

# CropWatch Bulletin

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 *Note:* CropWatch resources, background materials and additional data are available online at [www.cropwatch.com.cn](http://www.cropwatch.com.cn).

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## Abbreviations

5YA	Five-year average, the average for the April-July periods from 2009 to 2013; one of the standard reference periods and referred to as “recent past.”
13YA	Thirteen-year average, the average for the April-July periods from 2001 to 2013; one of the standard reference periods and referred to as “last decade.”
BIOMSS	Agroclimatic indicator for biomass production potential
CALF	Cropped Arable Land Fraction
CAS	Chinese Academy of Sciences
CWSU	CropWatch Spatial Units
DM	Dry matter
EC/JRC	European Commission Joint Research Centre
FAO	Food and Agriculture Organization of the United Nations
GAUL	Global Administrative Units Layer
GVG	GPS, Video, and GIS data
ha	hectare
ITCZ	Intertropical Convergence Zone
MPZ	Major Production Zone
MRU	Monitoring and Reporting Unit (formerly CPSZ)
NCDC	U.S. National Climatic Data Center
NDVI	Normalized Difference Vegetation Index
NOAA	U.S. National Oceanic and Atmospheric Administration
PAR	Photosynthetically active radiation
RADI	CAS Institute of Remote Sensing and Digital Earth
RADPAR	PAR agroclimatic indicator
RAIN	Rainfall agroclimatic indicator
TEMP	Air temperature agroclimatic indicator
Ton	Thousand kilograms
VCIx	Maximum Vegetation Condition Index
VHI	Vegetation Health Index
VHIn	Minimum Vegetation Health Index
W/m <sup>2</sup>	Watt per square meter

## Bulletin overview and reporting period

This CropWatch bulletin presents a global overview of crop stage and condition between April 1 and July 31, 2014. It is the 94<sup>th</sup> 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, 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](http://www.cropwatch.com.cn).

Chapter	Spatial coverage	Key indicators
<b>Chapter 1</b>	World, using Monitoring and Reporting Units (MRU), 65 large, agro-ecologically homogeneous units covering the globe	RAIN, TEMP, RADPAR, BIOMSS
<b>Chapter 2</b>	Major Production Zones (MPZ), six regions that contribute most to global food production	As above, plus CALF, VCIx, and VHIn
<b>Chapter 3</b>	31 key countries (main producers and exporters)	As above plus NDVI
<b>Chapter 4</b>	China	As above
<b>Chapter 5</b>	<i>Special topics and outlook</i>	
<b>Online Resources</b>	<a href="http://www.cropwatch.com.cn">www.cropwatch.com.cn</a>	

### 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](mailto:cropwatch@radi.ac.cn) or visit CropWatch online at [www.cropwatch.com.cn](http://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

The CropWatch August bulletin assesses the recent agroclimatic and agronomic factors up to July 2014 that determine crop development and the 2014 agricultural production. The analyses of environmental and satellite-based agronomic indicators focus on worldwide patterns and zoom into major production areas and countries. This bulletin also reports about disasters and El Niño perspectives.

### Water stress

Vagaries of water supply have played a significant part in shaping the outcome of the 2014 agricultural production. Droughts and excess rainfall, sometimes resulting in floods, have markedly influenced the development of crops in several large and spatially coherent areas. Associated landslides and fires are reported on, although these phenomena tend to be of local importance only. Another remarkable feature of the current period is that very limited areas experienced exceptional temperatures.

East Asia is among the major rainfall deficit areas, with significantly below average values in southern Japan (-34%) and the Korean peninsula (-50%), as well as several zones in China, including the Loess region, north-east China, and particularly the north China Plain (-25%). The most affected provinces in China include Shandong (-31%), Henan (-25%), Shaanxi (-22%), Liaoning (-21%), and Hubei (-16%). The drought was accompanied by moderate increases in temperature (+1.0°C to 1.5°C) and sunshine (+5%) and the effect on crop production was severe.

Less serious impacts characterize another rainfall deficit area in eastern Russia and central Asia (Kazakhstan, Uzbekistan) where many crops suffered water deficits between 20 and 50%, with the drought decreasing in the east to the extent that Tajikistan, Kyrgyzstan, Gansu-Xinjiang in China and areas around Mongolia actually recorded large excesses of rainfall, which benefited agriculture and pastureland.

Southern-central Europe, North America (+17%), and especially South America are among the areas where rainfall significantly affected crops; the South American Major Production Zone recorded an increase of rainfall close to 50%, resulting in an estimated biomass increase of 24% and markedly benefiting crop production. Other droughts occurred in parts of India (Punjab, Gujarat, Goa, and Kerala), Thailand and Myanmar.

### Land use intensity

The above-mentioned climatic conditions have interfered with cropland management, which CropWatch assesses through the Cropped Arable Land Fraction indicator for major production zones, important food producing and exporting countries, and for Chinese regions and provinces. The final outcome of the season eventually results from the product of cultivated areas and yields, which are estimated quantitatively as well as qualitatively through several satellite-based indicators.

Significant changes in cropped arable land occurred in Southern Australia (4.4% increase), south and south-east Asia (+5.5%), and in the Gulf of Guinea countries (+1.9%), where Nigeria (+5.5%) displays one of the highest values in the African continent, followed by Ethiopia (+4.9%). On the other hand, South Africa decreased arable land for the winter crops (essentially wheat) by 12.6%. Similarly, Turkey decreased summer crop areas by 6.7%. Several countries in Asia, including drought-affected India, increased cropped arable land significantly, which contributed to limiting the impact of the adverse

conditions on projected crop production. Cropped land increases include those in India (+8.6%), Pakistan (+8.3%), and Cambodia (+4.7%).

### **Projected 2014 production**

CropWatch projections for the global 2014 agricultural output include poor performance of maize (-2.7% compared with 2013 estimates), a near-stagnation of rice (+0.5%) and wheat (+0.3%) production, but a significant rise of soybeans (+4.4%).

The drop in maize mostly affects the major producers, including Canada (-17.9%), the United States (-7.7%), Argentina (-1.8%), and Brazil (-2.8%). Ukraine is one of the few countries that did well (+6.1%).

The slight wheat increase results from the combination of very favorable output in South America (up more than 20% in Brazil and Argentina, where the harvest marks the return to normal or better conditions after two poor seasons affected by drought) with mediocre harvests in North America (-7.5% in Canada and -2.3% in the United States). Rice did not do well among the largest countries, including India (-1.5%), and Indonesia (-1.7%). Production is projected to decline as well in Bangladesh and Thailand (-0.3% and -0.2%, respectively), while expectations are better for the Philippines (+2.8%) and Egypt (+3.5%), in spite of a cyclone affecting the crop in the former.

Soybeans are the only crop that is expected to do well, with a sizeable production increase of 4.4%, mostly driven by the United States (+10.9%) and Brazil (+9.0%). Argentina stayed at a low output increase of 0.5%.

In China, wheat production is estimated to be slightly up (+0.5%) from last year's, which puts the country's total cereal production at 448million tons, virtually the same level as the 2013 output. Maize (191 million tons) is down 1.14% due to drought and rice stagnates at 201 million tons. Soybean continued the recent downward trend (-1.28%).

## الملخص التنفيذي

تُقيم نشرة CropWatch لشهر أغسطس العوامل الزراعية والعوامل المناخية الأخيرة حتى شهر يوليو 2014 التي تُحدد تطورات المحاصيل والإنتاج الزراعي لعام 2014. وتُركز تحليلات المؤشرات البيئية المرتبطة بعلم الزراعة والقائمة على الأرقام الصناعية على الأنماط العالمية وتُسلط الضوء على مناطق وبلدان الإنتاج الرئيسية، كما تتضمن هذه النشرة تقريراً عن الكوارث ووجهات النظر المتعلقة بظاهرة إل نينيو.

## الإجهاد المائي

لعبت تقلبات الإمداد بالمياه دوراً مهماً في تحديد ملامح نتائج الإنتاج الزراعي لعام 2014؛ حيث أُنز الجفاف وهطول الأمطار - الأمر الذي يؤدي في بعض الأحيان إلى حدوث فيضانات- بشكل ملحوظ في تطورات المحاصيل في مناطق واسعة ومتراصة مكانياً، بالإضافة إلى حالات انهيارات أرضية وحرائق تم الإبلاغ عنها مع أن هذه الظواهر يغلب عليها أن تكون ذات أهمية محلية فقط، كما تتطوي الفترة الحالية على خاصية أخرى جديدة بالملاحظة؛ فقد شهدت مناطق محدودة للغاية درجات حرارة استثنائية.

تُعد منطقة شرق آسيا من بين المناطق الرئيسية التي شهدت نقصاً في تساقط الأمطار؛ حيث انخفضت القيم المتوسطة بشكل كبير في جنوب اليابان (-34%) وفي شبه الجزيرة الكورية (-50%) بالإضافة إلى عدة مناطق في الصين تشمل منطقة لويس والصين الشمالية الشرقية وخاصة سهل شمال الصين (-25%)، وتشتمل المقاطعات الصينية الأكثر تأثراً بذلك على مقاطعة شاندونغ (-31%)، ومقاطعة هونان (-25%)، ومقاطعة شنشي (-22%)، ومقاطعة لياونينغ (-21%)، ومقاطعة خبي (-16%). ولقد صاحب هذا الجفاف ارتفاعاً معتدلاً في درجة الحرارة (+1.0 درجة مئوية إلى 1.5 درجة مئوية) وأشعة الشمس (+5%) مما أدى إلى تأثر إنتاج المحاصيل بشدة.

تأثرت بعض المناطق الأخرى في روسيا الشرقية وآسيا الوسطى (كازخستان وأوزباكستان) بسبب نقص تساقط الأمطار تأثراً أقل خطورة من مثيلاتها؛ حيث عانت المحاصيل من نقص المياه بنسب تتراوح بين 20 و50%، كما انخفضت معدلات الجفاف في الشرق لدرجة أن طاجيكستان وقرغيزستان ومقاطعتي قانسو وشينجيانغ في الصين وبعض المناطق المحيطة بمنغوليا سجلت بالفعل زيادات كبيرة في معدل تساقط الأمطار مما عاد بالنفع على الزراعة والمراعي.

ومن بين المناطق التي تأثرت المحاصيل فيها بشكل كبير بسبب تساقط الأمطار منطقة أوروبا الوسطى وأوروبا الجنوبية وأمريكا الشمالية (+17%) وخاصة أمريكا الجنوبية؛ حيث سجلت منطقة الإنتاج الرئيسية بأمريكا الجنوبية ارتفاعاً في تساقط الأمطار يقرب من 50% مما أدى إلى زيادة الكتلة الحيوية بنسبة 24% وتحقق استفادة كبيرة في إنتاج المحصول. ولقد حدثت بعض حالات الجفاف في بعض المناطق بالهند (بنجاب، وغوجارات، وغوا، وكيرالا) وتايلاند وميانمار.

