shanxi where maize production was revised down by about 200 and 300 thousand tons. Rice production for most provinces was revised up from the August forecast except for Anhui and Jiangsu where rice was impacted by flooding and strong wide during mid-August. The unfavorable conditions harmed mainly single rice in Jiangsu and Anhui.

Driven by most up-to-date remote sensing data, CropWatch models foresee an increase in soybean yield for most provinces that produce except for Shanxi. New estimates show that the soybean production in Heilongjiang province - the top soybean producing province in China, representing nearly one third of the national soybean production - is at same level as 2014 and 168 thousand tons up from August forecast.

CropWatch revised the total annual output (including cereals, legumes, and tubers) to 568.1 million tons, 0.8% up from 2014 (a 4.3 million tons increase) and 0.4 million tons up from the August forecast. The total summer production is forecast at 407.3 million tons, a 0.6% increase (equivalent to 2.4 million tons) over last year's drought conditions and slightly above the 2013 summer crop production. The production estimates for early rice and winter crops remain unchanged compared with the August forecast.

Table 4.6. China, 2015 single rice, early rice, and late rice production and percentage difference with 2014, by province

	Early Rice		Single Rice		Late Rice	
	2015	**Δ(%)**	**2015**	**Δ(%)**	**2015**	**Δ(%)**
Anhui	1840	-4	13743	2	1787	0
Chongqing			4887	2		
Fujian	1733	3			1148	1
Guangdong	5305	2			5733	-2
Guangxi	5591	3			5676	2
Guizhou			5219	1		
Hebei						
Heilongjiang			20304	0		
Henan			3940	1		
Hubei	2320	-3	10880	2	2801	-1
Hunan	8207	-1	8532	2	8614	-2
Jiangsu			16970	2		
Jiangxi	7367	1	2873	0	7175	0
Jilin			5069	1		
Liaoning			4831	3		
Ningxia			542	-1		
Shaanxi			1053	1		
Sichuan			14886	1		
Yunnan			5316	0		
Zhejiang	821	-3	4747	1	887	-3
Sub total	**33184**	**0**	**123790**	**1**	**33821**	**-1**
Other provinces*	1940	-17	7716	-5	1874	21
National total *	**35123**	**-1**	**131507**	**1**	**35695**	**0**

Note: * production of Taiwan province is not included.

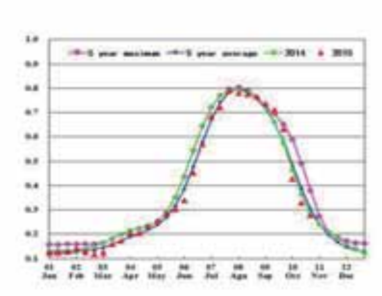
4.4 Regional analysis

Figures 4.10 through 4.16 present crop condition information for each of China's seven regions. The provided information is as follows: (a) Crop condition development graph based on NDVI, comparing the current season up to July 2015 to the previous season, to the five-year average (5YA), the five-year maximum; (b) Spatial NDVI patterns from April to July 2015 (compared to the (5YA); (c) NDVI profiles associated with the spatial patterns under (b); (d) maximum VCI (over arable land mask); and (e) biomass for April-July 2015. Additional information about agroclimatic indicators and BIOMSS for China is provided in Annex A, table A.11.

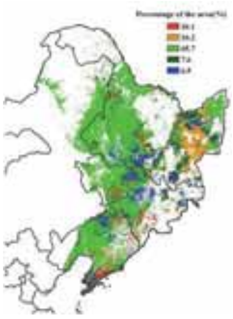
Northeast region

CropWatch agro-climatic and agronomic indicators describe around average conditions over most of the region during the reporting period (figure 4.10). The harvest of spring crops was concluded in October, while summer crops (including maize, rice and soybean) reached the grain filling to maturity stages from August to late September. As shown in the spatial NDVI patterns, compared to their recent five-year average and the corresponding cluster profiles, most (65.7%) crops were in average condition except east of Liaoning province. Significantly below average rainfall stressed crops in most of Liaoning province (-43%) and NDVI was well below the five-year average in the small area of the Liaodong peninsula. In the east of Heilongjiang province, NDVI also shows poor condition of crops due to the deficit of rain (-13%). However in the west of Jilin and Heilongjiang provinces, the crop condition was around and even better than average. However, more than half of the area suffered from a decreased biomass production potential (below -20%) when compared to the five-year average. The output expected from the region is average.

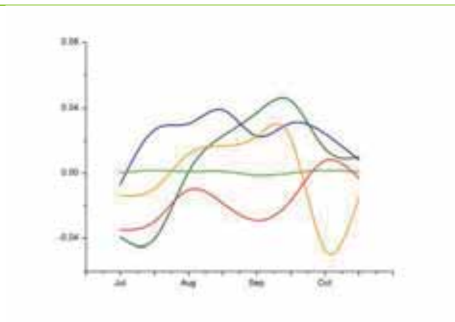
Figure 4.10. Crop condition China Northeast region, July-October 2015



(a) Crop condition development graph based on NDVI

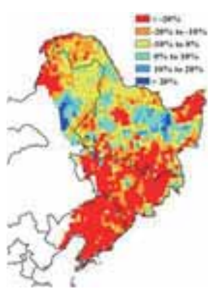


(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles

(d) Maximum VCI

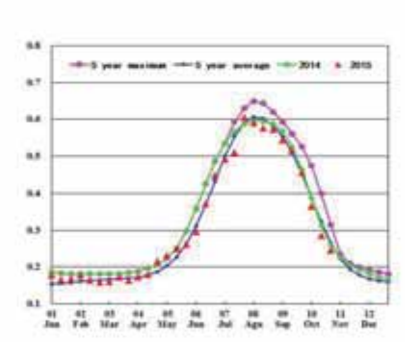


(e) Biomass

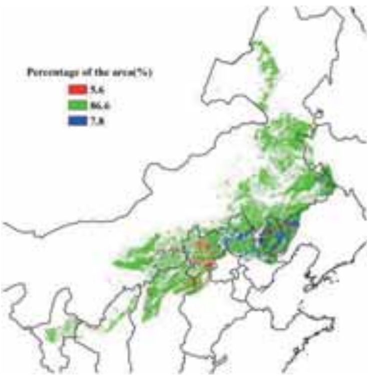
Inner Mongolia

The condition of maize and soybean, the main summer crops in Inner Mongolia, was generally unfavorable during the reporting period (figure 4.11): rainfall was above average by 5%, but poorly distributed; central and western areas were dry from June. TEMP was below average by 0.3°C, RADPAR above average by 1%, and BIOMASS below average by 5%. The crop development graph reflects poor crop condition throughout the monitoring period. Western and southern areas suffered from drought, which has significantly affected crop growth with troughs in the NDVI profiles starting in July in approximately 6% of the region. Western Liaoning, western Hebei, northern Shanxi and central and south-eastern Inner Mongolia all have poor vegetation conditions according to the VCIx map. In partly cropped land, the potential biomass was poor due to drought. According to the CropWatch indicators, maize and soybean production decreased to varying degrees compared with the previous season.

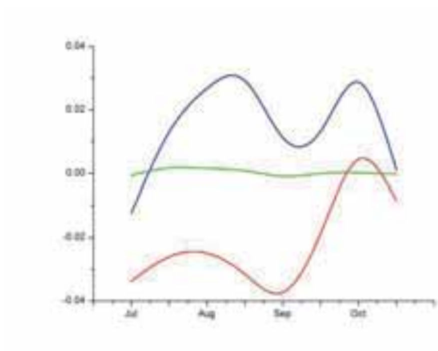
Figure 4.11. Crop condition China Inner Mongolia, July-October 2015



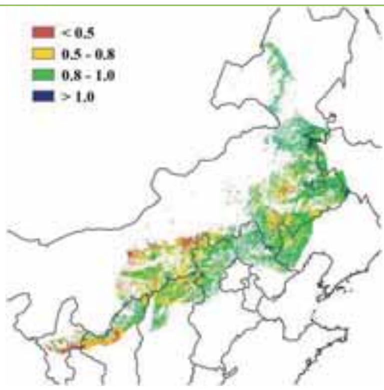
(a) Crop condition development graph based on NDVI



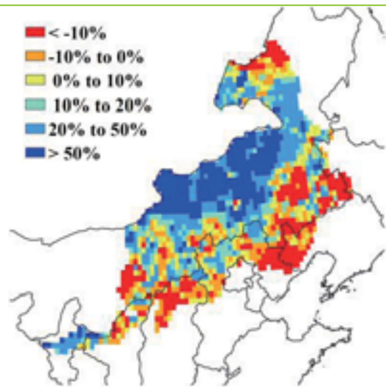
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI

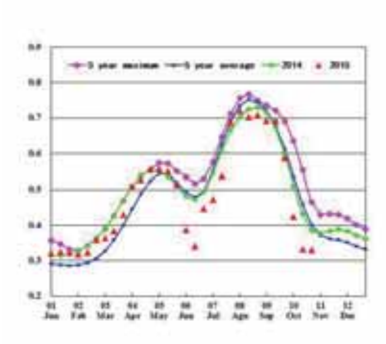


(e) Biomass

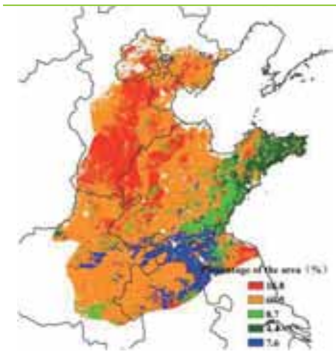
Huanghuaihai

During the monitoring period, the harvest of summer crop, including maize, rice and soybean, has been completed in early October, and the winter wheat is currently in its tillering stage. From July to October adverse meteorological conditions prevailed in Huanghuaihai; precipitation dropped significantly below average (-30%) and RADPAR increased by 5%, even if temperature remained average. Below-average rainfall led to a dramatic decline of biomass (-23%). The maximum VCI presented high values in southern Hebei province. According to the spatial NDVI patterns (compared to the recent five-year average) and corresponding NDVI profiles, NDVI was above average in most areas, except southern Hebei province and northern parts of Shandong province. Overall, the spatial average NDVI graph indicates the crop condition is below average and initial growing conditions for winter crops are not optimistic either.

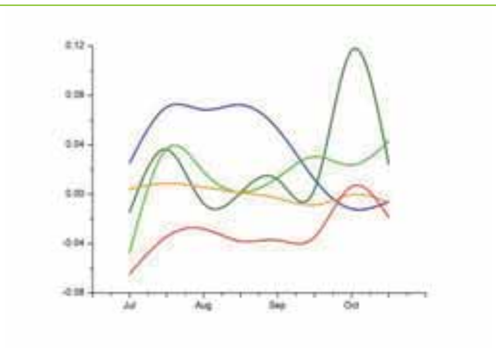
Figure 4.12. Crop condition China Huanghuaihai, July-October 2015



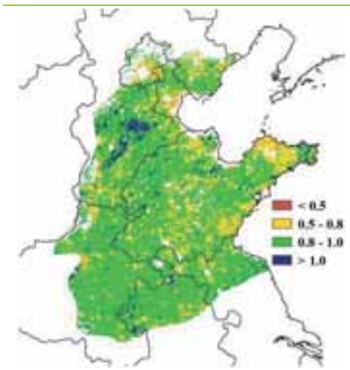
(a) Crop condition development graph based on NDVI



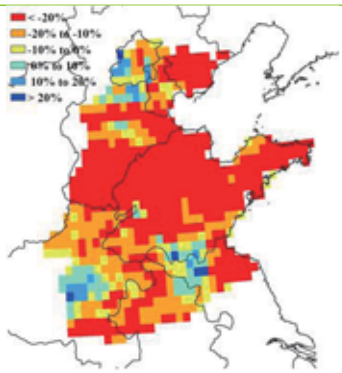
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI



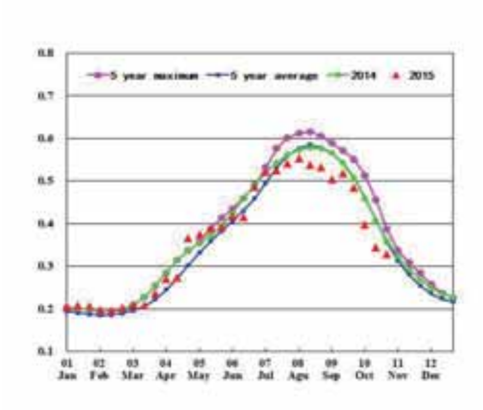
(e) Biomass

Loess region

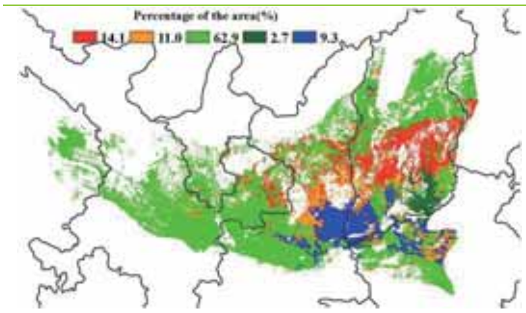
Maize in this area was harvested in late September and early October, and winter wheat has been planted during the monitoring period. From the beginning of July, crop condition was worse than last year's and below the five-year average (figure 4.13). Temperature, precipitation and PAR were average, resulting in potential biomass just slightly below average (-5%).

The analysis of spatial NDVI clusters and profiles indicates that most of the area's crop was (confirmed by the VCIx); the most favorable conditions occurred mainly in the east of Shaanxi and the south-west of Shanxi before September, due to the abundant rainfall and suitable sunlight. On the contrary - and mostly because of drought in August (as confirmed by the maps of potential biomass) - crops were in poor condition (compared to the five-year average) in the provinces of Shanxi and Shaanxi. The crop condition in some areas was apparently below average in late September, however, this may be as a result of early harvest rather than a poor crop. Due to suitable rainfall (+1%), more arable land was cropped than in recent years (CALF increased 5%).