## كثافة استخدام الأراضي

تدخلت الظروف المناخية المذكورة أعلاه في عملية إدارة الأراضي الزراعية التي تُقيّمها CropWatch من خلال مؤشر قطع الأراضي المنزرعة بالمحاصيل لمناطق الإنتاج الرئيسية، والبلدان المهمة في إنتاج الغذاء وتصديره، والمقاطعات والمناطق الصينية. وتتأتي النتيجة النهائية للموسم من ناتج المناطق المزروعة والمحاصيل التي تُقدّر من الناحية الكمية والنوعية من خلال عديد من المؤشرات القائمة على الأقمار الصناعية.

حدثت تغيرات كبيرة في الأراضي المنزرعة بالمحاصيل في أستراليا الجنوبية (ارتفعت بنسبة 4.4%)، وفي جنوب آسيا وجنوب شرق آسيا (+5.5%)، وفي دول جنوب غينيا (+1.9%) حيث حققت نيجيريا (+5.5%) واحدة من أعلى القيم في القارة الأفريقية وتليها إثيوبيا (+4.9%). وعلى الجانب الآخر، انخفضت نسبة الأراضي الصالحة لزراعة المحاصيل الشتوية (القمح في الأساس) في جنوب أفريقيا بنسبة 12.6%، وبالمثل، انخفضت نسبة مناطق زراعة المحاصيل الصيفية في تركيا بنسبة 6.7%، ولقد ازدادت الأراضي المنزرعة بالمحاصيل بشكل كبير في عديد من دول آسيا بما في ذلك دولة الهند المتضررة من الجفاف؛ مما أسهم في الحد من تأثير الظروف السلبية على الإنتاجية المتوقعة من المحصول، حيث ارتفعت نسبة الأراضي المزروعة في الهند (+8.6%) وباكستان (+8.3%) وكمبوديا (+4.7%).

## الإنتاج المتوقع لعام 2014

تشتمل توقعات CropWatch الخاصة بالناتج الزراعي العالمي لعام 2014 على أداء ضعيف للذرة (-2.7%) مقارنة بتقديرات عام 2013، وأداء شبه ثابت للأرز (+0.5%) وكذلك القمح (+0.3%) ولكن هناك ارتفاع كبير في محصول الفول الصويا (+4.4%).

ويؤثر الانخفاض في أداء الذرة بالشكل الأكبر على كبار الدول المنتجة، بما في ذلك كندا بنسبة (-17.9%) والولايات المتحدة بنسبة (-7.7%) والأرجنتين بنسبة (-1.8%) والبرازيل بنسبة (-2.8%). وتعد أوكرانيا من الدول القليلة التي حققت ارتفاعاً بلغ (+6.1%).

وقد نتجت الزيادة الطفيفة في القمح من الجمع بين نواتج محاصيل إيجابية جداً في أمريكا الجنوبية (وصلت لأكثر من 20% في البرازيل والأرجنتين، حيث يظهر الحصاد في هاتين الدولتين الرجوع إلى الأحوال الطبيعية أو الأفضل بعد موسمين فقيرين متأثراً بالجفاف) وبين ناتج محاصيل دون المستوى في أمريكا الشمالية (منخفض بنسبة -7.5% في كندا و-2.3% في الولايات المتحدة). ولم يسر محصول الأرز على ما يرام في أكبر الدول المنتجة له، بما فيها حيث انخفض بنسبة (-1.5%) والهند بنسبة (-1.7%) وإندونيسيا بنسبة (-1.7%). ومن المتوقع انخفاض الإنتاج أيضاً في بنجلاديش وتايلاند (بنسبة -0.3% و-0.2% على التوالي)، بينما تتحسن التوقعات بالنسبة للفلبين (حيث يتوقع الزيادة بنسبة +2.8%) ومصر (حيث يتوقع الزيادة بنسبة +3.5%)، بالرغم من وجود إعصار ضرب الدولة الأولى وأثر على كمية المحصول فيها.

ويعتبر محصول فول الصويا هو المحصول الوحيد المتوقع له الارتفاع، بزيادة كبيرة في الإنتاج تصل إلى 4.4% مدفوعة بشكل رئيسي بزيادة المحصول في الولايات المتحدة بنسبة (+10.9%) والبرازيل بنسبة (+9.0%). وقد استمرت الأرجنتين على زيادة منخفضة في الإنتاج بلغت 0.5%.

وفي الصين، تشير التقديرات إلى ارتفاع إنتاج القمح بنسبة طفيفة تصل إلى (+0.5%) عن السنة الماضية، والتي جعلت إجمالي إنتاج الحبوب لدى الدولة يصل إلى 448 طن، ويعتبر تقريباً نفس مستوى 2013. وقد انخفض ناتج الذرة (البالغ 191 مليون طن) بنسبة 1.14% بفعل الجفاف وقبع ناتج الأرز عند 201 مليون طن. وقد واصل فول الصويا اتجاهه الحالي في الهبوط الذي بلغت نسبته (-1.28%).

## Résumé

Le bulletin CropWatch du mois d'août analyse les facteurs agroclimatiques et agronomiques jusqu'à juillet 2014 qui déterminent l'évolution des céréales et la production agricole 2014. Les analyses des indicateurs environnementaux basés sur les observations par satellite sont axées sur les modèles au niveau mondial et focalisent sur les principaux pays et régions de production. Le présent bulletin fait également état des désastres et des perspectives El Niño.

### Le stress hydrique

Les aléas en matière d'approvisionnement d'eau ont joué un rôle important dans la configuration des résultats de la production agricole 2014. Les sécheresses et les fortes précipitations, occasionnant parfois des inondations, ont nettement marqué l'évolution des céréales au niveau de plusieurs zones d'importance et géographiquement cohérentes. Les glissements de terrain et les incendies associés sont rapportés, même si ces phénomènes n'ont en général qu'une importance localisée. La période actuelle est également marquée par un fait particulier, à savoir que des zones très limitées ont connu des températures exceptionnelles.

L'Asie de l'Est fait partie des zones principalement touchées par le déficit de précipitations, avec des moyennes nettement inférieures au sud du Japon (-34%) et la péninsule coréenne (-50%), ainsi que dans plusieurs zones en Chine, dont la région de Loess, le nord-est de la Chine, et en particulier la Grande Plaine du Nord de la Chine (-25%). Les provinces de Chine les plus touchées incluent Shandong (-31%), Henan (-25%), Shaanxi (-22%), Liaoning (-21%), et Hubei (-16%). La sécheresse a été accompagnée d'une augmentation modérée des températures (+1,0°C à 1,5°C) et de l'ensoleillement (+5%) qui ont sérieusement affecté la production céréalière.

Des impacts moins graves caractérisent une autre région déficitaire en précipitations dans l'est de la Russie et en Asie centrale (Kazakhstan, Ouzbékistan) où de nombreuses céréales ont souffert de déficits de précipitations de 20 à 50%, la sécheresse se réduisant dans l'est à tel point que le Tadjikistan, le Kirghizstan, et Gansu-Xinjiang en Chine et des zones autour de la Mongolie ont enregistré des excès importants de précipitations, lesquels ont profité à l'agriculture et aux pâturages.

Le sud de l'Europe centrale, l'Amérique du Nord (+17%) et en particulier l'Amérique du Sud font partie des régions où les précipitations ont largement affecté les céréales ; la plus grande zone de production d'Amérique du Sud a enregistré une augmentation des précipitations de près de 50%, ce qui a entraîné une augmentation estimée de la biomasse de 24% et profité nettement à la production céréalière. D'autres sécheresses ont été enregistrées dans des régions de l'Inde (Pendjab, Gujarat, Goa, and Kerala), la Thaïlande et le Myanmar.

### Intensité de l'utilisation des sols

Les conditions climatiques mentionnées ci-dessus ont affecté la gestion des terres cultivées que CropWatch analyse au moyen de l'indicateur de la part de terre arable de culture pour les plus grandes zones de production, les grands pays producteurs et exportateurs de produits alimentaires, et pour les régions et provinces chinoises. Le résultat définitif de la saison se calcule au final en faisant le produit des terres cultivées et des rendements, qui sont estimés quantitativement ainsi que qualitativement au moyen de plusieurs indicateurs basés sur les observations par satellite.

Des changements importants ont eu lieu au niveau des terres arables cultivées au sud de l'Australie (4,4% d'augmentation), au sud et au sud-est de l'Asie (+5,5%), et dans les pays du Golfe de Guinée (+1,9%) où le Nigéria (+5,5%) présente les plus valeurs les plus élevées sur le continent Africain, suivi par l'Éthiopie (+4,9%). De l'autre côté, l'Afrique du sud, a réduit ses terres arables pour les céréales d'hiver (essentiellement le blé) de 12,6%. De même, la Turquie a réduit ses zones de céréales d'été de 6,7%. Plusieurs pays d'Asie, dont l'Inde affectée par la sécheresse, ont augmenté de manière importante les ses terres arables cultivées, ce qui a contribué à limiter l'impact des conditions défavorables sur la production céréalière projetée. Les augmentations de terres cultivées comprennent celles en Inde (+8,6%), au Pakistan (+8,3%) et au Cambodge (+4,7%).

### **Projections de la production 2014**

Les projections CropWatch pour les résultats agricoles globaux pour 2014 comportent les mauvaises performances pour la production de maïs (-2,7% par rapport aux estimations 2013), une quasi-stagnation de la production de riz (+0,5%) et de blé (+0,3%), mais une augmentation significative de soja (+4,4%).

La baisse du maïs affecte surtout les grands producteurs, à savoir le Canada (-17,9%), les États-Unis (-7,7%), l'Argentine (-1,8%) et le Brésil (-2,8%). L'Ukraine est l'un des rares pays à avoir obtenu de bons résultats (+6,1%).

La légère augmentation pour le blé est la combinaison d'un résultat très favorable en Amérique du Sud (jusqu'à plus de 20% au Brésil et en Argentine, où la récolte marque le retour à des conditions normales ou meilleures après deux mauvaises saisons affectées par la sécheresse) avec des récoltes médiocres en Amérique du Nord (-7,5% au Canada et -2,3% aux États-Unis). Le riz n'a pas obtenu de bons résultats parmi les grands pays, dont la l'Inde (-1,5%) et l'Indonésie (-1,7%). Il est prévu que la production baisse également au Bangladesh et en Thaïlande (respectivement -0,3% et -0,2%), tandis que les attentes sont plus optimistes pour les Philippines (+2,8%) et l'Égypte (+3,5%), et ce malgré un cyclone affectant les céréales dans ce dernier pays.