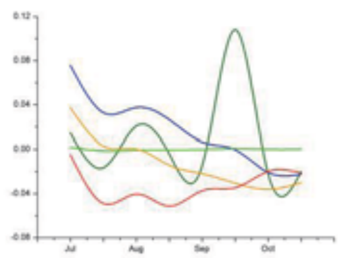
Figure 4.13. Crop condition China Loess region, July-October 2015



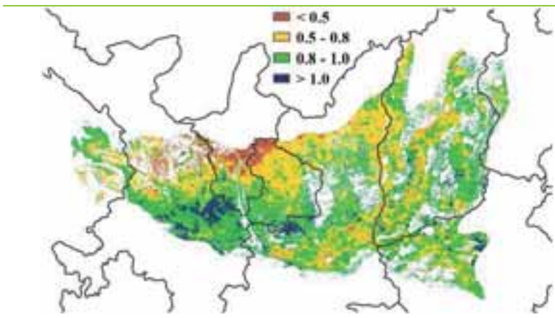
(a) Crop condition development graph based on NDVI



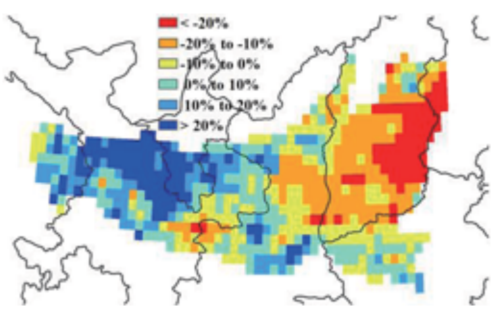
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI

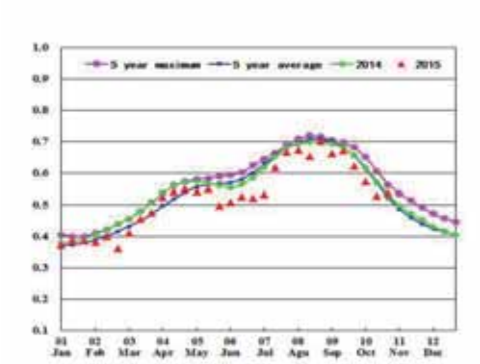


(e) Biomass

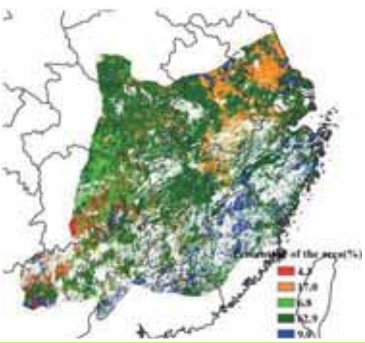
Lower Yangtze region

At the end of October, the harvest of semi-late rice was almost concluded while late rice was at the maturity stage in the region. In general, crop condition was below the recent five-year average between August and September according to the crop condition development graph. The CropWatch agroclimatic indicators show that rainfall was above average (+17%) whereas temperature and RADPAR were below (-1.3°C and -8%, respectively). Over the reporting period, the cropped arable land fraction (CALF) was stable, while the cropping intensity dropped slightly (-2%). The biomass production potential (BIOMSS) was above the five-year average (+11%), with the best conditions (>+20%) occurring in southern regions, such as Fujian, southern Jiangxi and Hunan, and northern Guangxi and Guangdong. The NDVI profiles and spatial NDVI patterns indicate that about 63% of croplands were continuously at the average level, mainly in the north-western and central parts of the region. The CropWatch estimates production in the Lower Yangtze region to be close to the recent five-year average (figure 4.14).

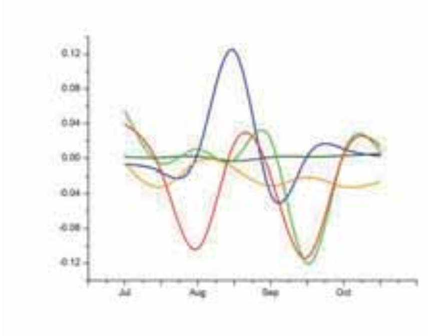
Figure 4.14. Crop condition Lower Yangtze region, July-October 2015



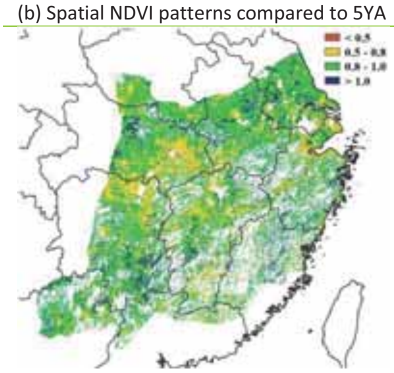
(a) Crop condition development graph based on NDVI



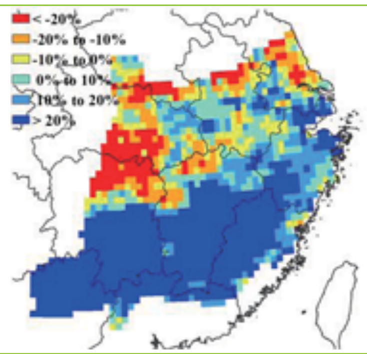
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI



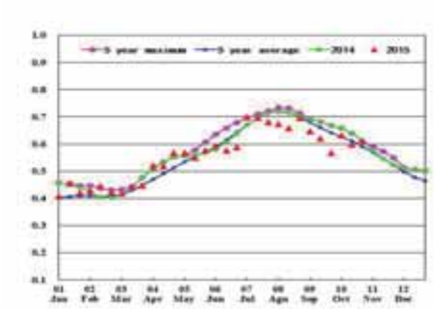
(e) Biomass

Southwest China

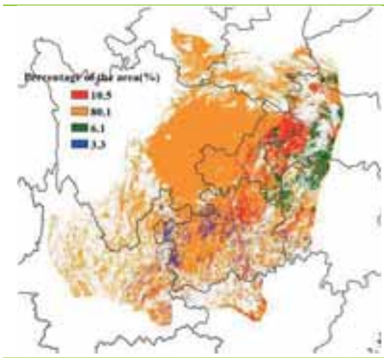
The overall condition of crops was partly below average in Southwest China between July and October (figure 4.15). The period coincides with the region's harvest season for maize and single cropped rice and the planting season for winter wheat. NDVI profiles were below average in July, somewhat recovered at the beginning of August, and then fell below average again in September. Since then, crops recovered a reached a level close to the five-year average in October.

The following regions should be paid attention to: south-western Hubei, north-western Hunan and south-eastern Chongqing because of poor potential biomass accumulation. CropWatch found below average precipitation in Chongqing (-11%) and Hubei (-31%), which will have a negative impact on the crop condition. The spatial NDVI patterns and profiles also show below average condition in the regions mentioned above during August and September. However CALF and cropping intensity in remained average during the monitoring period.

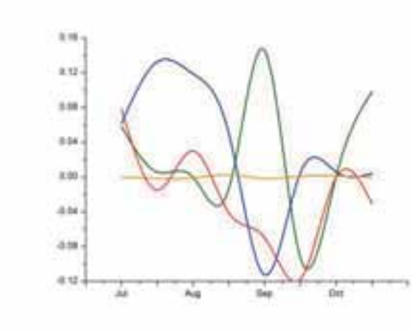
Figure 4.15. Crop condition Southwest China region, July-October 2015



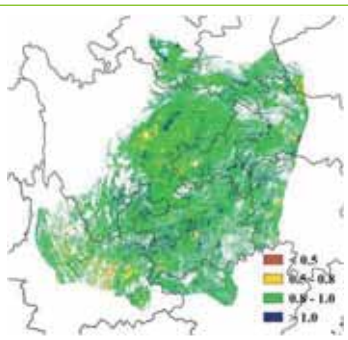
(a) Crop condition development graph based on NDVI



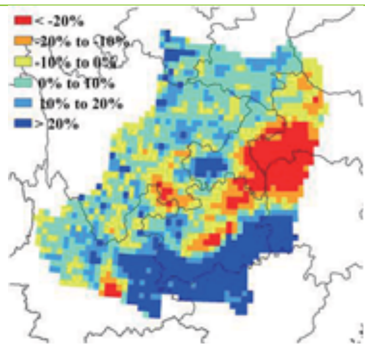
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI



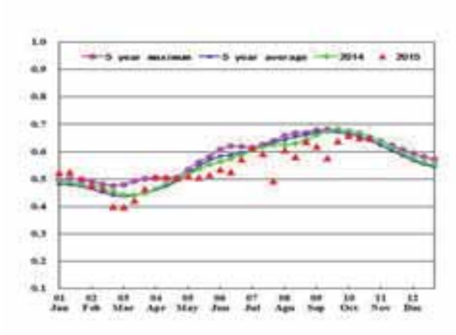
(e) Biomass

Southern China

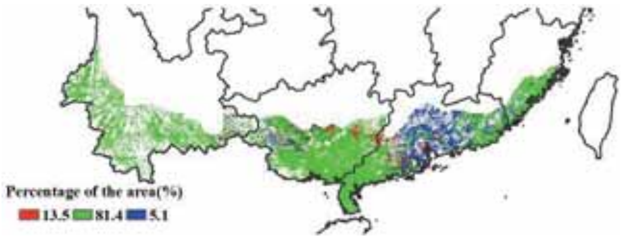
Partly below average crop conditions prevailed in southern China during the reporting period, which covered the end of the early rice harvest and the planting and harvest of late rice. The overall crop condition was average at the beginning of July, dropped to below average from July to the end of September, and recovered in October (figure 4.16).

In south-eastern Fujian, south-western Guangxi, southern Guangdong and southern Yunnan, NDVI kept close to the average five-year level, indicating the average rice growth and harvest. Compared to the latest five-year average, CALF kept unchanged and the cropping intensity decreased little (3%) in southern China. The double-cropped and late rice in southern Guangdong should be paid attention to because of the unfavourable NDVI profile, possibly due to the decreased temperature that was recorded in Guangdong (-0.7°C) during the monitoring period, even if crops recovered from the middle of September.

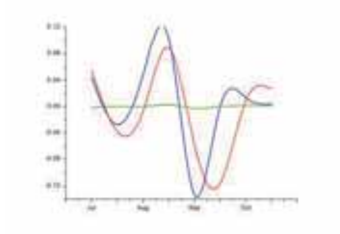
Figure 4.16. Crop condition Southern China region, July-October 2015



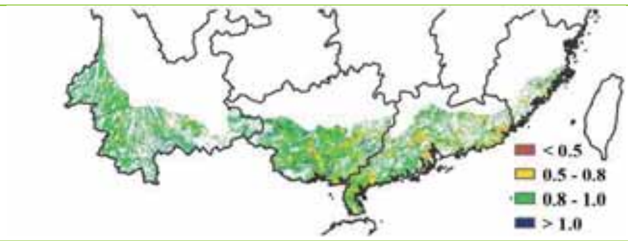
(a) Crop condition development graph based on NDVI



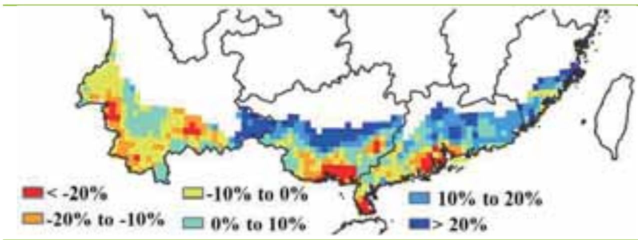
(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Maximum VCI



(e) Biomass

Chapter 5. Focus and perspectives

This focus section complements CropWatch analyses presented in chapters 1 through 4 by presenting additional information about topics of interest to global agriculture. Section 5.1 presents a production outlook for 2015, while the other three sections focus on disaster events (5.2), agricultural developments in Europe (section 5.3), and an update on El Niño (5.4).

5.1 Production outlook for 2015

The latest global CropWatch forecasts of maize, rice, wheat and soybean production for 2015 are presented in tables 5.1 and 5.2, providing both a quick overview (table 5.1) and more detailed production estimates (table 5.2) for each of the 31 countries monitored by CropWatch.

Table 5.1. Overview of 2015 production estimates and forecasts for maize, rice, wheat, and soybean (million tons) for major and minor producers and exporters

	Maize		Rice		Wheat		Soybean	
	2015	**Δ%**	**2015**	**Δ%**	**2015**	**Δ%**	**2015**	**Δ%**
Major producers	881	-0.3	668	-0.3	626	0.1	289	0.5
Minor producers	109	2.5	74	1.5	98	1.7	20	7.9
Total	**990**	**0.0**	**742**	**-0.1**	**724**	**0.3**	**309**	**1.0**
China	**194**	**1**	**202**	**1**	**122**	**2**	**13**	**-1**
Major exporters	482	0.2	286	-0.2	291	2.3	249	0.2

Note: Major exporters are those that normally account for 80% of world exports

Table 5.1 presents the revised production estimates for the major cereals and soybean for 2015. The global maize production stands at 990 million tons (unchanged from 2014), rice undergoes a slight decrease (-0.1%) to 742 million tones and wheat reaches 724 million tones (up 0.3%). Soybean displays an increase of 1% and reachs 309 million tons.

For China, CropWatch estimates the following values for maize (194 million tons, +1%), rice (202 million tons, +1%), wheat (122 million tons, +2%) and soybeans (13 million tons, -1%), continuing the decennial decrease (-1% for the current season).

As a rule, minor producers (which account for about 10% of production for maize and rice, 13% of wheat and 6% of soybean) outperform the major producers for all crops listed in terms of percentage change over the previous season. When considering only major exporters, i.e the countries that account for 80% of world exports, the situation changes only little for maize and rice (0.2% instead of 0.0% and -0.2% instead of -0.1%, respectively) and Soybean (0.2% instead of 1.0%) but more significantly for wheat (+2.3% instead of 0.3%).

Maize. The major maize producers that underwent absolute changes larger than 3% include Cambodia (-10%), India (-6%, due to poor weather), South Africa (-12%, due to El Niño) and Ukraine (-6%, due to abnormal weather conditions and the political situation). Kazakhstan and Poland both underwent a production increase of 4%. Ethiopia is also mentioned here (-3%) as, for the first time since the mid 1980s and 1998-2000 the country is facing a poor grain supply situation brought about by drought, although the impact is unlikely to be as severe as the two previous droughts.