Le soja est la seule céréale dont on attend de bons résultats, avec une augmentation assez importante de la production de 4,4%, emmenée principalement par les États-Unis (+10,9%) et le Brésil (+9,0%). L'Argentine est restée sur une faible augmentation de 0,5%.

En Chine, il est estimé que la production de blé est en légère hausse (+0,5%) par rapport à l'année dernière, à savoir une production céréalière totale du pays de 448 millions de tonnes, c'est-à-dire pratiquement le même niveau que le résultat 2013. Le maïs (191 millions de tonnes) est en baisse de 1,14% à cause de la sécheresse et le riz stagne à 201 millions de tonnes. Le soja a poursuivi sa récente tendance à la baisse (-1,28%).

## Краткий обзор

В августовском выпуске вестника “CropWatch” содержится оценка последних агроклиматических и агрономических факторов по состоянию на июль 2014 г., которые были определяющими для развития урожая и сельскохозяйственного производства в 2014 г. В ходе анализа экологических и спутниковых агрономических показателей был сделан акцент на глобальные тенденции с уделением более пристального внимания основным производственным регионам и странам. В вестнике также содержится информация о бедствиях и различные взгляды касательно Эль-Ниньо.

### Водный стресс

Нестабильная ситуация в сфере водообеспечения сыграла существенную роль в формировании итогов сельскохозяйственного производства в 2014 г. Засухи и чрезмерное количество осадков, иногда приводящее к наводнениям, со всей очевидностью оказали воздействие на созревание урожая в нескольких крупных и пространственно связанных регионах. Продолжают поступать сведения о вызванных ими оползнях и пожарах, хотя значимость данных явлений имеет лишь локальный характер. Еще одной отличительной особенностью текущего периода стало то, что аномальные температуры наблюдались на очень ограниченных территориях.

Восточная Азия относится к одному из основных регионов, характеризующихся дефицитом дождевых осадков, со значениями на уровне существенно ниже средних в южной части Японии (-34%) и на Корейском полуострове (-50%), а также в нескольких зонах Китая, включая Лессовый регион и северо-восток Китая, в частности северную часть Китайской равнины (-25%). Провинции Китая, попавшие под наибольшее воздействие, включают Шаньдун (-31%), Хэнань (-25%), Шэньси (-22%), Ляонин (-21%) и Хубэй (-16%). Засуха сопровождалась умеренными повышениями температуры (от +1,0°C до 1,5°C) и солнечного света (+5%), что оказало губительное воздействие на производство урожая.

Менее серьезное воздействие имело место в другом регионе с дефицитом дождевых осадков в восточной России и Центральной Азии (Казахстан, Узбекистан), где недостаток водообеспечения для многих культур составил от 20 до 50%, а засуха уменьшалась в направлении востока вплоть до того, что в Таджикистане, Кыргызстане, Ганьсу-Синьцзяне в Китае и на территориях вокруг Монголии по сути было зарегистрировано чрезмерное количество осадков, что положительно сказалось на сельском хозяйстве и пастбищных землях.

Южная часть Центральной Европы, Северная Америка (+17%) и в особенности Южная Америка относятся к регионам, где дождевые осадки оказали весьма существенное воздействие на сельскохозяйственные культуры; в Южноамериканской основной производственной зоне было зарегистрировано повышение уровня осадков почти на 50%, что, согласно расчетам, привело к повышению уровня биомассы на 24%, тем самым оказав явное положительное воздействие на урожайность. Другие случаи засухи имели место в Индии (Пенджаб, Гуджарат, Гоа и Керала), Таиланде и Мьянме.

### Интенсивность землепользования

Вышеуказанные климатические условия оказали влияние на управление пахотными землями, оценка которого производится “CropWatch” с помощью Индикатора доли посевных пахотных земель для основных производственных зон, важных стран-производителей продовольствия и

стран-экспортеров, а также для регионов и провинций Китая. В конечном счете, окончательный итог сезона зависит от продукции на обрабатываемых землях и урожая, которые рассчитываются как количественно, так и качественно с помощью нескольких показателей на основе спутниковых данных.

Существенные изменения в посевных пахотных землях произошли в Южной Австралии (повышение на 4,4%), Южной и Юго-Восточной Азии (повышение на 5,5%, а также в странах Гвинейского залива (повышение на 1,9%), где Нигерия (+5,5%) демонстрирует одно из наиболее высоких значений на всем Африканском континенте. Следом за Нигерией идет Эфиопия (+4,9%). С другой стороны, Южная Африка сократила посевные площади под зимние культуры на 12,6%. Точно так же Турция сократила площади, засеянные летними культурами, на 6,7%. Несколько стран Азии, включая пораженную засухой Индию, существенно повысили площадь посевных земель, что стало вкладом в ограничение воздействия неблагоприятных условий на прогнозируемую урожайность. Расширение площади обрабатываемых земель имело место в Индии (+8,6%), Пакистане (+8,3%) и Камбодже (+4,7%).

### **Прогноз производства на 2014 г.**

Прогнозы “CropWatch” в отношении глобальных объемов сельскохозяйственного производства на 2014 г. включают плохие показатели для кукурузы (-2,7% в сравнении с оценками 2013 г.), практически стагнацию в производстве риса (+0,5%) и пшеницы (+0,3%) и существенный рост производства соевых бобов (+4,4%).

Спад объемов кукурузы оказывает влияние преимущественно на основных поставщиков, включая Канаду (-17,9%), США (-7,7%), Аргентину (-1,8%) и Бразилию (-2,8%). Одна из немногих стран, преуспевших в этой области, - Украина (+6,1%).

Небольшой рост производства пшеницы является результатом благоприятных показателей по Южной Америке (повышение на более чем 20% в Бразилии и Аргентине, где урожай демонстрирует возврат к нормальным или еще более благоприятным условиям после двух неудачных сезонов, сопровождавшихся засухами) вкуче со средним урожаем в Северной Америке (-7,5% в Канаде и -2,3% в США). Рис показал далеко не наилучшие результаты среди крупнейших стран, включая Индию (-1,5%) и Индонезию (-1,7%). Также прогнозируется спад производства в Бангладеше и Таиланде (-0,3% и -0,2% соответственно), в то время как прогнозы для Филиппин и Египта более оптимистичны (+2,8% и 3,5% соответственно), невзирая на циклон, который оказал воздействие на урожай в Филиппинах.

Согласно прогнозам, единственной культурой, которая покажет хорошие результаты, являются соевые бобы, рост производства которых станет существенным – на 4,4%, в основном за счёт США (+10,9%) и Бразилии (+9,0%). Аргентина остается на уровне незначительного роста в 0,5%.

В Китае, согласно оценкам, производство пшеницы в сравнении с прошлым годом ненамного возрастет (+0,5%), что приведет к общему национальному производству зерновых на уровне 448 миллиона тонн. Фактически, это тот же уровень, который наблюдался и в 2013 г. Производство кукурузы (191 миллиона тонн) будет отмечено снижением на 1,14% из-за засухи, а производство риса останется практически без изменений – 201 миллионов тонн. Объемы производимых соевых бобов продолжают сокращаться (-1,28%).

## Resumen

El boletín informativo de agosto de CropWatch evalúa los factores agroclimáticos y agronómicos recientes hasta julio 2014, los cuales determinan el desarrollo de los cultivos y la producción agrícola de este año. El análisis de los indicadores ambientales y agronómicos satelitales se enfoca en modelos a nivel mundial, enfatizando particularmente las principales regiones y países productores. Este boletín también informa acerca de las perspectivas de desastres y del fenómeno de El Niño.

### Estrés hídrico

El suministro incierto de agua representa un aspecto importante en la proyección de resultados para la producción agrícola del año 2014. La sequía y el exceso de lluvias -que algunas veces se traduce en inundaciones- han influido notablemente en el desarrollo de cultivos en diversas áreas de gran extensión y espacialmente coherentes. Asociados a estos fenómenos extremos se informa de deslizamientos de tierra e incendios, aunque estos tienden a ser de mera importancia local. Otra característica destacable del período en curso es que solo ciertas áreas muy limitadas sufrieron temperaturas poco habituales.

Asia oriental se encuentra entre las principales zonas con déficit de lluvia cuyos valores promedio fueron significativamente más bajos al sur de Japón (-34%), en la península de Corea (-50%) y en diversas zonas de China, como la región de Loess, el noreste chino y particularmente la llanura del norte de China (-25%). Las provincias más afectadas en este país fueron Shandong (-31%), Henán (-25%), Shaanxi (-22%), Liaoning (-21%) y Hubei (-16%). La sequía estuvo acompañada de aumentos moderados de la temperatura (1°C a 1,5°C) y de la radiación solar (+5%), afectando gravemente los cultivos.

Impactos menos graves se produjeron en otras zonas con déficit de lluvias, como el este de Rusia y Asia central (Kazajistán y Uzbekistán) donde muchos cultivos sufrieron entre un 20 y un 50% de escasez de agua, y una disminución de la sequía al este de Tayikistán, Kirguistán, Gansu-Sinkiang en China y en los alrededores de Mongolia donde, por el contrario, se registró un importante superávit de lluvias que benefició la agricultura y el pastoreo.

El sur y el centro de Europa, Norteamérica (+17%) y en especial Sudamérica se cuentan entre las zonas donde la lluvia afectó significativamente los cultivos. La principal región productora sudamericana registró un incremento de las precipitaciones cercano al 50%, lo que se tradujo en un aumento estimado del 24% en la biomasa, beneficiando notablemente la producción de cultivos. En algunas zonas de India (Punjab, Guyarat, Goa y Kerala), en Tailandia y en Birmania se produjeron sequías.

### Intensidad del uso de suelos

Las condiciones climáticas antes mencionadas han interferido en la gestión de terrenos cultivables, la cual es evaluada por CropWatch por medio del indicador de división del terreno cultivable para las principales zonas productoras, los países productores y exportadores de alimentos más importantes y las diversas regiones y provincias de China. El resultado final de la temporada a la larga se obtiene del producto entre el área cultivada y las cosechas, las que se estiman cuantitativa y cualitativamente por medio de diversos indicadores satelitales.