Rice. In Australia, Ethiopia, Russia and Turkey, rice production estimates are up 20%, 7%, 5% and 6%, respectively, while marked decreases are projected for India (-1%) and Romania (-9%). Although Mexico is not a rice producer of any relevance, the size of the drop in production (-33%) is nevertheless worth mentioning.

Wheat. CropWatch projects some spectacular increases in wheat production from the western Mediterranean to Central Asia, a contiguous region for which other sections of this report (sections 1.2 and 3.1) have stressed the unusually favorable precipitation. The area includes Egypt (+5%), Turkey (+10%), Iran (+4%, after several years of unfavorable weather) and Kazakhstan (+16%) where the agricultural benefits of abundant rainfall have largely outweighed negative effects.

In Latin America, Brazil (+4%) significantly outperformed its southern neighbour in terms of wheat production (Argentina, -4%). India and Romania recorded an estimated drop of 4% while Canada underwent a more severe decrease of 8% compared with the 2014 season.

Soybean. Finally, three countries stand out among the minor producers of soybean: Russia (+35%), South Africa (+33%), and Indonesia (-11%, due to a very marked decrease of precipitation brought about by El Niño conditions). Other countries worth mentioning include Australia (+6%), India (+4%) and Ukraine (-4%).

Table 5.2. 2015 production estimates and forecasts for maize, rice, wheat, and soybean (thousand tons) in selected countries, compared to 2014 CropWatch estimates

	Maize		Rice		Wheat		Soybean	
	2015	Δ%	2015	Δ%	2015	Δ%	2015	Δ%
Argentina	25332	1	1691	-3	11630	-4	51788	-1
Australia	1052	2	1779	20	25807	1	89	6
Bangladesh	2251	1	50696	0	1315	2	64	1
Brazil	79655	1	11831	0	6946	4	90230	1
Cambodia	932	-10	9525	1			103	-6
Canada	11845	-1			30673	-8	5415	0
China	193734	1	202325	1	121613	2	13014	-1
Egypt	5936	0	6533	0	9949	5	22	-5
Ethiopia	6524	-3	195	7	4243	-3	87	20
France	14785	-2	76	-7	38972	-2	105	-2
Germany	4583	-1			27406	-1	3	5
India	18881	-6	154805	-1	91396	-4	12147	4
Indonesia	17997	-2	67586	-2			690	-11
Iran	2483	-1	2533	0	13935	4		
Kazakhstan	603	4	365	2	15990	16	252	12
Mexico	23847	0	121	-33	3626	-1	323	11
Myanmar	1717	0	27630	-3	188	1	177	-7
Nigeria	10402	-2	4550	-3	103	-14	760	9
Pakistan	4870	3	9458	0	24765	2		
Philippines	7560	1	19520	1				
Poland	3681	4			10401	-2		
Romania	10763	-3	42	-9	7170	-4	161	5
Russia	11959	2	1017	5	54366	2	2035	35
South Africa	13207	-12			1704	-2	894	33
Thailand	5050	-1	39347	1			192	-6
Turkey	5922	1	986	6	22797	10	229	16
United Kingdom					14759	1		

	Maize		Rice		Wheat		Soybean	
	2015	Δ%	2015	Δ%	2015	Δ%	2015	Δ%
Ukraine	28151	-6	160	1	23309	1	3711	-4
United States	361744	0	9923	-2	56600	3	106755	0
Uzbekistan	423	9	401	12	6739	7		
Vietnam	5184	2	45067	2				
Sub total	881072	-0.3	668163	-0.3	626403	0.1	289247	0.5
Other countries	109245	2.5	73839	1.5	97921	1.7	19545	7.9
Global	990317	0.0	742003	-0.1	724325	0.3	308792	1.0

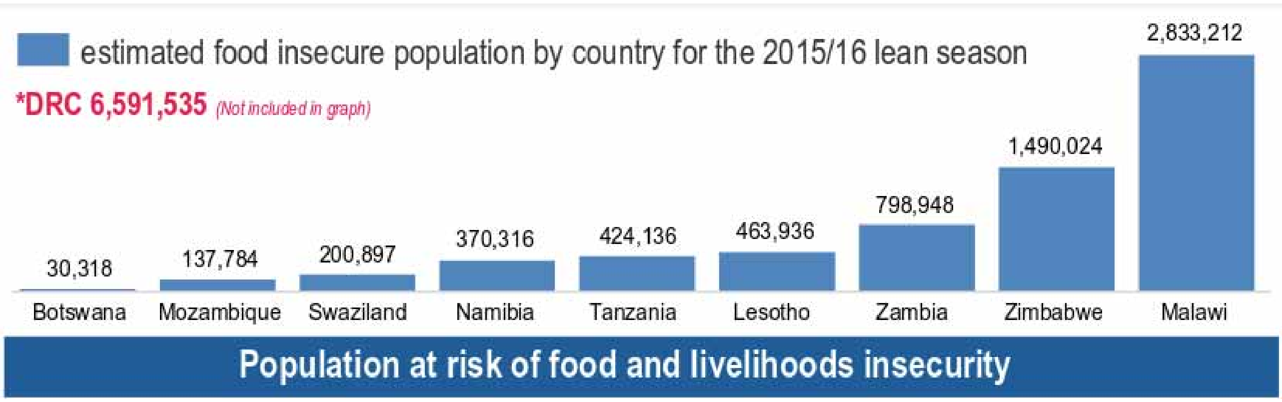
Note: The production values in this table were estimated based on satellite indices over the respective cultivation areas, except for the minor producers for which the values were extrapolated to 2015 based on FAO statistics. For maize, satellite-based estimates cover all countries with productions starting at 1,723 thousand tons for maize (Myanmar and above); 2,534 thousand tons for rice (Iran and above); 1,340 ton for wheat (Bangladesh and above), and 3,617 thousand tons for soybean (Ukraine and above).

5.2 Disaster events

The very active tropical cyclone period from July to October 2015 mainly affected the western Pacific basin, where cyclones typically make landfall in eastern Asia after crossing the island states of eastern and Southeast Asia. Cyclones, storms, and heavy rain led to significant loss due to floods and wind in the agricultural sector. On the other hand worrisome droughts severely affected eastern and southern Africa as well as Central America, creating food insecurity areas at risk of worsening over the coming months.

The reporting period was also characterized by the continuation of some disasters already reported on in the previous CropWatch bulletin. They include persisting aftershocks of the 25 April 2015 Dolakha earthquake of Nepal, affecting not only Nepal but also India and Pakistan, including a 7.5 magnitude earthquake in Peshawar on 26 October. The earthquakes created a precarious situation of insecurity and have increased the risk of landslides. This affects food production in the area.

Figure 5.1. Food insecure people in southern Africa between now and the next harvest



Note: The next harvest is starting March-April 2016, assuming rainfall will be close to expectations. *Source:* https://www.humanitarianresponse.info/en/operations/southern-africa/infographic/sadc-regional-summary-food-livelihoods-insecurity-vac-2015

The major factors that cause a deterioration of food security for the reporting period are probably also related with the situation created by El Niño, including a high frequency of floods, droughts, and tropical cyclones. For the first time in several years, there is a risk of widespread food shortages in regions of east and southern Africa and in Central America.

Drought

Detailed information about the North American drought affecting parts of the US and Canada was reported in detail in previous CropWatch bulletins, including the specific country reports in Chapter 3. At the end of August, the media reported that major wildfires had engulfed at least 10 US states, burning more than half a million hectares of forest in western States, mostly in California, Idaho, Montana, Oregon, and Washington.

The current reporting period saw drought alerts issued for the Caribbean and the Central American Dry Corridor, an area encompassing the Free and Sovereign State of the Chiapas in southern Mexico and the neighboring areas of Guatemala, El Salvador, Honduras, and Nicaragua, starting in August and extending into October. The on going drought is directly triggered by El Niño conditions.

Guatemala also suffered a deterioration of the food situation, with nearly one million people facing acute food insecurity due to reduced crop production: 900,000 people are left without domestic food stocks. In El Salvador, more than 100,000 farmers are estimated to be affected by crop losses due to a prolonged dry spell during the primera season, and up to 60% of the maize harvest was lost. An estimated 156,000 people are in IPC Phase 3 (food crisis) in the eastern and western regions of El Salvador as a result. As the drought has now been lasting for two years in some areas, 1.3 million people are estimated to suffer moderate food insecurity while for 500,000 people the shortage is ranked as severe.

By mid September, 1.6 million people were reported as affected by drought in the Dominican Republic and, similar to the Dry Corridor region, the rainfall shortage started in 2014. Crop losses amount to tens of millions of dollars in total.

At the end of August and September, Relief Web reported that 1.8 million people have been affected by prolonged dry spells and frost in the Highlands region of Papua New-Guinea. 1.3 million people are reported to be most at risk. Crops have been destroyed, and several schools and health facilities have been closed due to water shortages. The affected population is reported to be resorting to less reliable sources of drinking water as a result.

Although 2.7 million people were found to be severely food insecure in Niger during the June to September lean season in Niger, the situation there is complex with the addition of refugees to a situation of chronic food insecurity. On the other hand, outright drought affected much of east Africa (especially pastoral areas) in Kenya, Ethiopia, and south Sudan where environmental stress has compounded civil unrest.

CropWatch has stressed the risk of agricultural drought in southern Africa in previous assessments, with the major agricultural country in the region, South Africa, having suffered a drop in maize production estimated by CropWatch at -24% in August and currently put at -30% by national sources. The drought has affected neighboring countries as well, especially Malawi, Zambia, and Zimbabwe (figure 5.1) and bears the clear imprint of El Niño.

Floods, heavy rain, mudslides and tropical cyclones

Heavy rains, floods, and mudslides are typically associated with cyclones in tropical areas. High ocean surface temperatures (above 27°C) are needed to trigger and feed tropical cyclones with water vapor, which subsequently releases a lot of energy through condensation and strong winds. In fact, the energy and the destructive power of tropical cyclones are directly related to the amount of rainfall they generate.

Tropical cyclones

As already mentioned in the previous CropWatch bulletin, two intense cyclones affected Asia in July and early August: typhoon **Chan-Hom** and north Indian Ocean cyclonic storm **Komen**. Typhoon Chan-Hom (June 30 to July 15) visited Caroline Islands, Guam, Northern Mariana Islands, Japan, China, Korea, and the Russian Far East and caused losses close to US$1.46 billion, mostly in China (Zhejiang and Jiangsu provinces). Agriculture and transportation make up the largest share of the total loss.

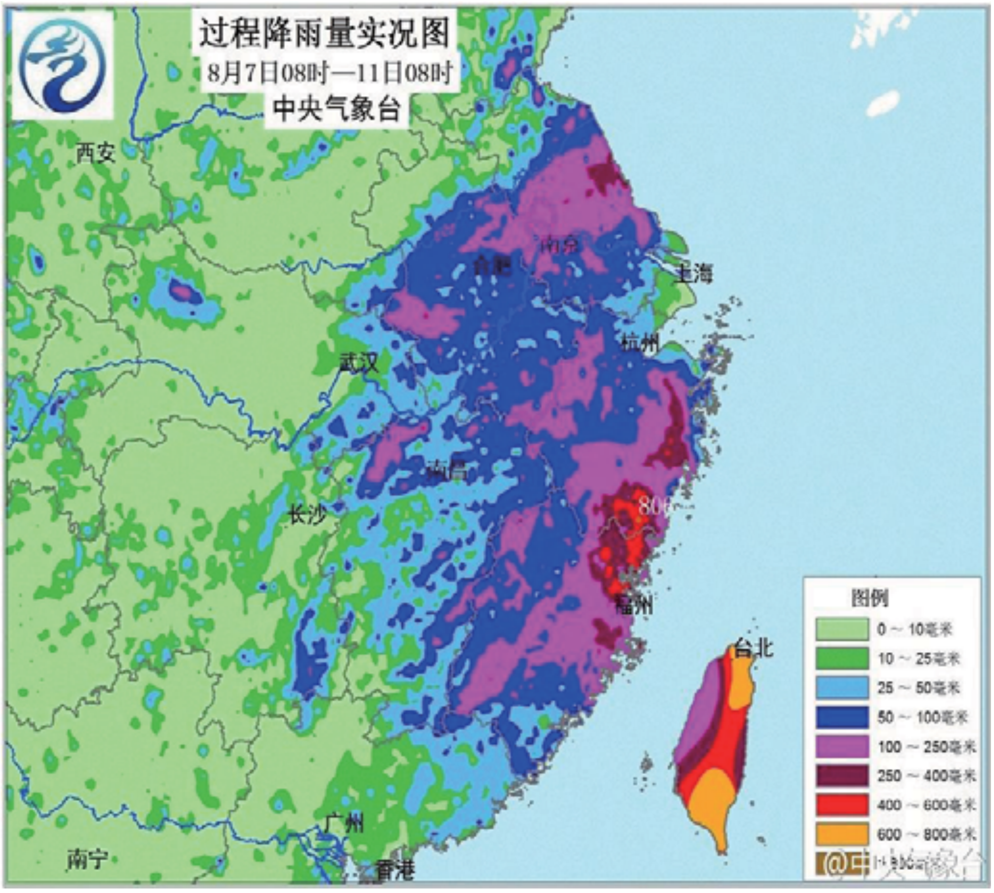
According to the FAO, the August floods and landslides associated with Komen dealt a major blow to the agriculture of Myanmar, as they affected 11 out of the country's 14 states, resulting in severely limited availability of food: more than 1.6 million people were affected and about 600,000 ha of farmland were inundated, destroying 400,000 ha of standing paddy rice fields, not to mention fish and shrimp ponds and cattle. Northern and western regions in Myanmar suffered most as a result of the floods that killed 46 and the government has declared disaster zones for Chin State, Arakan State, Magwe Division, and Sagaing Division. The Western Rakhine and Chin states are among the four worst affected areas.

Komen had a severe impact on India and Bangladesh as well, causing 170 deaths. In India, about half a million suffered from the direct and indirect impacts of tropical cyclone Komen.

Another tropical storm causing damage was **Soudelor** (July 29 to August 12) whose wind speeds reached 285 km/h (one-minute sustained) causing 38 deaths and US$3.2 billion worth of damage in total. It affected the Mariana Islands, Japan, Philippines, eastern China (Zhejiang, Fujian, Anhui, and Jiangxi provinces as well as Taiwan), and South Korea (figure 5.2). Agricultural losses in Japan reached US$2.9 million in all sectors, while close to 7,000 ha of crops sustained damage. In the Island of Taiwan, the banana crop suffered most (about 5,000 ha for a total damage of US$14.3 million. The total sector incurred a loss of US$94.8 million.

Typhoon **Goni** (Ineng) formed on 13 August and dissipated on 25 August, after affecting a large area reaching from Mariana Islands, Philippines, Japan, Korea, and China (especially Taiwan) to Russia, reaching one-minute sustained speeds of 215 km/h. 34 people lost their lives in this typhoon. Available damage estimates include US$94.3 million (mostly in agriculture and infrastructure) in the Philippines and US$60 million in Japanese agriculture. Although close to 90,000 ha suffered in Russia (for a total impact of US$35.5 million), the considerably weakened cyclone brought abundant but welcome rainfall to both China and Russia.

Figure 5.2. Total rainfall (millimetres) recorded from 7 -11 August during the passage of typhoon Soudelor



Source: https://en.wikipedia.org/wiki/Typhoon_Soudelor_%282015%29

A tropical storm name **Erika** created havoc in the Antilles (particularly Dominica), The Bahamas, and the south-eastern United States (mainly Florida) between 25 and 29 August. In spite of modest wind speeds (one-minute sustained: 85 km/h) it still created damage amounting to US$511.7 million. Dominica was the most severely affected country.

Hurricane **Joaquin** formed close to the Spanish coast on 28 September and died off over the eastern Caribbean on 15 October. One-minute sustained winds reached 250 km/h. 34 casualties were reported and damage estimates amount to at least US$60 million. The following countries were affected: Turks and Caicos Islands, the Bahamas, Cuba, Haiti, the south-eastern United States, Bermuda, and Azores. On top of that, the Iberian Peninsula was also affected in Joaquin’s early stages. Most crop losses occurred in horticulture (generally fruits).

Mujigae was a short-lived typhoon know in the Philippines as **Kabayan** that affected the Philippines, Vietnam, and China between 30 September and 5 October. One-minute sustained winds reached 215 km/h, causing 22 deaths and very significant damage amounting to US$3.69 billion according to early estimates, mostly in China. The typhoon gained strength just before reaching the country, while the Philippines mostly suffered from heavy rainfall in Luzon. In Southern China, 11 people were killed and more than 200 injured. After the landfall in Guangdong Mujigae inflected losses of US$1.97 billion and damaged about 200,000 ha of farmland there. Following Guangdong, Mujigae moved to Guanxi, where the disaster affected about 1.4 million residents in 22 counties and economic losses of US$27 million.

Typhoon **Dujuan** followed a parallel track to Mujigae, but took a more northern and slower moving between 19 and 30 September, reaching slightly higher one-minute speeds of 230 km/h (145 mph) but causing less casualties as it passed over southern Japanese islands: only three deaths were confirmed and damage reached US$660.9 million. In Fujian, direct economic losses have been estimated at US$377.5 million, including 31,000 hectares of crops. In Zhejiang, losses were ten times less and no casualties were reported. In Taiwan, losses to agriculture are estimated at US$6.59 million, mostly in Yunlin County, and most of it in directly linked to agriculture (a total of 8,000 ha was affected).

Koppu (11 to 23 October; known as **Lando** in the Philippines) is a third cycle with a track running parallel to Mujigae's and Dujuan's, but barely affecting continental China. Its highest one-minute sustained wind speeds were comparable as well with 240 km/h, causing most damage (US$235.8 million) on Luzon in the northern Philippines and, to some extent on Taiwan and Ryukyu Islands in southern Japan. About 50% of the damage occurred in the agricultural sector (US$125 million, according to PAGASA estimates), mostly in the provinces of Aurora, Cagayan, Isabela, Nueva Ecija, Nueva Vizcaya, Pangasinan, and Quirino.

Hurricane **Patricia** formed off the Pacific coast of southern Mexico on 20 October and dissipated on 24 October after affecting Central America, Mexico and the southern US (Texas). Extremely high 1-minute sustained wind speeds were reached (325 km/h), resulting in 8 casualties and damage in excess of 300 million US$. Patricia is the strongest Tropical Cyclone ever recorded on earth, no doubt in relation to El Niño conditions and very high ocean surface temperatures (30.5°C). Patricia made landfall in Jalisco, a region with low population density, and mountains that "broke" the winds and resulted in very abundant precipitation. About 45,000 Ha of crops were affected in Colima, Jalisco, Michoacán, and Nyarit States, with about one third being completely lost. Most damage occurred in agriculture.

Floods

Floods not associated with cyclones have been reported from a number of locations across all continents, especially in Asia. In late July, flash floods were reported from Iran and from the Philippines where heavy monsoon rains claimed the lives of more than 20 people on Luzon. Also in the Philippines, the Lanao Del Norte province suffered from flash floods during early August.

At the end of the August, flooding killed 40 in North Korea, affecting more than ten thousand people in the northeast of the country, along the Russian and Chinese border. In early August, torrential rains affected the country in South Hwanghae, South Hamgyong, and North Hamgyong provinces. The heaviest floods probably occurred on 11 September in Japan, after rivers burst their banks in the northeast of the country as tropical storm Etau (between 6 and 11 September) veered northeast after crossing the country over central Honshu.

In Africa heavy rainfall leading to floods was recorded around mid-August from Burkina Faso where thousands of households were affected and several people were killed near Ouagadougou. More severe floods occurred more recently (end of October) in Somalia where close to 100,000 people were affected and about half had to be relocated for their safety.

In Europe, the most significant floods occurred in Macedonia at the beginning of August.

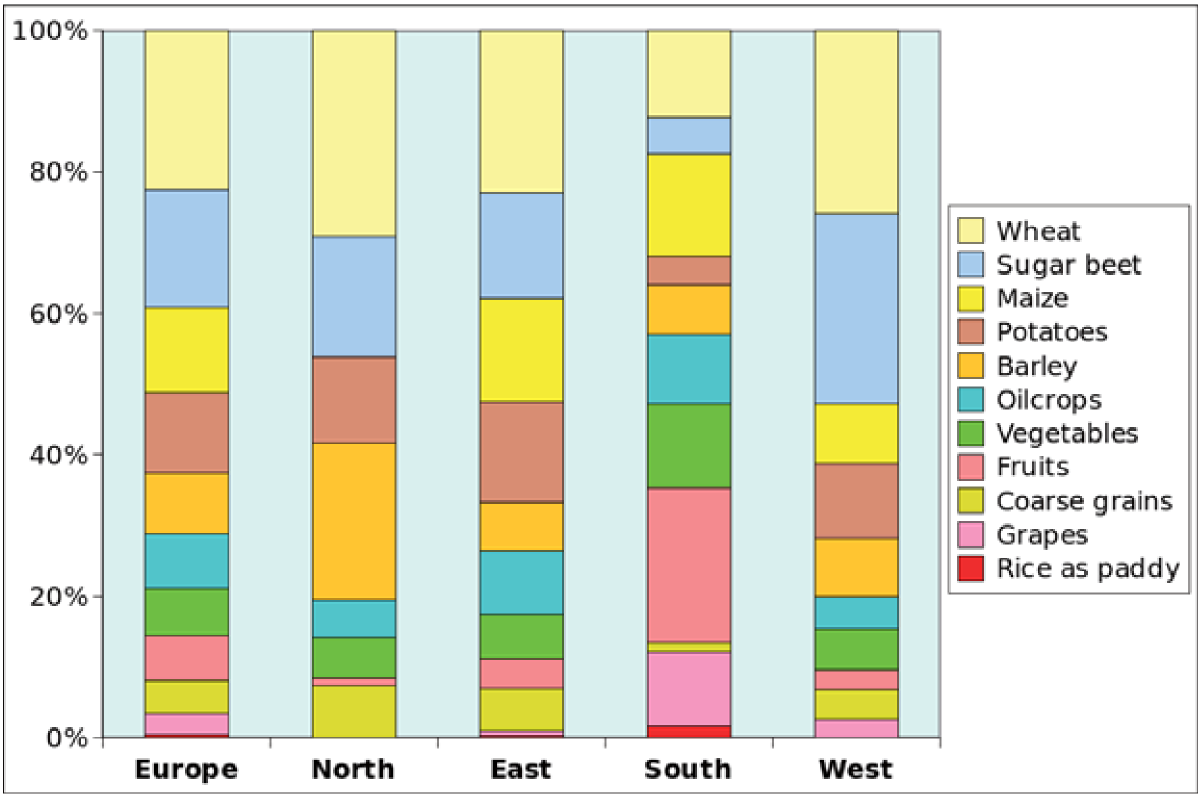
5.3 Crop production and trends in Europe

Introduction

The total European production of the fifty major food products amounted to almost exactly one billion tons in 2013. Half of this production originated in the eastern part of the continent[1] and one quarter comes from Western Europe, followed by the south and the north, with just under 10% of production. Various animal products (for example meat, milk, and eggs) are not included and would add about 20% to the total amount of food produced.

The total volume of food follows population distribution relatively closely, with an average per capita production of 1.35 tons/person per year. Average production per capita is somewhat higher in Eastern Europe (1.66 tons/person per year) and less in Northern Europe (0.81 tons/person per year)

Figure 5.3. Share by production of the fifty main commodities in Europe excluding animal products



Note: The categories often include a mix of dry and fresh products (for example dry onions and shallots in vegetables), while tomatoes are in fruits and soybeans in oil crops.

1 This analysis is based on FAOSTAT data. The country groups are also according to FAO. Western Europe: *Austria, *Belgium, *France, *Germany, *Luxembourg, *Netherlands, Switzerland; southern Europe: ,Albania, Bosnia and Herzegovina, *Croatia, *Greece, *Italy, *Malta, Montenegro, *Portugal, Serbia, *Slovenia, *Spain, the former Yugoslav Republic of Macedonia; eastern Europe: Belarus, *Bulgaria, *Czech Republic, *Hungary, *Poland, Republic of Moldova, *Romania, Russian Federation, *Slovakia, Ukraine; northern Europe: *Denmark, *Estonia, *Finland, Iceland, *Ireland, *Latvia, *Lithuania, Norway, *Sweden, *United Kingdom. European Union members are marked by *. Cyprus is a member of the UE but is an Asian country.

The crop mix

As a result of history, agricultural policies and climate, the crop mix differs among the various regions of the continent (figure 5.3). The figure includes all crop categories that belong to the “top fifty” at the continental level. Therefore some categories are excluded, such as fiber crops (flax is important in Northern Europe only) and fodder crops, especially green maize in Western Europe.

Altogether, when considering the broad categories in figure 5.3, there is remarkably little difference between the agricultural production mix in the west, north and east of Europe, an area extending from France to Russia and covering a variety of soil and climate conditions.

Wheat, sugarbeet, and maize make up about 50% of production in Europe. When potatoes and barley are added, this increases to 70%, except in the southern countries where it does not exceed 50%. It is mostly thanks to the gradual replacement of winter wheat by spring wheat in the north and in the continental east that the "European mix" can be maintained across the continent.

The categories do not necessarily include the same crops: there is some adaptation to environmental conditions, but also differing traditions. Coarse grains include rye and triticale in both areas, but oats and buckwheat occur mostly in the east of Europe. Oil crops include mostly rapeseed in both areas, but significantly more sunflower and soybeans in the east than in the west. Other crops are outright indicators such as leeks in the west, which are virtually absent in the east.

The south of Europe includes mainly Mediterranean countries, which have a typical climate with dry and warm summers as well as wet and mild winters. This results in a large share of olive oil among oil crops (about 90%), an abundance of fruits and vegetables, grapes and wine, as well as rice (mostly from Italy and Spain). Together with animal products (e.g. fish) the mix also constitutes the basis of the Mediterranean diet.

Trends

At the continental level, the production of wheat, maize and particularly soybean have been undergoing significant increases over the recent decade, mostly at the expense of barley, sugar beet and especially potatoes, which are on the decline in several regions. Table 5.3 summarizes the trends affecting major European crops.

Table 5.3. Recent trends (1998-2013) affecting European crops

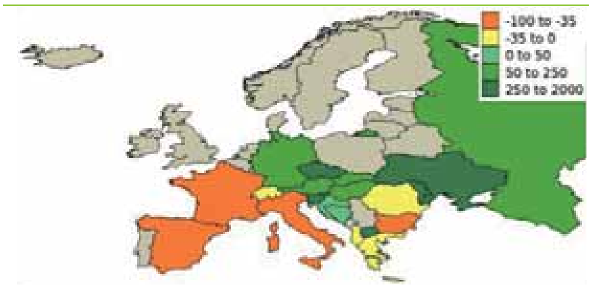
	Europe	North	East	South	West
Wheat	13/10	8/7	23/17	-8/9	8/6
Sugar beet	-0/8	-29/10	37/14	-58/16	2/7
Maize	38/12	7063/85	115/22	-6/9	6/8
Potatoes	-14/5	-22/5	-17/7	-25/4	-2/7
Barley	-3/9	-6/7	3/17	-9/20	-7/8
Soybean	137/23	n.a.	509/28	-13/19	-29/23

Note: The first number is the % difference between the average 2009-2013 production and the 1998-2002 production, the second number is the de-trended coefficient of variation in this %, i.e. the standard deviation of the departures from the linear trend divided by the 1998-2013 average. If the value is n.a., the crop doesn’t occur in the region.

Figure 5.4. Changes in the share of wheat, maize, soybean and potato areas (percent difference between 1998-2002 and 2009-2013)

(a) Maize

(b) Wheat



(c) Soybean

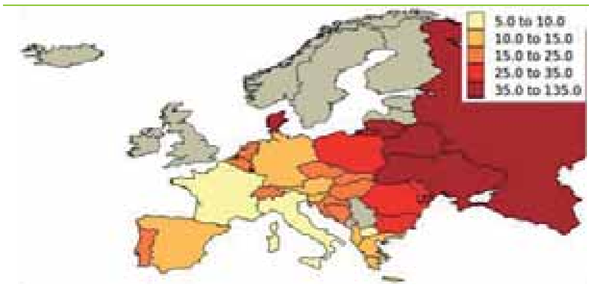
(d) Potatoes

Spectacular increases occurred in cultivated areas (figure 5.4) in the eastern part of the continent, partly because the countries were still suffering from the political and economic disruption of agriculture brought about by the end of the Soviet Union and the regimes of eastern Europe, but also because of the deliberate policies aimed at taking advantage of the international demand for soybean. The Czech republic increased production almost five-fold, while this factor is close to thirty in Ukraine.