Se produjeron cambios significativos en las tierras cultivables al sur de Australia (aumento de 4,4%), al sur y suroriente de Asia (+5,5%) y en los países del golfo de Guinea (+1,9%), donde Nigeria (+5,5%) exhibe uno de los valores más altos del continente africano, seguido por Etiopía (+4,9%). Por otro lado, Sudáfrica

redujo su terreno disponible para cultivos de invierno (esencialmente trigo) en un 12,6%. De igual forma, Turquía disminuyó en un 6,7% sus áreas para cultivos de verano. Varios países de Asia, incluyendo India que resultó afectada por una sequía, aumentaron significativamente sus terrenos cultivables, lo que contribuyó a mitigar el impacto producido por las condiciones adversas en la producción estimada de cultivos. El aumento de terreno cultivable considera regiones de India (+8,6%), Paquistán (+8,3%) y Camboya (+4,7%).

### **Producción estimada para 2014**

Las proyecciones de CropWatch para 2014 en cuanto a los resultados agrícolas a nivel mundial mencionan un rendimiento bajo para el maíz (-2,7%) en comparación con las estimaciones del 2013, una situación cercana al estancamiento para la producción de arroz (+0,5%) y trigo (+0,3%) y un importante auge de la soja (+4,4%).

La caída del maíz afecta principalmente a los grandes productores, como Canadá (-17,9%), Estados Unidos (-7,7%), Argentina (-1,8%) y Brasil (-2,8%). Ucrania es uno de los pocos países que ha logrado buenos resultados (+6,1%).

El ligero aumento en la producción de trigo se debe a la combinación de varios resultados favorables en Sudamérica (hasta más de 20% en Brasil y Argentina, marcando estas cosechas el retorno a condiciones mejores o normales después de dos temporadas deficientes afectadas por la sequía) junto con cosechas mediocres en Norteamérica (-7,5% en Canadá y -2,3% en Estados Unidos). El arroz no alcanzó buenos resultados en los países más grandes como India (-1,5%) e Indonesia (-1,7%). Se estima un descenso en la producción en Bangladesh y en Tailandia (-0,3% y -0,2% respectivamente), mientras que las expectativas son mejores en Filipinas (+2,8%) y en Egipto (+3,5%) a pesar del ciclón que afectó los cultivos en el primero de ellos.

La soja es el único cultivo que se estima tendrá buenos resultados, con un aumento considerable en la producción de 4,4% mayormente en Estados Unidos (+10,9%) y Brasil (+9%). Argentina se mantuvo con un bajo aumento en sus resultados de 0,5%.

En China se espera que la producción de trigo ascienda levemente (+0,5% respecto al último año), lo que significa un volumen total del cereal de 448 millones de toneladas, prácticamente el mismo nivel del resultado del año 2013. El maíz (191 millones de toneladas) bajó un 1,14% debido a las sequías y el arroz se estancó en 201 millones de toneladas. La soja continuó con su reciente tendencia a la baja (-1,28%).

# 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). A complete list of values for the MRUs is included in Annex A, table A.1. A map of the MRUs and more detail about the indicators is included in Annex C.

## 1.1 Overview

Overall, most indicators other than rainfall show little variation. For rainfall (RAIN), anomalous conditions have prevailed in several large areas, starting with southern Africa where a rainfall deficit close to or larger than 50% has affected the Western Cape province (MRU-10) and Madagascar (MRU-5 and -6). Other areas in the continent have recorded smaller but nevertheless significant departures from average rainfall, starting with the Horn of Africa (MRU-2, -32%), Southern Africa (MRU-9, -26%), and the east African Highlands (MRU-2, -18%). North Africa is to be mentioned as well (MRU-7, -19%); the area is not contiguous with the previous ones and the rainfall shortage actually started at the end of 2013 (as mentioned in previous CropWatch bulletins). Corresponding drops in biomass potential (BIOMSS) range from -57% (MRU-6, south-west Madagascar) to -28% (MRU-9, Southern Africa) and -25% (MRU-5, Madagascar). The rainfall anomaly is compatible with El Niño in southern Africa, where it coincides with the end (and harvest) of the maize season and the beginning of the wheat season.

Similarly, another large rainfall deficit affects East Asia (MRU-43, RAIN -40%) and southern Japan and Korea (MRU-46, -33%), as well as several areas in China, including the Loess region (MRU-36, -7%), North-east China (MRU-38, -9%), and especially the north China Plain (MRU-34, Huanghuaihai, -25%). Most of eastern Asia experiences above average temperature (TEMP) in the range of +1.0°C to 1.5°C and correlated RADPAR anomalies close to +5%. The neighboring Mongolia region (MRU-47) and Gansu-Xinjiang (MRU-32) receive the largest RAIN excess of all units: +184% and +114% respectively. With close to normal temperature and sunshine, this results in an expected BIOMSS increase above 70%, a welcome event in the two areas where rangeland is the basis of the livestock economy. Elsewhere in Asia, southern Asia (MRU-45) and the adjacent southern Himalaya area (MRU-44) experience above average TEMP, accompanied by increased RADPAR (+4%). However, due to slightly above-average rainfall (just short of 10%), no particular negative impact on summer crops is foreseen for this area.

In contrast to the rainfall deficits mentioned for southern Africa and east Asia, abundant rainfall falls over large areas in southern Latin America, including in south-east Brazil, Concepción to Bahia Blanca (MRU-26, +62%), adjacent and agriculturally less important areas of central-north Argentina (MRU-25), and the semi-arid Southern Cone (MRU-28), both recording a large excess of +83% for RAIN. Radiation (RADPAR) is low in the same areas (-5% to -9%). Temperature (TEMP) is about average and the favorable rainfall will benefit winter crops and rangelands.

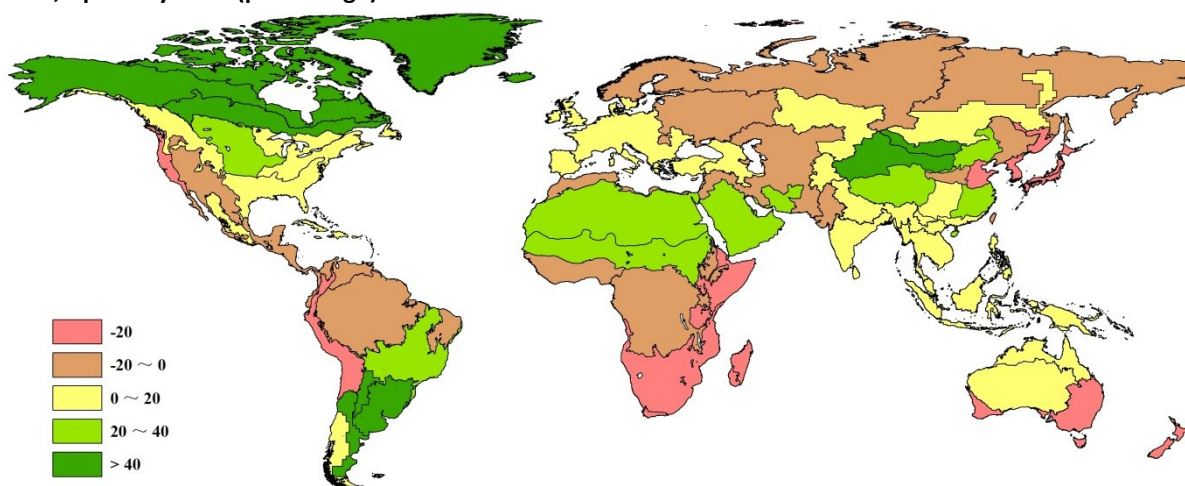
More isolated anomalies affect New Zealand (MRU-56, -44% rainfall and an estimated drop in biomass production of 29%); the northern Great Plains (MRU-12, abundant rainfall of +34%, accompanied by a drop in sunshine and temperature); and the U.S. West Coast (MRU-16, RAIN -48% and a heat-wave (+2.1°C), but with close to average sunshine).

## 1.2 Rainfall

As mentioned in the overview, rainfall showed the most variation across regions, compared to the other agroclimatic indicators and BIOMSS. In addition to the areas highlighted in the overview, abundant rainfall fell over the northern Great Plains (MRU-12, +34%), an important maize growing zone of the United States. In China, rainfall in the Lower Yangtze (MRU-37), a major rice growing area increased 22%. Some areas less important for crop production but very relevant for livestock received large excesses of rainfall: Mongolia region (MRU-47, +184%) and Gansu-Xinjiang (MRU-32, +114%).

Rainfall varied less in other agriculturally important regions: American corn belt (MRU-13, +3%), American cotton belt-Mexican coastal plain (MRU-14, +9%), Western Europe (MRU-60, +1%), southern Himalayas (MRU-44, +7%), continental south-east Asia (MRU-50, +7%), and Southeast Asian islands (MRU-49, +0.4%).

**Figure 1.1. Global map of rainfall anomaly (as indicated by the RAIN indicator) by MRU, departure from 13YA, April-July 2014 (percentage)**



Note: Data for April-July 2014, compared with the thirteen-year average (13YA) for the April-July periods for 2001-2013.

## 1.3 Temperature

As shown in figure 1.2, most continents experienced warmer than average conditions compared with the recent thirteen years, which corresponds well with the prevailing global warming projections.

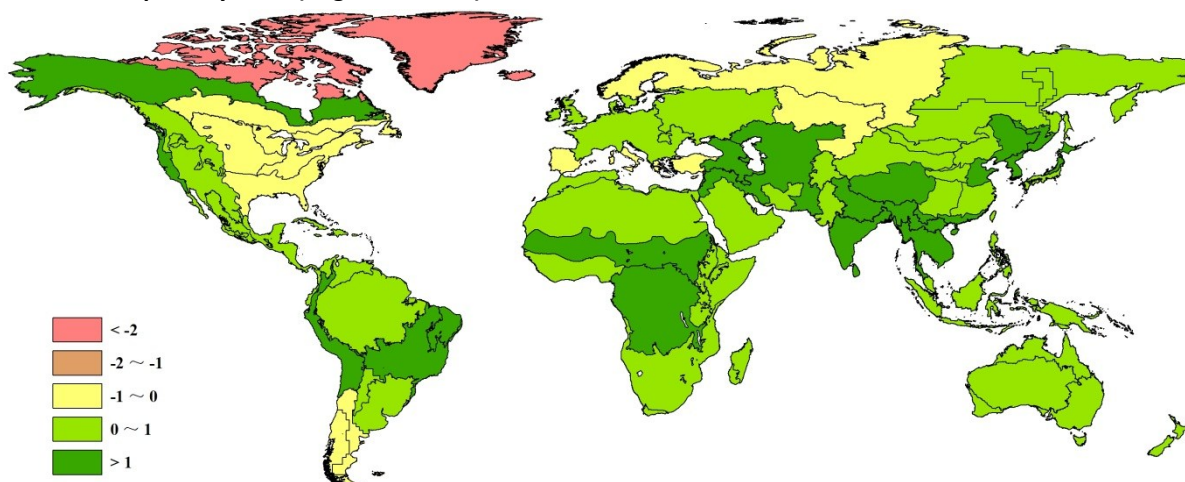
Four significant warming areas with positive TEMP departure larger than 1°C are captured in (i) boreal North America (MRU-61, +1°C) and America West Coast (MRU-16, +2.1°C, also the largest departure among all MRUs); (ii) central-northern Andes (MRU-21, +1.1°C), central-eastern Brazil (MRU-23, +1.0°C) and northern Brazil (MRU-22, +2.0°C); (iii) the West African Sahel (MRU-8, +1.1°C) and equatorial central Africa (MRU-01, +1.1); and (iv) large areas in central and southeast Asia, including the Caucasus (MRU-29, +1.1°C), western Asia (MRU-31, +1.0°C), southern Asia (MRU-45, +1.2°C), southern Himalayas (MRU-44, +1.1°C), China Qinghai-Tibet (MRU-39, +1.1°C), southern China (MRU-40, 1.2°C), China Hainan (MRU-33, +1.2°C), China Huanghuaihai (MRU-34, +1.0°C), northeast China (MRU-38, +1.2°C), Southeast Asia mainland (MRU-50, +1.1°C) and East Asia (MRU-43, +1.2°C).

In about four “hot” spots, boreal North America (MRU-61) has presented continuously above average values for the TEMP indicator since October 2013. The area is, however, of little agricultural importance. It is also the only region simultaneously exhibiting above average RAIN, TEMP, and RADPAR since January 2014. Over the reporting period, the Sahel MRU (MRU-08) also recorded positive departures for all three

agroclimatic indicators (RAIN, +25%; TEMP, +1.1°C; and RADPAR, +0.1%). Central-eastern Brazil (MRU-23) and China Qinghai-Tibet (MRU-39) enjoy favorable conditions, with above average temperature accompanied by above average rainfall (RAIN, +25% and +31% respectively) and below average sunshine (RADPAR, -1% and -2% respectively). Meanwhile, most of the other regions showed average or even worse conditions. Particularly along the American West Coast (MRU-16) and in China's Huanghuaihai (MRU-34), the high temperature was accompanied by poor rainfall (RAIN, -48% and -25% for the two MRUs respectively) and excessive sunshine (RADPAR, +0.1 and +1% respectively) which is consistent with the exceptional agricultural drought in the western United States, especially in California and China in July 2014.

The number of cooler areas—with below average temperature—are limited for this reporting period; and those that are somewhat colder are of limited agricultural significance. The largest negative temperature departure is recorded in sub-arctic America (MRU-65, -3.3°C); other regions experience slightly below average temperature including Mediterranean Europe and Turkey (MRU-59, -1°C), boreal Eurasia (MRU-57, -0.6°C), the Ural to the Altai Mountains (MRU-62, -0.2°C) and America's northern Great Plains (MRU-12, -0.3°C). Temperature only drops 0.1°C for the MRUs in the central-east part of the United States (MRUs 13-15) and the Southern Cone area (MRU-27 and 28) in South America.

**Figure 1.2. Global map of air temperature anomaly (as indicated by the TEMP indicator) by MRU, departure from 13YA, April-July 2014 (degrees Celsius)**



Note: Data for April-July 2014, compared with the thirteen-year average (13YA) for the April-July periods for 2001-2013.

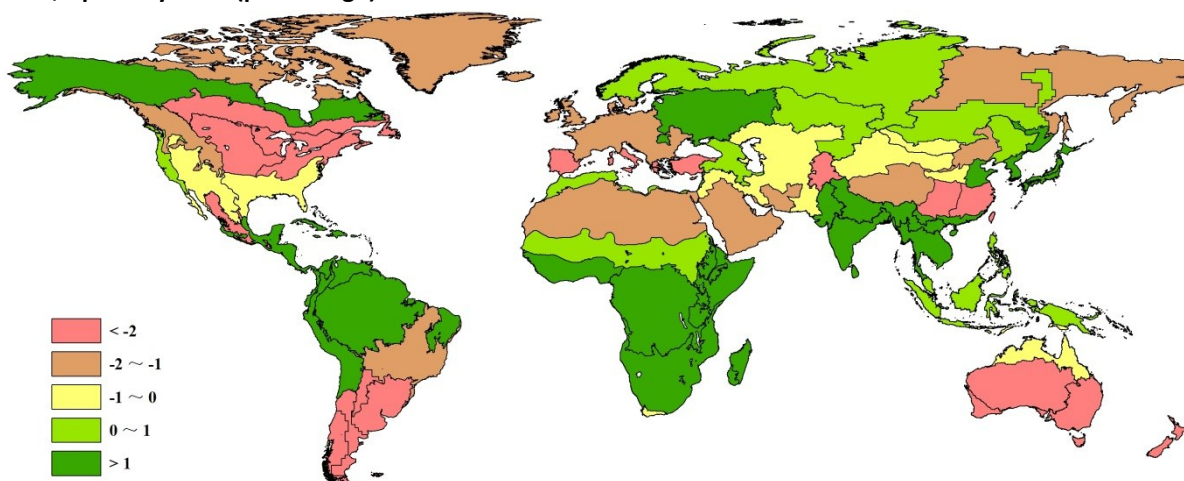
#### 1.4 Photosynthetically active radiation

For the reporting period, particular mention must be made of PAR (as indicated by the RADPAR indicator) increases in the Central Northern Andes (MRU-21, +3%) and East-Asia (MRU-43, +4%). These increases were characterized by positive temperature departures and lower than normal precipitation. Other areas with marked positive departure in RADPAR include (i) southern Asia and southeast Asia, with very favorable radiation conditions (all +4%) in the Himalayas (MRU-44), southern Asia (MRU-45), and southeast Asia mainland (MRU-50); (ii) the Horn of Africa (MRU-04, +4%); (iii) Southern Japan and Korea (MRU-46, +3%); and (iv) the Ukraine to the Ural mountains (MRU-58, +3%). The highest PAR departure for the recent reference period occurred in equatorial central Africa (MRU-01) with +6%.

In several parts of China, RADPAR very consistently followed the rainfall and temperature patterns mentioned above, where abundant rainfall generally leads to low temperatures and reduced RADPAR. This applies to the two main grain producing regions of China—the Lower Yangtze region (MRU-37) and China's South West (MRU-41)—which both show a significant decrease in PAR (-4% and -5%, respectively).

The regions with a decrease in RADPAR also include Gansu-Xinjiang (MRU-32, -0.1%), Inner Mongolia (MRU-35, -1%), Loess region (MRU-36, -0.7%), and Qinghai-Tibet (MRU-39, -2%). The regions with RADPAR increases include Huanghuaihai (MRU-34, +1%), Southern China (MRU-40, +2%), and Hainan, where the largest positive departure in China was recorded (MRU-53, +5%).

**Figure 1.3. Global map of PAR anomaly (as indicated by the RADPAR indicator) by MRU, departure from 13YA, April-July 2014 (percentage)**

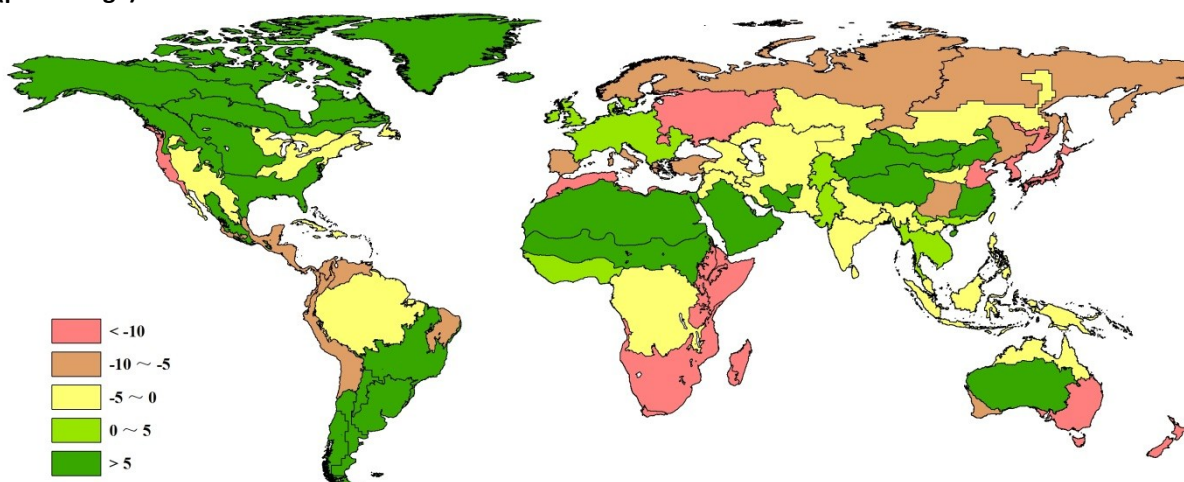


Note: Data for April-July 2014, compared with the thirteen-year average (13YA) for the April-July periods for 2001-2013.

## 1.5 Biomass

BIOMSS is a synthetic agroclimatic indicator taking into account rainfall and temperature factors to describe the potential biomass accumulation. Recent departures from average for the 65 global MRUs are shown in figure 1.4.

**Figure 1.4. Global map of biomass accumulation (BIOMSS) by MRU, departure from 13YA, April-July 2014 (percentage)**



Note: Data for April-July 2014, compared with the thirteen-year average (13YA) for the April-July periods for 2001-2013.

Generally, the western hemisphere enjoyed a more favorable BIOMSS than the eastern hemisphere. The very large positive BIOMSS departures are most prominent in non-agricultural areas (MRUs-65, 61, 15, 28, 64, 39, and 63). Some areas of relevance to crops and livestock (pastures) also demonstrate well above average potential biomass, including the West African Sahel (MRU-08, +20%), American cotton belt and Mexican coastal plain (MRU-14, +8%), American northern Great Plains (MRU-12, +14%), central-north Argentina (MRU-25, +43%), central-eastern Brazil (MRU-23, +19%), south-east Brazil and Concepcion

Bahia Blanca (MRU-26, +32%), the south-western Southern Cone (MRU-27, +12%), the Mongolia region (MRU-47, +82%), China Gansu-Xinjiang (MRU-32, +70%), China Inner Mongolia (MRU-35, +20%), and China Lower Yangtze (MRU-37, +8%).