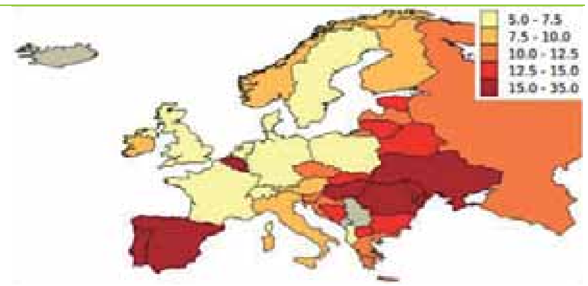
Other crops that have seen large increases are maize, especially in the north, taking advantage of two main factors: the availability of more cold tolerant varieties, and rising global temperatures, a development paralleling the northward expansion of soybean production in North America into the Canadian Prairies. The European maize boom is centered in the east: an increase of 159% in Poland, and an increase of 480% in Russia, while maize production in Belarus increased by tenfold.

As for potatoes, as mentioned previously, the production decline is a continent-wide phenomenon (figure 5.4) with only a few countries displaying positive production trends, for instance Albania, Macedonia, and Belgium. As shown in figure 5.4, production increases can be brought about by yield increases even when the area decreases (e.g. in the case of Ukraine).

Figure 5.5. Inter-annual variability (risk) of maize production and wheat yield, as measured by the de-trended coefficient of variation between 1998 and 2013



(a) Maize production



(b) Wheat Yield

In the south of Europe, the production of the crops that are dominant in the European agricultural landscape elsewhere has been declining, which indicates a relative specialization of Mediterranean crops in the south. Not only does the Mediterranean enjoy a type of agriculture that is different from other parts of the European continent (figure 5.4), but this difference is being exacerbated by current trends in agriculture. Rice is one of the crops for which areas have been expanding (an increase of 10%), together with fodder maize (an increase of 50%) and triticale (an increase of 233%), indicating an increasing focus on animal production.

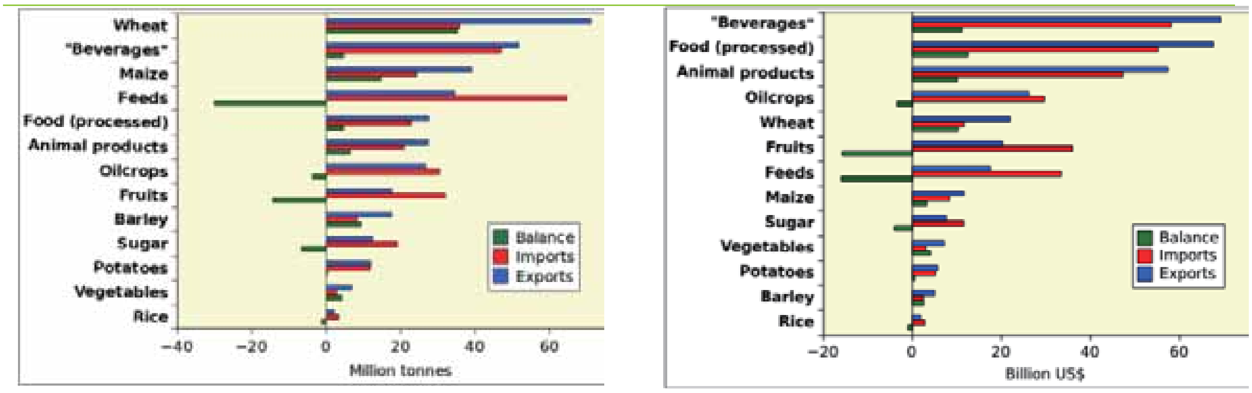
The coefficients of variation in table 5.3 and figure 5.5 are a measure of the risk incurred by farmers in terms of production variability and resulting farm income. Potatoes are generally a low risk crop, but high variability affects maize in the east, particularly at high latitudes, reflecting relative inexperience of farmers with the crop and environmental variability in many areas that are often marginal for the crop. Rapid soybean development in the east of Europe is also accompanied by high variability. Figure 5.5 demonstrates that there are large differences in risk levels for European countries, including for very traditional wheat areas, e.g. the Carpathian basin.

Trade

Wheat, maize and beverages top European agricultural exports (figure 5.6). The category of beverages includes mainly water, wine, beer, and a variety of juices, many of them prepared with concentrates of imported fruits. For wheat, maize and beverages, the trade balance is positive as the continent includes several major producers such as France, Russia, and Ukraine.

In the category of feeds, the continent suffers a deficit, which is certainly one of the factors why the noted increase in soybean cultivation is taking place. The demand for soybeans is mostly driven by China but demand for it is high globally and there are no signs of abating demand, especially if projections of meat demand (and the required animal feeds) are to be trusted.

Figure 5.6. European agricultural imports and exports by volume (left) and by value (right) in 2012



(a) Imports and Exports by Volume

(b) Imports and Exports by Value

Note: This table is based on the 50 major commodities as listed by FAOSTAT.

In terms of value (figure 5.6, right), beverages take up the first place with a value of about 69 billion US$ thanks to wine, beer, and juices, followed by the highly value-added processed food (worth 67 billion US$) which constitutes, incidentally, a partial re-exportation of imports, e.g. durum wheat imports from Italy as macaroni, or cocoa beans imported as fruit and exported as chocolate and pastry from Belgium and Switzerland.

Table 5.4. Relative contribution and rank of wheat, maize, soybeans, potato, and barley among the fifty main imports and exports of the European regions

	Imports											
	Europe		East		North		South		West		EU	
	Mt	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank
Wheat	33.0	1	6	3	11	2	45	1	38	3	94	1
Maize	24.3	3	8	5	9	5	46	2	38	4	98	3
Soybeans	15.3	5	6	24	9	10	37	4	49	6	92	5
Potatoes	8.5	9	11	23	10	20	24	7	56	9	93	8
Barley	8.1	12	14	16	10	26	14	14	62	8	91	12

	Exports											
	Europe		East		North		South		West		EU	
	Mt	Rank	%	Rank	%	Rank	%	Rank	%	Rank	%	Rank
Wheat	67.0	1	50	1	9	1	3	8	38	1	62	1
Maize	39.0	2	70	2			7	3	23	2	49	2
Barley	17.5	3	46	3	15	2			38	6	65	4
Potatoes	7.9	12				17		40		7		10
Soybeans	4.1	24	48	9					52	26	60	33

Note: EU: European Union, Mt: million metric tons.

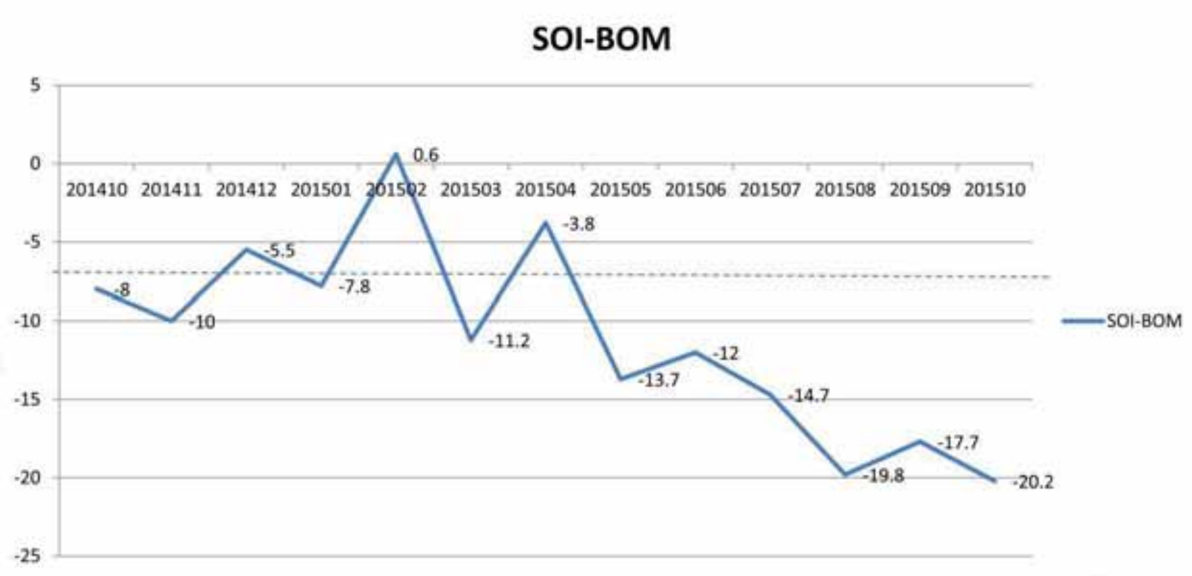
Europe also produces and exports fair amounts of oil crops (27 million tons) but imports palm and groundnut oil, leading to a negative balance in the oil crop category. Grains, including mainly wheat and maize, are relatively minor exports in terms of value.

There are significant differences between regions and countries in terms of trade of agricultural products as is evident in table 5.4. For the major crops, especially wheat, maize, and soybean, about 85% of imports go to western and southern Europe (83%, 84% and 86%, respectively; 94%, 98% and 92% are absorbed by the European Union). Those crops are among the main agricultural imports for the regions. In contrast, the east outperforms all other regions in terms of maize, wheat, and barley exports. Only for soybeans are the contributions of east (48% exported) the west (52% exported) comparable.

5.4 El Niño

El Niño continued to strengthen during the monitoring period. The graph below (figure 5.7) illustrates the behavior of the Southern Oscillation Index (SOI) of the Australian Bureau of Meteorology (BOM) from October 2014 to October 2015. Sustained negative values of SOI below -7 indicate an El Niño event, while sustained positive values above +7 are typical of La Niña. Values within the range (-7 to +7) indicate neutral conditions.

Figure 5.7. Behavior of the Southern Oscillation Index from October 2014 to October 2015



As shown in the figure, the SOI value stayed below 0 for most of the past 12 months, except in February 2015, after which it dropped continuously to reach a highly negative value of -20.2 in October of this year. Considering the consistently low negative value of SOI and tropical Pacific Ocean temperatures over El Niño thresholds, the status of the ENSO Tracker at the BOM is "real El Niño event as of October 2015"; it is likely that this will persist until the end of this year.

The strong El Niño has led to drier-than-normal conditions in Australia, Indonesia and parts of India, while it has brought heavy rain to parts of North America. According to NOAA there is an 85% chance that the current El Niño will last through to the first months of 2016, with its strength peaking in November or December. Compared to the strongest El Niño on record which occurred in 1997–1998, when the sea surface temperature was 2.3°C above average, NOAA projects that the current El Niño could produce temperatures that are 2°C higher than average, or more. Although El Niño could provide some relief to the current US drought, it is unlikely that one season of above-normal rain and snow can alleviate the four years of drought.

Recently, the FAO released an early warning of El Niño threatening Somalia's humanitarian gains, as El Niño is linked with very heavy rainfall in east Africa. Experts from the FAO warn that this year's El Niño could catch up with the intensity of 1997-1998 El Niño weather events, which left large parts of southern Somalia under water and killed approximately 2,000 people. In Southern Africa, increased drought risk may affect the next two years according to the UK Meteorological Office. CropWatch will continue to closely monitor global impacts of EI Niño in the coming months.

Annex A. Agroclimatic indicators and BIOMSS

Tables in this Annex provide additional information about the agroclimatic indicators—RAIN, TEMP, and RADPAR—and BIOMSS for the Monitoring and Reporting Units (MRU) (table A.1), thirty-one main producing and exporting countries (A.2), regions or provinces within large countries—Argentina, Australia, Brazil, Canada, India, Kazakhstan, Russia, and the United States (tables A.3 through A.10), and China (table A.11). All tables illustrate current values for the indicators along with the departure from average (average for RAIN, TEMP, and RADPAR and five-year average for BIOMSS) in percentage or degrees Celsius.