Normal to below average BIOMSS dominate the rest of the globe, particularly in Eurasia, which might be due to the scarce rainfall in this region during the monitoring period (figure 1.1). Specifically, severe potential biomass drops are found in the Horn of Africa (MRU-04, -25%), Southern Africa (MRU-09, -28%), Madagascar (MRU-05, -25% and MRU-06, -57%), Australia's Queensland to Victoria (MRU-54, -13%), and New Zealand (MRU-56, -29%), which may be mainly attributed to deficient rainfall. Other regions with large and negative BIOMSS departure include the American West Coast (MRU-16, -37%), north African Mediterranean (MRU-07, -12%), Ukraine to Ural mountains (MRU-58, -12%), China Huanghuaihai (MRU-34, -11%), East Asia (MRU-43, -21%), and Southern Japan and Korea (MRU-46, -22%). The negative anomalies in these regions may be ascribed to the combined effect of excessive heat and insufficient rainfall.

## 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), maximum vegetation condition index (VCIx), and minimum vegetation health index (VHIn)—to describe crop condition in seven 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](http://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 seven MPZs, comparing the indicators to their respective thirteen- and five-year averages.

**Table 2.1. April to July 2014 agroclimatic indicators by Major Production Zone, current value and departure from 13YA**

	RAIN		TEMP		RADPAR	
	Current (mm)	Departure from 13YA (%)	Current (°C)	Departure from 13YA (°C)	Current (MJ/m <sup>2</sup> )	Departure from 13YA (%)
West Africa	622	0.2	28.5	0.5	1137	2
South America	456	51	18.9	0.9	771	-4
North America	462	17	18.8	-0.3	1295	-2
South and Southeast Asia	818	8	29.7	1.2	1191	4
Western Europe	262	-6	15.0	-0.3	1170	-0.5
Central Europe and Western Russia	227	-9	15.8	0.2	1178	3
Southern Australia	130	-27	13.4	0.8	670	-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 thirteen-year average (13YA) for the same period (April-July) for 2001-13.

**Table 2.2. April to July 2014 agronomic indicators by Major Production Zone, current season values and departure from 5YA**

	BIOMSS (gDM/m <sup>2</sup> )		Cropped arable land fraction (% of pixels)		Maximum VCI
	Current	Departure from 5YA (%)	Current	Departure from 5YA (%)	Current
West Africa	1695	3	98.0	1.9	0.80
South America	1112	24	97.3	1.2	0.86
North America	1362	9	98.6	-0.2	0.86
South and Southeast Asia	1461	-0.6	91.5	5.5	0.73
Western Europe	1068	-2	99.8	0.0	0.86
Central Europe/ Western Russia	939	-2	96.5	-0.5	0.87
Southern Australia	565	-18	95.7	4.4	0.89

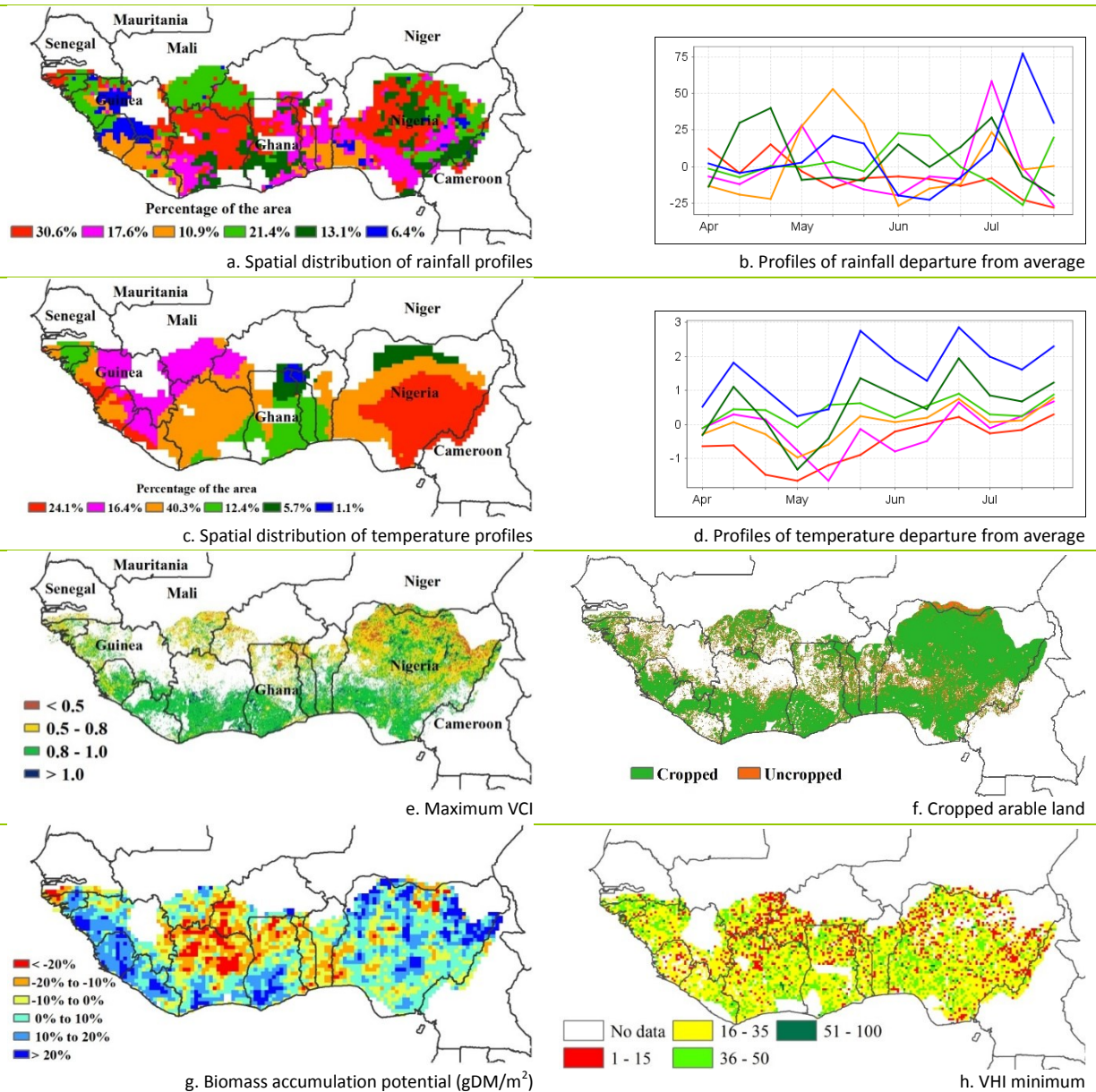
Note: Departures are expressed in relative terms (percentage) for all variables. Zero means no change from the average value; Relative departures are calculated as  $(C-R)/R*100$ , with C=current value and R=reference value, which is the five-year (5YA) average for the same period (April-July) for 2009-13.

## 2.2 West Africa

Due to the movement of the Intertropical convergence zone (ITCZ) from south to north over west Africa during the first half of the year, the rainy season starts earlier in the south of the countries included in this MPZ. In most countries, planting of maize thus occurs from March or April in the south, and in May or later in the north. In the west of the MPZ, countries are located at higher latitudes and maize plantings also begin in May. Seasons may vary from very long to bimodal in the south, depending mostly on elevation.

Figure 2.1 illustrates the CropWatch agroclimatic and agronomic indicators for the MPZ. Slightly below average temperature prevailed from April to early June in the center and south-east of Nigeria, as well as in an area centered around north-east Guinea.

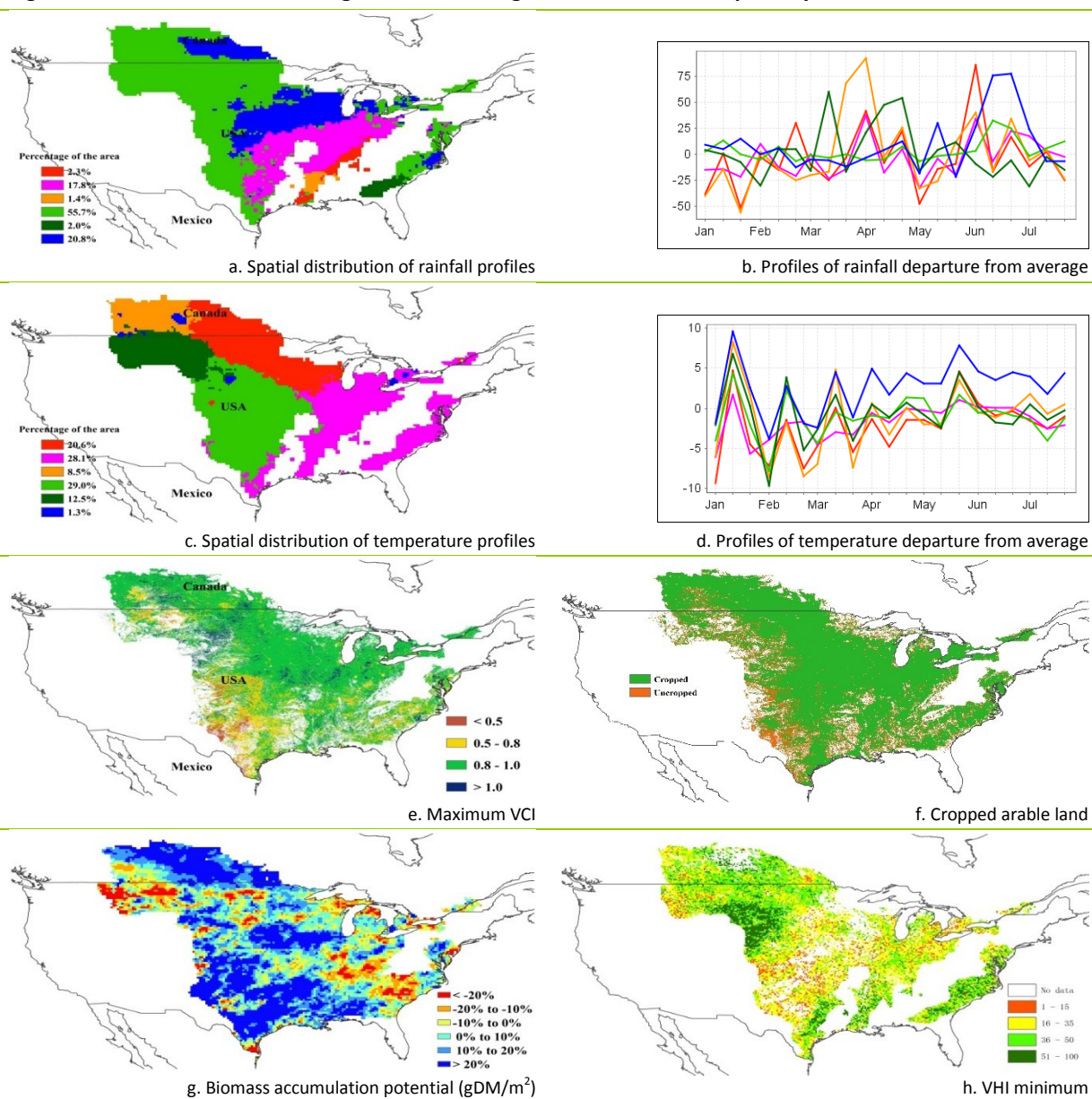
**Figure 2.1. West Africa MPZ: Agroclimatic and agronomic indicators, April-July 2014**