Table A.1. July-October 2015 agroclimatic indicators and biomass by global Monitoring and Reporting Unit

		RAIN		TEMP		RADPAR		BIOMSS	
	65 Global MRUs	Current (mm)	14YA dep. (%)	Current (°C)	14YA dep. (°C)	Current (MJ/m^2)	14YA dep. (%)	Current (gDM/m^2)	5YA dep. (%)
1	Equatorial central Africa	428	-6	25.3	0.7	1160	6	1139	-6
2	East African highlands	444	-28	20.4	0.7	1198	7	1210	-24
3	Gulf of Guinea	964	14	26.4	-0.2	936	-4	2074	4
4	Horn of Africa	100	-25	24.1	0.0	1296	4	361	-17
5	Madagascar (main)	136	12	21.5	-0.5	1127	2	403	6
6	Southwest Madagascar	59	-4	21.1	-1.1	1207	1	217	-5
7	North Africa-Mediterranean	138	46	24.1	-0.1	1276	-2	506	36
8	Sahel	682	27	29.6	0.4	1251	2	1698	12
9	Southern Africa	51	-19	22.3	0.7	1205	3	203	-4
10	Western Cape (South Africa)	129	-19	13.0	0.4	908	-4	454	-9
11	British Columbia to Colorado	220	17	12.4	0.4	1111	-3	838	17
12	Northern Great Plains	398	45	18.4	0.4	1089	-1	1193	30
13	Corn Belt	434	7	17.9	-0.1	1004	-1	1382	3
14	Cotton Belt to Mexican Nordeste	501	14	24.5	-0.1	1136	1	1358	14
15	Sub-boreal America	256	-7	12.4	0.4	853	-1	1067	-3
16	West Coast (North America)	80	-7	18.2	0.9	1250	-2	345	21
17	Sierra Madre	593	-7	20.3	0.0	1231	2	1610	4
18	SW U.S. and N. Mexican highlands	241	33	22.0	0.3	1284	-1	874	36
19	Northern South and Central America	732	-23	27.5	0.3	1110	5	1810	-13
20	Caribbean	654	-16	27.7	-0.2	1275	5	1706	-17
21	Central-northern Andes	267	-28	16.8	1.0	1140	4	762	-6
22	Nordeste (Brazil)	62	10	27.4	0.8	1265	3	244	9
23	Central eastern Brazil	310	53	26.0	0.6	1130	1	884	38
24	Amazon	299	-24	28.7	0.1	1178	5	1015	-13
25	Central-north Argentina	81	-13	19.0	-0.6	884	-10	288	-24
26	Pampas	582	35	17.1	0.4	825	-9	1186	3
27	Western Patagonia	279	-28	6.7	-0.5	688	-8	753	-4
28	Semi-arid Southern Cone	64	-5	10.1	-0.8	889	-7	277	7
29	Caucasus	131	-24	19.7	0.6	1139	1	520	-14
30	Pamir area	225	43	17.5	-0.5	1202	-3	686	19

	65 Global MRUs	RAIN		TEMP		RADPAR		BIOMSS	
		Current (mm)	14YA dep. (%)	Current (°C)	14YA dep. (°C)	Current (MJ/m²)	14YA dep. (%)	Current (gDM/ m²)	5YA dep. (%)
31	Western Asia	68	18	23.6	-0.1	1239	0	261	9
32	Gansu-Xinjiang (China)	330	173	16.5	-0.4	1132	0	1002	90
33	Hainan (China)	687	-41	27.4	-0.2	1079	3	1495	-28
34	Huanghuaihai (China)	328	-30	22.5	-0.4	1058	5	1012	-23
35	Inner Mongolia (China)	282	5	15.7	-0.3	1065	1	1051	-5
36	Loess region (China)	363	0	17.6	-0.3	1095	7	1220	-5
37	Lower Yangtze (China)	581	17	23.9	-1.3	959	-8	1602	11
38	Northeast China	287	-24	16.3	-0.1	958	1	1024	-22
39	Qinghai-Tibet (China)	849	26	11.8	-0.4	1030	2	1294	6
40	Southern China	702	-3	24.0	-0.7	932	-7	1775	3
41	Southwest China	573	4	20.3	-0.7	879	-3	1638	3
42	Taiwan (China)	736	-25	24.8	-1.0	1020	-6	1488	-8
43	East Asia	324	-48	17.1	-0.5	929	3	1091	-30
44	Southern Himalayas	1176	17	25.3	-0.3	935	0	1824	-3
45	Southern Asia	921	-4	27.7	0.3	983	6	1515	-19
46	Southern Japan and Korea	846	9	21.7	-1.2	944	-1	1762	-3
47	Southern Mongolia	568	309	15.3	-0.1	1126	0	1438	125
48	Punjab to Gujarat	313	-41	29.5	-0.4	1078	2	810	-34
49	Maritime Southeast Asia	409	-52	26.0	-0.2	1126	9	1051	-47
50	Mainland Southeast Asia	1112	-8	27.3	-0.2	948	1	2165	-5
51	Eastern Siberia	286	-2	11.4	0.1	792	-2	1085	-5
52	Eastern Central Asia	242	0	11.0	1.0	938	2	933	-4
53	Northern Australia	29	-71	23.9	-0.7	1260	5	124	-71
54	Queensland to Victoria	95	-43	12.9	-0.1	942	-1	393	-43
55	Nullarbor to Darling	117	-46	13.7	0.8	919	0	534	-28
56	New Zealand	83	-73	8.3	-0.5	714	-4	371	-60
57	Boreal Eurasia	321	-2	10.4	-0.3	696	-1	1133	-3
58	Ukraine to Ural mountains	180	-25	14.2	-0.9	830	3	787	-17
59	Mediterranean Europe and Turkey	158	-4	20.2	0.9	1163	-2	576	2
60	W. Europe (non Mediterranean)	252	-16	16.2	-0.2	896	1	965	-13
61	Boreal America	399	8	7.8	0.3	603	-4	1141	3
62	Ural to Altai mountains	293	50	12.5	-1.1	828	-3	1107	39
63	Australian desert	69	-19	14.8	0.3	991	-2	339	-16
64	Sahara to Afghan deserts	49	80	30.2	0.0	1378	0	167	18
65	Sub-arctic America	236	165	-0.5	1.9	255	-8	835	165

Note: Departures are expressed in relative terms (percentage) for all variables, except for temperature, for which absolute departure in degrees Celsius is given. Zero means no change from the average value; relative departures are calculated as (C-R)/R*100, with C=current value and R=reference value, which is the five-year (5YA) or fourteen-year average (14YA) for the same period between April and July.

Table A.2. July-October agroclimatic indicators and biomass by country

	31 Countries	RAIN		TEMP		RADPAR		BIOMSS	
		Current (mm)	14YA Departure (%)	Current (°C)	14YA Departure (°C)	Current (MJ/m²)	14YA Departure (%)	Current (gDM/m²)	5YA Departure (%)
[ARG]	Argentina	206	-13	15.2	-0.3	840	-9	592	-19
[AUS]	Australia	91	-45	14.0	0.1	964	-1	401	-40

31 Countries		RAIN		TEMP		RADPAR		BIOMSS	
		Current (mm)	14YA Departure (%)	Current (°C)	14YA Departure (°C)	Current (MJ/m²)	14YA Departure (%)	Current (gDM/m²)	5YA Departure (%)
[BGD]	Bangladesh	2432	72	28.5	-0.7	823	-8	2358	8
[BRA]	Brazil	325	24	26.2	0.6	1139	2	860	14
[CAN]	Canada	274	-6	12.9	0.4	902	-1	1056	1
[CHN]	China	516	1	20.8	-0.7	967	-3	1322	0
[DEU]	Germany	248	-17	15.7	-0.1	823	1	1040	-15
[EGY]	Egypt	11	159	26.9	0.2	1345	0	26	62
[ETH]	Ethiopia	559	-20	21.6	0.9	1185	6	1458	-17
[FRA]	France	240	-18	15.9	-1.2	962	1	904	-16
[GBR]	UK	316	-5	12.4	-1.7	703	-3	1205	-7
[IDN]	Indonesia	263	-67	26.0	-0.1	1149	11	754	-59
[IND]	India	908	-2	27.5	0.0	992	5	1426	-19
[IRN]	Iran	67	73	23.7	0.2	1287	-1	220	66
[KAZ]	Kazakhstan	210	47	14.5	-0.9	936	0	818	34
[KHM]	Cambodia	1161	0	28.4	-0.1	1023	3	2404	2
[MEX]	Mexico	592	-17	24.5	0.1	1221	3	1479	0
[MMR]	Myanmar	1149	-8	25.9	-0.3	833	-1	2193	-4
[NGA]	Nigeria	967	21	27.1	-0.2	1022	-3	2047	7
[PAK]	Pakistan	287	10	26.1	-1.0	1189	-1	672	-8
[PHL]	Philippines	1184	2	26.5	-0.1	1077	4	2055	-11
[POL]	Poland	156	-39	15.9	0.3	859	7	708	-34
[ROU]	Romania	213	-27	18.1	0.8	960	0	850	-9
[RUS]	Russia	230	-5	13.2	-0.8	819	0	961	1
[THA]	Thailand	883	-10	27.3	-0.2	974	2	2013	-9
[TUR]	Turkey	144	13	20.9	1.2	1210	0	521	4
[UKR]	Ukraine	116	-49	17.0	0.1	951	7	541	-38
[USA]	USA	426	22	20.3	0.1	1107	-1	1191	20
[UZB]	Uzbekistan	77	156	21.3	-0.5	1231	-1	301	105
[VNM]	Vietnam	1008	-10	26.5	0.1	986	0	2065	-3
[ZAF]	South Africa	104	-15	16.5	1.1	1070	0	413	7

See note table A.1.

Table A.3. Argentina, July-October 2015 2014 agroclimatic indicators and biomass (by province)

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	14YA Departure (%)	Current (°C)	14YA Departure (°C)	Current (MJ/m²)	14YA Departure (%)	Current (gDM/m²)	5YA Departure (%)
Buenos	281	-1	11.4	-0.7	809	-5	796	-13

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	14YA Departure (%)	Current (°C)	14YA Departure (°C)	Current (MJ/m²)	14YA Departure (%)	Current (gDM/m²)	5YA Departure (%)
Aires								
Chaco	111	-42	19.9	0.1	836	-13	413	-36
Cordoba	105	-29	14.0	-0.6	857	-11	444	-23
Corrientes	383	-8	18.6	0.3	805	-12	1034	-14
Entre Rios	260	-24	15.3	-0.3	815	-10	823	-23
La Pampa	147	-29	11.5	-0.9	823	-8	608	-19
Misiones	883	34	20.3	1.5	846	-8	1937	15
Santiago Del Estero	94	-5	18.3	-0.4	877	-12	341	-13
San Luis	79	-39	12.6	-1.0	850	-12	360	-37
Salta	15	-74	18.6	-0.6	970	-6	75	-66
Santa Fe	169	-24	16.4	0.0	842	-11	617	-19
Tucuman	-1	0	-1.0	0.0	-1	0	-1	0

See note table A.1.

Table A.4. Australia, July-October 2015 agroclimatic indicators and biomass (by state)

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	14YA Departure (%)	Current (°C)	14YA Departure (°C)	Current (MJ/m²)	14YA Departure (%)	Current (gDM/m²)	5YA Departure (%)
New South Wales	113	-26	12.6	-0.1	955	-3	460	-27
South Australia	69	-59	12.8	0.3	866	0	338	-50
Victoria	61	-73	11.0	0.4	808	0	301	-65
W. Australia	111	-46	14.5	0.8	945	0	512	-29

See note table A.1.

Table A.5. Brazil, July-October agroclimatic indicators and biomass (by state)

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	14YA Departure (%)	Current (°C)	14YA Departure (°C)	Current (MJ/m²)	14YA Departure (%)	Current (gDM/m²)	5YA Departure (%)
Ceara	70	142	28.1	0.2	1368	1	278	60
Goias	171	-2	26.6	0.6	1206	3	636	14
Mato Grosso Do Sul	540	96	25.5	0.1	1040	-4	1479	66
Mato	249	4	29.0	0.7	1190	2	897	26

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	14YA Departure (%)	Current (°C)	14YA Departure (°C)	Current (MJ/m^2)	14YA Departure (%)	Current (gDM/m^2)	5YA Departure (%)
Grosso								
Minas Gerais	144	-7	24.2	1.1	1164	4	514	8
Parana	1193	126	21.4	1.3	940	-4	2049	47
Rio Grande Do Sul	958	42	17.7	0.9	767	-12	1854	11
Santa Catarina	1150	75	17.8	1.5	779	-11	2005	27
Sao Paulo	563	103	23.2	1.0	1046	-2	1522	80

See note table A.1.

Table A.6. Canada, July-October agroclimatic indicators and biomass (by province)

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	14YA Departure (%)	Current (°C)	14YA Departure (°C)	Current (MJ/m^2)	14YA Departure (%)	Current (gDM/m^2)	5YA Departure (%)
Alberta	182	-9	12.2	0.6	932	0	815	-8
Manitoba	280	14	14.7	0.7	910	-3	1167	13
Saskatchewan	204	1	13.2	0.5	931	-2	918	6

See note table A.1.

Table A.7. India, July-October agroclimatic indicators and biomass (by state)

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	14YA Departure (%)	Current (°C)	14YA Departure (°C)	Current (MJ/m^2)	14YA Departure (%)	Current (gDM/m^2)	5YA Departure (%)
Arunachal Pradesh	1683	14	23.0	-0.2	826	2	2197	3
Andhra Pradesh	606	-20	28.8	0.4	1049	10	1441	-22
Assam	1702	23	28.8	-0.3	839	-1	2362	1
Bihar	1335	40	29.6	-0.7	958	1	1826	-4
Chandigarh	-1	0	-1.0	0.0	-1	0	-1	0
Chhattisgarh	1285	16	27.2	0.2	957	7	1878	-12
Daman and Diu	186	-70	29.6	1.2	991	5	448	-64
Delhi	422	-10	29.5	-0.6	1082	1	1179	-17
Dadra and Nagar Haveli	370	-75	27.5	0.4	924	11	969	-50
Gujarat	171	-78	29.8	0.4	1023	4	365	-75
Goa	535	-67	27.0	0.2	952	16	1558	-30

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	14YA Departure (%)	Current (°C)	14YA Departure (°C)	Current (MJ/m^2)	14YA Departure (%)	Current (gDM/m^2)	5YA Departure (%)
Himachal Pradesh	1248	55	15.3	-0.3	1071	-2	1511	3
Haryana	507	11	28.8	-0.8	1089	-1	1310	-3
Jharkhand	1190	21	27.8	0.0	962	2	1761	-16
Kerala	822	-40	26.5	0.6	940	6	1815	-22
Karnataka	561	-36	25.6	0.5	1013	12	1345	-20
Meghalaya	2804	35	25.0	-0.4	805	-5	2326	0
Maharashtra	627	-38	27.1	0.5	972	10	1230	-33
Manipur	945	-5	23.1	-0.4	786	-6	2205	0
Madhya Pradesh	793	-10	27.7	0.2	975	5	1422	-20
Mizoram	2185	54	24.4	-0.7	824	-7	2456	2
Nagaland	1227	-3	23.5	-0.2	854	-2	2242	-2
Orissa	1102	-5	27.7	0.0	942	7	1839	-17
Puducherry	1145	-40	27.1	1.6	969	8	2407	-3
Punjab	545	20	28.6	-0.7	1090	-1	1404	11
Rajasthan	327	-27	29.7	-0.5	1099	2	810	-35
Sikkim	1769	27	15.5	-0.7	916	-6	1572	1
Tamil Nadu	477	-21	29.0	0.5	1147	8	1342	-18
Tripura	2886	112	27.5	-0.7	812	-8	2577	8
Uttarakhand	1302	28	18.6	-0.4	1043	3	1588	-2
Uttar Pradesh	795	2	29.6	-0.1	1048	5	1588	-9
West Bengal	1897	59	29.0	-0.3	896	-1	2174	3

See note table A.1.