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

Most of the region had below average temperature during early May. Rainfall fluctuated widely but usually stayed in the range of plus or minus 25% compared with the recent average. More significant positive rainfall departures (> + 50%) occurred in May in southern Benin, Togo, and south-west Nigeria; during the first dekad of July in much of the southern center of the region (east Ghana to southern-central Nigeria) and during all of July in some of the areas that underwent a relative cold spell in the highlands of Guinea, thereby creating favorable water flow conditions for the Niger river later this year. The cropped arable land map indicates that the season has not actually started in the northernmost central (Mali, Burkina Faso) and eastern parts of the MPZ (Nigeria). With the possible exception of parts of the northern halves of Côte d'Ivoire and Ghana, most indicators concur to describe the conditions of crops over the area as generally average or favorable, with a slight increase of cropped arable land (+1.9%) and relatively high average regional maximum VCI (0.80).

**Figure 2.2. North America MPZ: Agroclimatic and agronomic indicators, April-July 2014**



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

### 2.3 North America

In general, crops are average in the North American MPZ. Overall, rainfall (RAIN) increased by 13%, temperature (TEMP) decreased by 0.3°C, and radiation (RADPAR) dropped 2% compared with the average of the last thirteen years (2001-2013). The most significant rainfall deficit occurred in early May and in particular affected Washington, northern Texas, Oklahoma, and Kansas, which is confirmed by low VHI values in the MPZ (see figure 2.2). Late May witnessed above average temperature in some of the same areas (Texas), leading to increased water deficits. Fortunately, June recorded several wet episodes, starting in the south at the beginning of the month and expanding to Wisconsin, Iowa, southern Saskatchewan, and Manitoba. Rainfall was far above the recent five-year average (more than 75%) and provided plentiful water resources for crop growth; it also decreased PAR, which has no doubt limited crop photosynthesis.

Although accumulated biomass (BIOMSS) showed a positive departure of 9% and good crop performance was recorded (according to VCIx), cropped arable land fraction increased by 4% (especially concentrated in the southwestern region of the MPZ) compared to the five-year average. Combined with weakened crop photosynthesis and serious water stress in the west, findings indicate that less than average crop production is to be expected.

### 2.4 South America

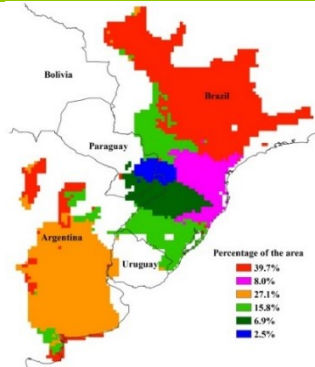
Thanks to favorable climatic conditions in the MPZ, the harvesting of maize, rice, and soybean and the planting of winter wheat has been completed over the reporting period. Figure 2.3 summarizes the CropWatch indicators for the MPZ.

Rainfall (RAIN) and temperature (TEMP) in the MPZ were generally favorable from April to July 2014, with nearly half more rainfall and one degree higher temperature compared with the thirteen-year average over the same period. Four percent below average RADPAR was observed during the last four months. Generally, the above average climatic conditions are beneficial for crop development and maturation, with the exception of some areas suffering from excess rainfall and floods, as mentioned in chapter 5.

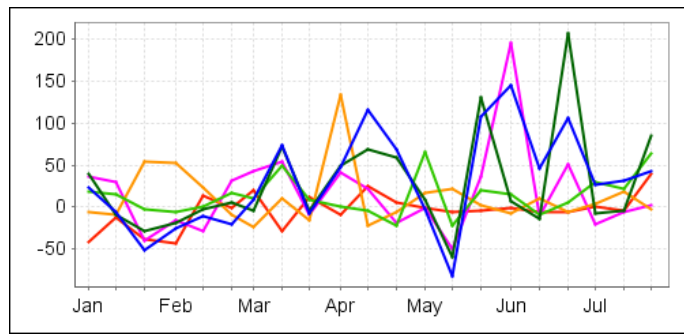
The condition of crops was above average, as confirmed by 24% above average biomass (BIOMSS) and a high VCIx value (0.86). Biomass accumulation in Sao Paulo and central Mato Grosso, however, was well below average (20% lower), while in contrast, biomass in most of other regions in the MPZ was 10% above average. The 50 mm rainfall deficit in mid-May and the continuously above average temperature from May to July in Sao Paulo was the main reason for the low biomass, which is confirmed by the low values of the VHI minimum map.

More than 97% of the arable lands were cropped in April to July 2014, 1% higher than the recent five-year average. Only central Mato Grosso Do Sul and regions close to Bahia Blanca show uncropped land from April to July. Accordingly, maximum VCI were lower as well, compared with other regions in the MPZ. Generally, crop condition in Brazil is more favorable than in Argentina, as shown in the maximum VCI map. Pixels with low minimum VHI (below 15) are found sporadically in Argentina, mostly in the central Pampas.

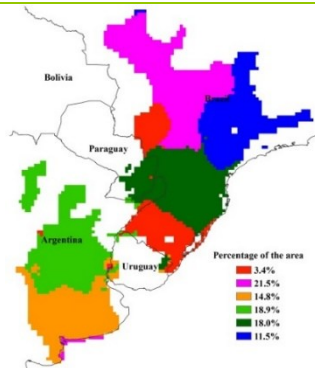
**Figure 2.3. South America MPZ: Agroclimatic and agronomic indicators, April-July 2014**



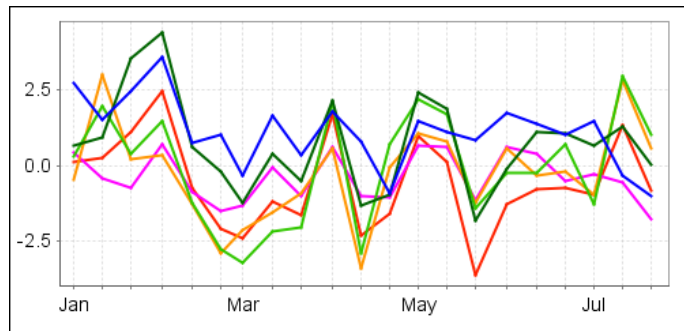
a. Spatial distribution of rainfall profiles



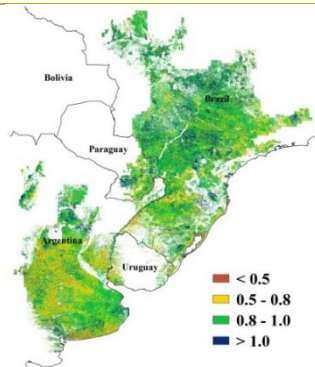
b. Profiles of rainfall departure from average



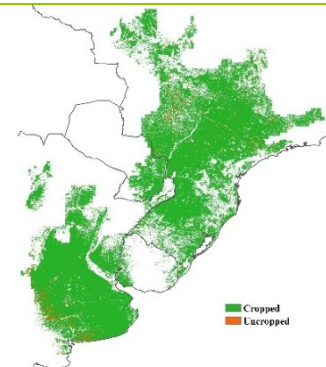
c. Spatial distribution of temperature profiles (% difference)



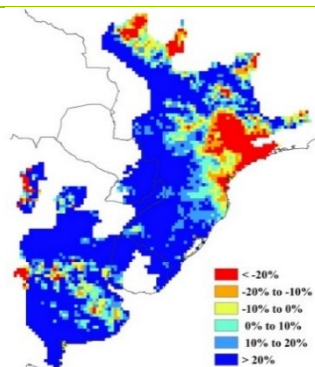
d. Profiles of temperature departure from average



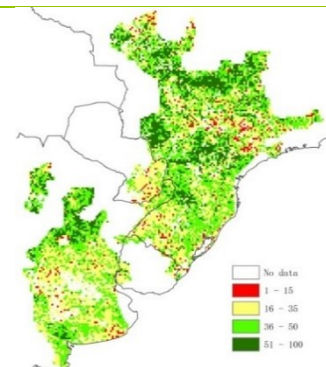
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential (gDM/m<sup>2</sup>)