Table A.8. Kazakhstan, July-October 2015 agroclimatic indicators and biomass (by province)

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	14YA Departure (%)	Current (°C)	14YA Departure (°C)	Current (MJ/m^2)	14YA Departure (%)	Current (gDM/m^2)	5YA Departure (%)
Akmolinskaya	163	10	13.0	-1.2	856	-1	770	18
Karagandinskaya	158	12	13.2	-0.6	941	3	748	19
Kustanayskaya	145	-1	13.7	-1.6	859	0	685	10
Pavlodarskaya	196	23	13.7	-0.8	828	-2	909	37
Severo kazachstanskaya	298	59	12.1	-1.6	775	-3	1206	58
Vostochno kazachstanskaya	376	118	12.7	-0.4	978	0	1188	55
Zapadno kazachstanskaya	61	-41	16.9	-1.0	961	3	305	-26

See note table A.1.

Table A.9. Russia, July-October 2015 agroclimatic indicators and biomass (by oblast)

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	14YA Departure (%)	Current (°C)	14YA Departure (°C)	Current MJ/m^2)	14YA Departure (%)	Current (gDM/m^2)	5YA Departure (%)
Bashkortostan Rep.	289	32	11.7	-1.9	743	-8	1125	21
Chelyabinskaya Oblast	236	8	11.5	-1.9	762	-4	982	12
Gorodovikovsk	-1	0	-1.0	0.0	-1	0	-1	0
Krasnodarskiy Kray	218	-18	15.7	0.1	918	3	1013	-1
Kurganskaya Oblast	335	60	11.2	-2.2	729	-6	1285	58
Kirovskaya Oblast	335	22	11.0	-1.8	656	-10	1324	18
Kurskaya Oblast	76	-66	15.1	-0.7	902	9	361	-60
Lipetskaya Oblast	80	-63	14.7	-0.9	867	6	408	-52
Mordoviya Rep.	181	-27	13.3	-1.4	804	1	838	-14
Novosibirskaya Oblast	311	40	11.5	-0.7	732	-7	1301	41
Nizhegorodskaya O.	231	-13	12.6	-1.5	750	-1	1007	-2
Orenburgskaya Oblast	128	-15	13.9	-1.5	866	-1	588	-7
Omskaya Oblast	330	55	10.9	-1.4	696	-8	1324	61
Permskaya Oblast	451	63	10.0	-2.2	606	-17	1426	24
Penzenskaya Oblast	132	-40	13.8	-1.3	839	2	631	-31
Rostovskaya Oblast	104	-40	19.1	-0.2	1029	8	486	-25
Ryazanskaya Oblast	125	-50	13.8	-1.0	805	2	622	-35
Stavropolskiy Kray	97	-54	20.7	0.2	1028	5	469	-42
Sverdlovskaya Oblast	396	57	9.8	-2.3	627	-14	1384	47
Samarskaya Oblast	183	0	14.1	-1.1	828	-2	825	12
Saratovskaya Oblast	107	-30	15.9	-1.0	917	4	506	-19
Tambovskaya	83	-61	14.3	-1.2	861	4	426	-51

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	14YA Departure (%)	Current (°C)	14YA Departure (°C)	Current MJ/m²)	14YA Departure (%)	Current (gDM/m²)	5YA Departure (%)
Oblast								
Tyumenskaya Oblast	384	75	10.2	-2.2	668	-11	1376	61
Tatarstan Rep.	276	23	12.8	-1.7	724	-9	1148	26
Ulyanovskaya Oblast	174	-21	13.9	-1.0	813	0	798	-11
Udmurtiya Rep.	378	46	11.0	-2.1	651	-13	1428	33
Volgogradskaya O.	99	-27	17.5	-1.0	984	8	459	-20
Voronezhskaya Oblast	52	-70	16.0	-0.4	945	9	273	-63

See note table A.1.

Table A.10. United States, July-October 2015 agroclimatic indicators and biomass (by state)

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	14YA Departure (%)	Current (°C)	14YA Departure (°C)	Current (MJ/m²)	14YA Departure (%)	Current (gDM/m²)	5YA Departure (%)
Arkansas	576	37	24.0	0.1	1145	1	1435	17
California	77	72	19.4	0.8	1332	-3	333	84
Idaho	158	54	14.6	0.2	1200	-3	745	53
Indiana	342	-18	19.7	-0.5	1046	-3	1237	-4
Illinois	410	5	20.3	-0.1	1074	-2	1338	11
Iowa	567	43	19.1	0.0	1071	-2	1596	34
Kansas	495	42	22.3	0.2	1168	-1	1377	29
Michigan	317	-8	16.9	0.1	986	-3	1111	-10
Minnesota	480	43	16.9	0.5	1021	0	1493	34
Missouri	750	77	21.5	-0.2	1104	-2	1731	43
Montana	187	37	15.5	0.3	1113	-3	835	26
Nebraska	536	88	19.8	0.5	1133	-2	1542	51
North Dakota	253	16	16.8	0.9	1060	2	1023	11
Ohio	333	-15	19.2	-0.2	1035	0	1269	-5
Oklahoma	635	85	24.1	-0.3	1192	0	1559	48
Oregon	91	-15	16.5	0.7	1187	-2	463	5
South Dakota	487	106	18.9	0.6	1119	0	1514	67
Texas	401	25	26.4	0.4	1241	3	1070	26
Washington	98	-26	16.3	0.7	1103	-1	410	-18
Wisconsin	455	18	17.0	0.1	990	-3	1402	11

See note table A.1.

Table A.11. China, July-October 2015 agroclimatic indicators and biomass (by province)

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	14YA Departure (%)	Current (°C)	14YA Departure (°C)	Current MJ/m²)	14YA Departure (%)	Current (gDM/m²)	5YA Departure (%)
Anhui	447	-20	23.5	-1.3	1021	2	1398	-11
Chongqing	499	-11	21.7	-0.7	887	-3	1588	-3
Fujian	714	34	23.4	-1.3	906	-15	1852	29
Gansu	354	12	15.3	-0.2	1055	5	1226	15
Guangdong	745	9	26.2	-0.7	998	-6	1718	9
Guangxi	822	34	24.9	-1.1	926	-11	1872	19
Guizhou	563	18	20.9	-1.0	844	-9	1584	11
Hebei	296	-16	19.4	-0.5	1051	1	1005	-20
Heilongjiang	302	-13	15.6	0.0	926	0	1091	-16
Henan	387	-18	22.5	-0.3	1083	9	1277	-8
Hubei	353	-31	22.8	-0.7	1028	4	1291	-18
Hunan	475	4	23.7	-1.2	951	-6	1416	3
Jiangsu	427	-23	23.5	-1.3	1011	2	1350	-9
Jiangxi	588	29	24.5	-1.5	946	-12	1675	23
Jilin	279	-28	16.6	-0.3	985	1	962	-26
Liaoning	253	-43	19.0	-0.1	1037	3	876	-38
Inner Mongolia	274	6	15.1	-0.1	1033	0	1027	-4
Ningxia	312	39	16.4	-0.2	1144	6	1126	24
Shaanxi	458	-2	18.7	-0.3	1037	8	1448	1
Shandong	322	-32	22.6	-0.2	1061	5	893	-31
Shanxi	313	-12	17.0	-0.2	1099	5	1074	-19
Sichuan	631	4	19.1	-0.6	853	-2	1627	1
Yunnan	669	0	19.0	-0.6	861	-7	1798	5
Zhejiang	607	6	23.3	-1.7	878	-14	1779	12

See note table A.1.

Annex B. 2015 production estimates

Table B.1. Argentina, 2015 maize and soybean production, by province (thousand tons)

	Maize		Wheat		Soybean	
	2015	Δ%	2015-2016	Δ%	2015	Δ%
Buenos Aires	7141	0.3	6171	-1.9	14178	-7.1
Córdoba	7052	1.3	1075	-1.3	12029	0.5
Entre Rios	1111	-2.7	867	0.0	3409	2.3
San Luis	1113	6.1				
Santa Fe	4219	1.3	1390	-0.5	10471	0.1
Santiago Del Estero	1215	1.0				
Sub total	21851	1.0	9504	-1.5	40086	-2.3
Others	3481	1.1	2126	-11.7	11702	2.4
Argentina	25332	1.0	11630	-3.5	51788	-1.3

Δ% indicates percentage difference with previous year.

Table B.2. Australia, 2015-2016 wheat production, by state (thousand tons)

	Wheat	
	2015-2016	Δ%
New South Wales	6761	5.1
South Australia	4425	0.3
Victoria	3085	-2.1
Western Australia	10518	-1.9
Sub total	24788	0.3
Other states	1018	18.4
Australia	25807	0.9

Δ% indicates percentage difference with 2014.

Table B.3. Brazil, 2015 maize, rice, and soybean production, by state (thousand tons)

	Maize		Rice		Wheat		Soybean	
	2015	Δ%	2015	Δ%	2015	Δ%	2015	Δ%
Ceara	166	2.7						
Goias	8511	0.8					9988	0.3
Mato Grosso	19651	0.2					26096	0.6
Mato Grosso Do Sul	7658	1.8					6331	0.6
Minas Gerais	7389	0.7					3629	-0.1
Parana	15022	0.0			2664	5.0	17154	0.1
Rio Grande Do Sul	4864	-0.1	8636	1.6	3690	3.1	13608	1.1
Santa Catarina	3038	-0.6	1052	1.9			1708	-0.5
Sao Paulo	3822	1.4					2172	-0.4
Sub total	70121	0.5	9688	1.7	6354	3.9	80686	0.5
Others	9534	7.5	2143	-7.5	592	-0.4	9544	9.3
Brazil	79655	1.3	11831	-0.1	6946	3.5	90230	1.3

Δ% indicates percentage difference with 2014.

Table B.4. Canada, 2015 wheat production, by state (thousand tons)

	Maize		Wheat	
	2015	Δ%	2015	Δ%
Alberta			8290	-11.3
Manitoba			3654	-0.1
Ontario	2965	-2.0	1725	-1.5
Quebec	7559	-0.5		
Saskatchewan			13055	-7.8
Sub total	10525	-1.0	26724	-7.6
others	1320	3.0	3949	-9.7
Canada	11845	-0.5	30673	-7.9

Δ% indicates percentage difference with 2014.

Table B.5. United States, 2015 maize, rice, wheat and soybean production, by state (thousand tons)

States	Maize		Rice		Wheat		Soybean	
	2015	Δ%	2015	Δ%	2015	Δ%	2015	Δ%
Alabama	1156	0.4					517	-0.1
Arkansas	2491	-1.1	5045	-0.7	686	1.3	4324	-1.0
California			1661	-1.0	585	26.2		
Colorado	3740	-0.1			2461	1.2		
Georgia	1396	4.3			311	1.2		
Idaho					2692	6.4		
Illinois	56608	-5.2			1231	0.8	14790	-0.8
Indiana	24504	-11.1			694	0.2	8221	-1.8
Iowa	61796	2.8					13721	-0.3
Kansas	14240	-1.0			7795	16.2	3841	-1.0
Kentucky	5854	2.0			1004	1.9	2279	-0.3
Louisiana	1783	-1.6	1419	-4.2			2107	-3.3
Maryland					477	0.2	632	0.0
Michigan	9087	0.5			988	1.1	2497	-0.3
Minnesota	31951	6.8			1833	3.8	8301	-0.1
Mississippi	2233	-2.0	622	-2.8	343	1.0	3048	-2.1
Missouri	15680	-1.8	666	1.0	1184	1.3	6566	-7.4
Montana					5565	-2.4		
Nebraska	42647	4.8			2072	7.2	7785	-1.0
New York	2545	-0.4			165	1.4		
North Carolina	2611	-0.2			1220	0.4	1876	-0.4
North Dakota	8055	1.1			9343	-1.1	5390	-2.2
Ohio	15239	-1.8			1109	1.0	6793	-1.8
Oklahoma	1106	2.2			1449	11.9		
Oregon					1155	-4.5		
Pennsylvania	4039	0.2			268	0.9	809	0.3
South Carolina					314	0.7		
South Dakota	19981	-0.1			3251	-8.9	6238	-0.3
Tennessee	3621	1.0			865	1.4	1996	-1.0
Texas	7579	1.3	488	-0.2	2077	13.1		
Virginia	1292	0.2			486	0.9	701	0.3
Washington					2884	-2.3		
Wisconsin	12646	2.6			448	1.4	2220	3.6
Sub total	353879	-0.2	9901	-1.2	54954	2.7	104652	-1.3
others	7865	17.7			1624	16.0	2103	4.9
USA	361744	0.2	9923	-1.7	56578	2.6	106755	-0.1

Annex C. Quick reference guide to CropWatch indicators, spatial units, and production estimation methodology

The following sections give a brief overview of CropWatch indicators and spatial units, along with a description of the CropWatch production estimation methodology. For more information about CropWatch methodologies, visit CropWatch online at www.cropwatch.com.cn.

CropWatch indicators

The CropWatch indicators are designed to assess the condition of crops and the environment in which they grow and develop; the indicators—RAIN (for rainfall), TEMP (temperature), and RADPAR (photosynthetically active radiation, PAR)—are not identical to the weather variables, but instead are value-added indicators computed only over crop growing areas (thus for example excluding deserts and rangelands) and spatially weighted according to the agricultural production potential, with marginal areas receiving less weight than productive ones. The indicators are expressed using the usual physical units (e.g., mm for rainfall) and were thoroughly tested for their coherence over space and time. CWSU are the CropWatch Spatial Units, including MRUs, MPZ, and countries (including first-level administrative districts in select large countries). For all indicators, high values indicate "good" or "positive."

INDICATOR			
BIOMSS			
Biomass accumulation potential			
Crop/ Ground and satellite	grams dry matter/m^2, pixel or CWSU	An estimate of biomass that could potentially be accumulated over the reference period given the prevailing rainfall and temperature conditions.	Biomass is presented as maps by pixels, maps showing average pixels values over CropWatch spatial units (CWSU), or tables giving average values for the CWSU. Values are compared to the average value for the last five years (2010-14), with departures expressed in percentage.
CALF			
Cropped arable land and cropped arable land fraction			
Crop/ Satellite	[0,1] number, pixel or CWSU average	The area of cropped arable land as fraction of total (cropped and uncropped) arable land. Whether a pixel is cropped or not is decided based on NDVI twice a month. (For each four-month reporting period, each pixel thus has 8 cropped/ uncropped values).	The value shown in tables is the maximum value of the 8 values available for each pixel; maps show an area as cropped if at least one of the 8 observations is categorized as "cropped." Uncropped means that no crops were detected over the whole reporting period. Values are compared to the average value for the last five years (2010-14), with departures expressed in percentage.
CROPPING INTENSITY			
Cropping intensity Index			
Crop/ Satellite	0, 1, 2, or 3; Number of crops growing over a year for each pixel	Cropping intensity index describes the extent to which arable land is used over a year. It is the ratio of the total crop area of all planting seasons in a year to the total area of arable land.	Cropping intensity is presented as maps by pixels or spatial average pixels values for MPZs, 31 countries, and 7 regions for China. Values are compared to the average of the previous five years, with departures expressed in percentage.

INDICATOR			
NDVI			
Normalized Difference Vegetation Index			
Crop/ Satellite	[0.12-0.90] number, pixel or CWSU average	An estimate of the density of living green biomass.	NDVI is shown as average profiles over time at the national level (cropland only) in crop condition development graphs, compared with previous year and recent five-year average (2010-14), and as spatial patterns compared to the average showing the time profiles, where they occur, and the percentage of pixels concerned by each profile.
RADPAR			
CropWatch indicator for Photosynthetically Active Radiation (PAR), based on pixel based PAR			
Weather/Satellite	W/m^2, CWSU	The spatial average (for a CWSU) of PAR accumulation over agricultural pixels, weighted by the production potential.	RADPAR is shown as the percent departure of the RADPAR value for the reporting period compared to the recent fourteen-year average (2001-14), per CWSU. For the MPZs, regular PAR is shown as typical time profiles over the spatial unit, with a map showing where the profiles occur and the percentage of pixels concerned by each profile.
RAIN			
CropWatch indicator for rainfall, based on pixel-based rainfall			
Weather/Ground and satellite	$Liters/m^2$, CWSU	The spatial average (for a CWSU) of rainfall accumulation over agricultural pixels, weighted by the production potential.	RAIN is shown as the percent departure of the RAIN value for the reporting period, compared to the recent fourteen-year average (2001-14), per CWSU. For the MPZs, regular rainfall is shown as typical time profiles over the spatial unit, with a map showing where the profiles occur and the percentage of pixels concerned by each profile.
TEMP			
CropWatch indicator for air temperature, based on pixel-based temperature			
Weather/Ground	°C, CWSU	The spatial average (for a CWSU) of the temperature time average over agricultural pixels, weighted by the production potential.	TEMP is shown as the departure of the average TEMP value (in degrees Centigrade) over the reporting period compared with the average of the recent 14 years (2001-14), per CWSU. For the MPZs, regular temperature is illustrated as typical time profiles over the spatial unit, with a map showing where the profiles occur and the percentage of pixels concerned by each profile.
VCIx			
Maximum vegetation condition index			
Crop/ Satellite	Number, pixel to CWSU	Vegetation condition of the current season compared with historical data. Values usually are [0,1], where 0 is "NDVI as bad as the worst recent year" and 1 is "NDVI as good as the best recent year." Values can exceed the range if the current year is the best or the worst.	VCIx is based on NDVI and two VCI values are computed every month. VCIx is the highest VCI value recorded for every pixel over the reporting period. A low value of VCIx means that no VCI value was high over the reporting period. A high value means that at least one VCI value was high. VCI is shown as pixel-based maps and as average value by CWSU.
VHI			
Vegetation health index			
Crop/ Satellite	Number, pixel to CWSU	The average of VCI and the temperature condition index (TCI), with TCI defined like VCI but for	Low VHI values indicate unusually poor crop condition, but high values, when due to low temperature, may be difficult to interpret. VHI is

INDICATOR			
		temperature. VHI is based on the assumption that "high temperature is bad" (due to moisture stress), but ignores the fact that low temperature may be equally "bad" (crops develop and grow slowly, or even suffer from frost).	shown as typical time profiles over Major Production Zones (MPZ), where they occur, and the percentage of pixels concerned by each profile.
VHIn			
Minimum Vegetation health index			
Crop/ Satellite	Number, pixel to CWSU	VHIn is the lowest VHI value for every pixel over the reporting period. Values usually are [0, 100]. Normally, values lower than 35 indicate poor crop condition.	Low VHIn values indicate the occurrence of water stress in the monitoring period, often combined with lower than average rainfall. The spatial/time resolution of CropWatch VHIn is 16km/week for MPZs and 1km/dekad for China.

Note: Type is either "Weather" or "Crop"; source specifies if the indicator is obtained from ground data, satellite readings, or a combination; units: in the case of ratios, no unit is used; scale is either pixels or large scale CropWatch spatial units (CWSU). Many indicators are computed for pixels but represented in the CropWatch bulletin at the CWSU scale.

CropWatch spatial units (CWSU)

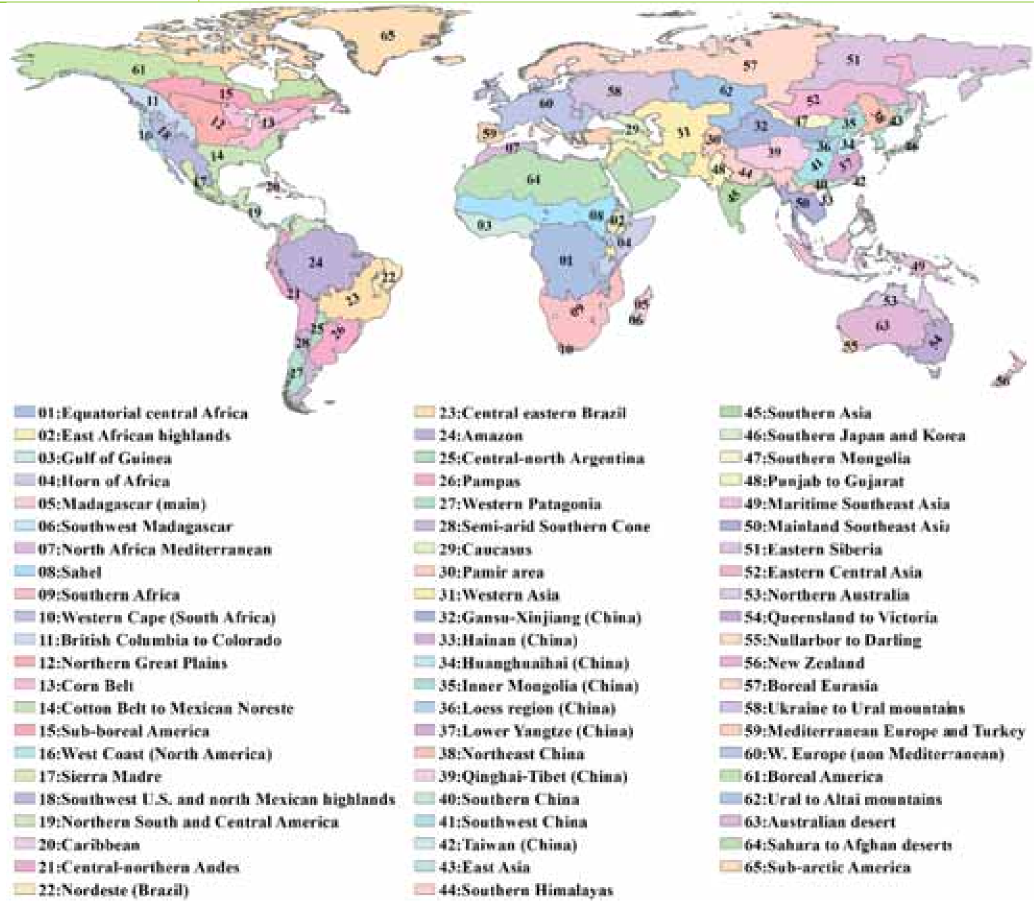
CropWatch analyses are applied to four kinds of CropWatch spatial units (CWSU): Countries, China, Major Production Zones (MPZ), and global crop Monitoring and Reporting Units (MRU). The tables below summarize the key aspects of each spatial unit and show their relation to each other. For more details about these spatial units and their boundaries, see the CropWatch bulletin online resources.

SPATIAL LUNITS	
CHINA	
Overview	*Description*
Seven monitoring regions	The seven regions in China are agro-economic/agro-ecological regions that together cover the bulk of national maize, rice, wheat, and soybean production. Provinces that are entirely or partially included in one of the monitoring regions are indicated in color on the map below.

Countries (and first-level administrative districts, e.g., states and provinces)	
Overview	*Description*
"Thirty plus one" countries to represent main producers/exporters and other key countries.	CropWatch monitored countries together represent more than 80% of the production of maize, rice, wheat and soybean, as well as 80% of exports. Some countries were included in the list based on criteria of proximity to China (Uzbekistan, Cambodia), regional importance, or global geopolitical relevance (e.g., four of five most populous countries in Africa). The total number of countries monitored is "thirty plus one," referring to thirty countries and China itself. For the nine largest countries—, United States, Brazil, Argentina, Russia, Kazakhstan, India, China, and Australia, maps and analyses may also present results for the first-level administrative subdivision. The CropWatch agroclimatic indicators are computed for all countries and included in the analyses when abnormal conditions occur. Background information about the countries' agriculture and trade is available on the CropWatch Website, www.cropwatch.com.cn.

Major Production Zones (MPZ)	
Overview	*Description*
Six globally important areas of agricultural production	The six MPZs include West Africa, South America, North America, South and Southeast Asia, Western Europe, and Central Europe to Western Russia. The MPZs are not necessarily the main production zones for the four crops (maize, rice, soybean, wheat) currently monitored by CropWatch, but they are globally or regionally important areas of agricultural production. The six zones were identified based mainly on production statistics and distribution of the combined cultivation area of maize, rice, wheat and soybean.

Global Monitoring and Reporting Unit (MRU)	
Overview	*Description*
65 agro-ecological/agro-economic units across the world	MRUs are reasonably homogeneous agro-ecological/agro-economic units spanning the globe, selected to capture major variations in worldwide farming and crops patterns while at the same time providing a manageable (limited) number of spatial units to be used as the basis for the analysis of environmental factors affecting crops. Unit numbers and names are shown in the figure below. A limited number of units (e.g., MRU-63 to 65) are not relevant for the crops currently monitored by CropWatch but are included to allow for more complete coverage of global production. Additional information about the MRUs is provided online under www.cropwatch.com.cn .



Production estimation methodology

The main concept of the CropWatch methodology for estimating production is the calculation of current year production based on information about last year's production and the variations in crop yield and cultivated area compared with the previous year. The equation for production estimation is as follows:

$$Production_i = Production_{i-1} * (1 + \Delta Yield_i) * (1 + \Delta Area_i)$$

where i is the current year, $\Delta Yield_i$ and $\Delta Area_i$ are the variations in crop yield and cultivated area compared with the previous year; the values of $\Delta Yield_i$ and $\Delta Area_i$ can be above or below zero.

For the 31 countries monitored by CropWatch, yield variation for each crop is calibrated against NDVI time series, using the following equation:

$$\Delta Yield_i = f(NDVI_i, NDVI_{i-1})$$

where $NDVI_i$ and $NDVI_{i-1}$ are taken from the time series of the spatial average of NDVI over the crop specific mask for the current year and the previous year. For NDVI values that correspond to periods after the current monitoring period, average NDVI values of the previous five years are used as an average expectation. $\Delta Yield_i$ is calculated by regression against average or peak NDVI (whichever yields the best regression), considering the crop phenology of each crop for each individual country.

A different method is used for areas. For China, CropWatch combines remote-sensing based estimates of the crop planting proportion (cropped area to arable land) with a crop type proportion (specific type area to total cropped area). The planting proportion is estimated based on an unsupervised classification of high resolution satellite images from HJ-1 CCD and GF-1 images. The crop-type proportion for China is obtained by the GVG instrument from field transects. The area of a specific crop is computed by multiplying farmland area, planting proportion, and crop-type proportion of the crop.

To estimate crop area for wheat, soybean, maize, and rice outside China, CropWatch relies on the regression of crop area against cropped arable land fraction of each individual country (paying due attention to phenology):

$$Area_i = a + b * CALF_i$$

where a and b are the coefficients generated by linear regression with area from FAOSTAT or national sources and CALF the Cropped Arable Land Fraction from CropWatch estimates. $\Delta Area_i$ can then be calculated from the area of current and the previous years.

The production for "other countries" (outside the 31 CropWatch monitored countries) was estimated as the linear trend projection for 2015 of aggregated FAOSTAT data (using aggregated world production minus the sum of production by the 31 CropWatch monitored countries).

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Online resources

This bulletin is only part of the CropWatch resources available. Visit **www.cropwatch.com.cn** for access to additional resources, including the methods behind CropWatch, country profiles, and other CropWatch publications. For additional information or to access specific data or high-resolution graphs, simply contact the CropWatch team at cropwatch@radi.ac.cn.

Online Resources posted on www.cropwatch.com.cn:

- ✓ **Definition of spatial units**
  A description of the four spatial levels of analysis: Monitoring and Reporting Units (MRU), Major Production Zones (MPZ), selected countries, and the use of sub-national administrative areas.
- ✓ **Methodology**
  Overview of CropWatch data sources and methods.
- ✓ **Time series of indicators**
  Background data on agroclimatic indicators presented in a series of tables.
- ✓ **Country profiles**
  Short profiles for each of the 30 countries and China highlighting key facts of interest to agriculture.
- ✓ **Country long term trends**
  Quick overview of average crop area, yield, and production values for maize, rice, soybean, and wheat for recent years, along with long-term (2001-12) trends (based on FAOSTAT data).

CropWatch bulletins introduce the use of several new and experimental indicators. We would be very interested in receiving feedback about their performance in other countries. With feedback on the contents of this report and the applicability of the new indicators to global areas, please contact:

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