h. VHI minimum

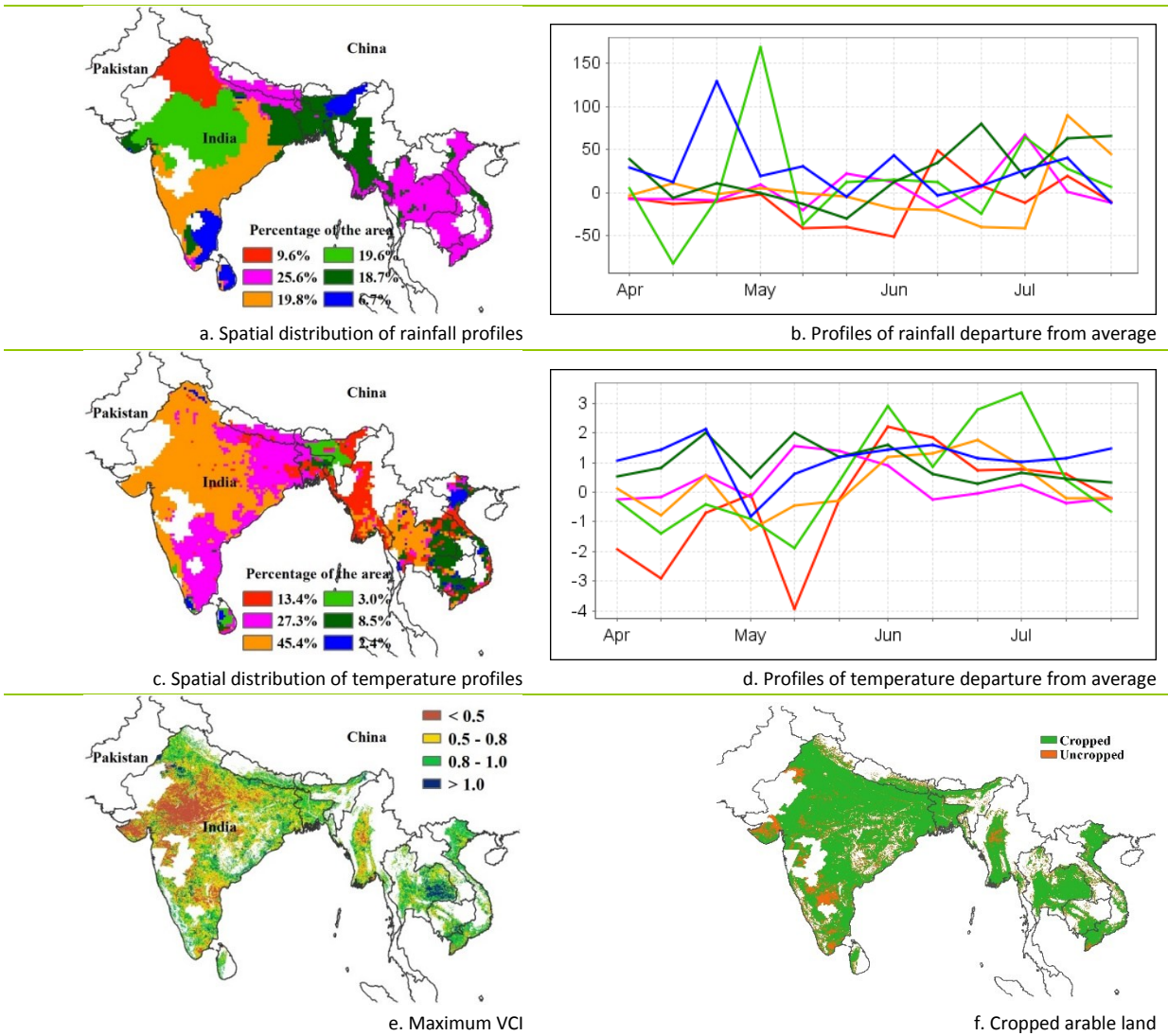
Note: For more information about the indicators, see Annex C.

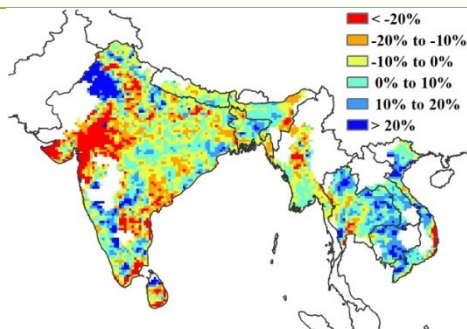
### 2.5 South and Southeast Asia

Agroclimatic and agricultural indicators during April to July indicate slight increases of RAIN (+8%), TEMP (1.2°C), and RADPAR (4%), compared with the thirteen-year average (figure 2.4). Rainfall in all countries was comparable to the average, except a period of low RAIN in April followed by high values in May in Gujarat, Rajasthan, and Madhya Pradesh. Droughts, possibly associated with El Niño (see section 5.3), occurred in April to June, especially in the dry zone of Myanmar and the north and central areas of Thailand, as well as in Punjab, Uttar Pradesh, Rajasthan, and Madhya Pradesh. The biomass accumulation potential shows favorable conditions along the Mekong River, the Red River delta of Vietnam, and in Punjab province in India, which are all major rice plantation areas.

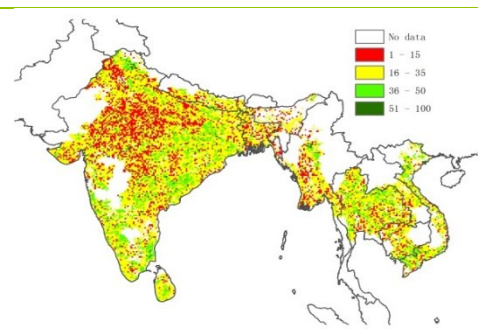
The VCIx map indicates good crop condition (+0.73), particularly in Sisaket, Surin, Burirum, Roiet, and Yasothon provinces of Thailand. In contrast, VCIx values are low in Madhya Pradesh, Gujarat, Rajasthan, and Andhra Pradesh in India, and in the dry zone of Myanmar. The increase over the recent five-year average of the fraction of cropped arable land in the MPZ is the world's highest increase (+5.5%). The uncropped areas are located mostly in Andhra Pradesh, Karnataka, Gujarat, and Haryana in India, as well as in the dry zone of Myanmar, related to low VCIx and VHIn values.

**Figure 2.4. South and Southeast Asia MPZ: Agroclimatic and agronomic indicators, April-July 2014**





g. Biomass accumulation potential (gDM/m<sup>2</sup>)



h. VHI minimum

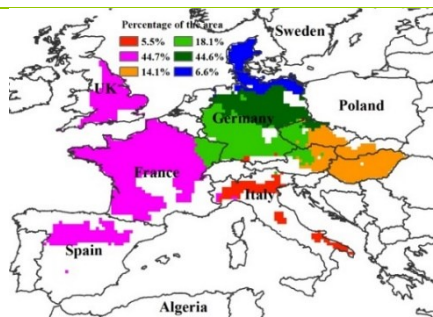
Note: For more information about the indicators, see Annex C.

## 2.6 Western Europe

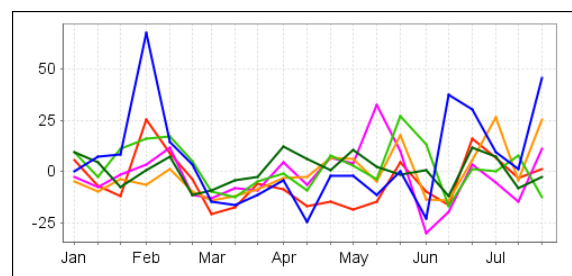
Overall, the total April to July precipitation (RAIN) in Western Europe was 6% below the recent thirteen-year average, with exceptional positive departures over Germany and Denmark (figure 2.5). Temperature (TEMP) shows a decrease of 0.3°C. The spatial distributions of TEMP show a positive departure in north and east Italy, northern France, and southeastern United Kingdom, especially in late May, early June, and early July. RADPAR displays a decrease of 0.5%. As a result of poor environmental conditions, biomass (BIOMSS) is below the five-year average in southern Germany, northeastern and western France, and Spain. In general, BIOMSS for the MPZ shows a decrease of 2% compared to the five-year average.

The average VCIx value for the MPZ is 0.86; low values are seen for the south and east of Spain (in Aragon, Castilla y León, and Extremadura and Castilla-La Mancha), south-west France (Poitou-Charentes and Midi-Pyrénées), south-east Germany (Bayern and Baden-Württemberg), Northeastern Austria (Niederösterreich) and eastern Hungary (Békés and Csongrád). The spatial distributions of VHI<sub>in</sub> show the lowest value in southern Germany, northeastern France, northern Italy, and southern Spain, due to low precipitation, but to varying extents. The fraction of cropped arable land reached 99.8% over the monitoring period.

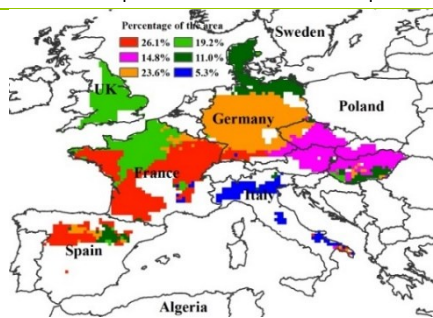
Figure 2.5. Western Europe MPZ: Agroclimatic and agronomic indicators, April-July 2014



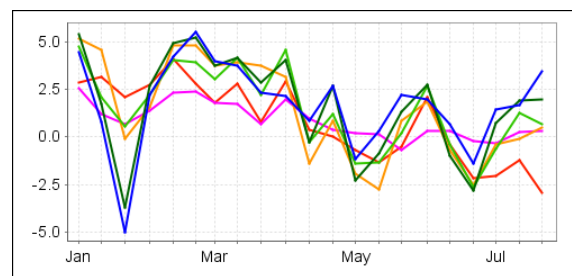
a. Spatial distribution of rainfall profiles



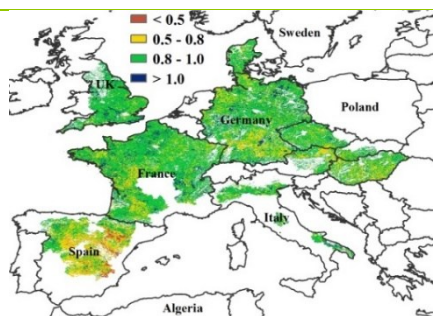
b. Profiles of rainfall departure from average



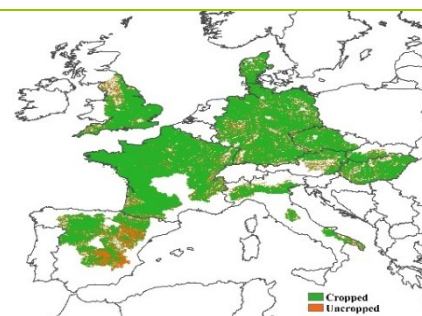
c. Spatial distribution of temperature profiles



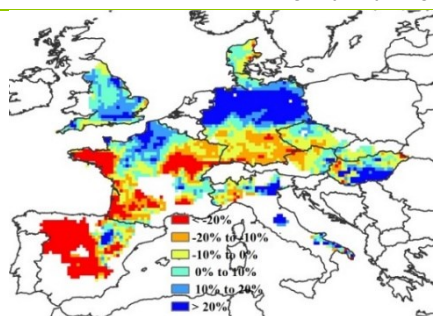
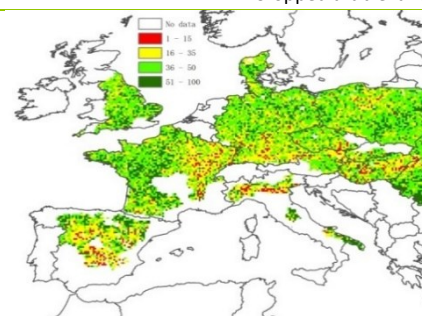
d. Profiles of temperature departure from average



e. Maximum VCI



f. Cropped arable land

g. Biomass accumulation potential (gDM/m<sup>2</sup>)

h. VHI minimum

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

## 2.7 Central Europe to Western Russia

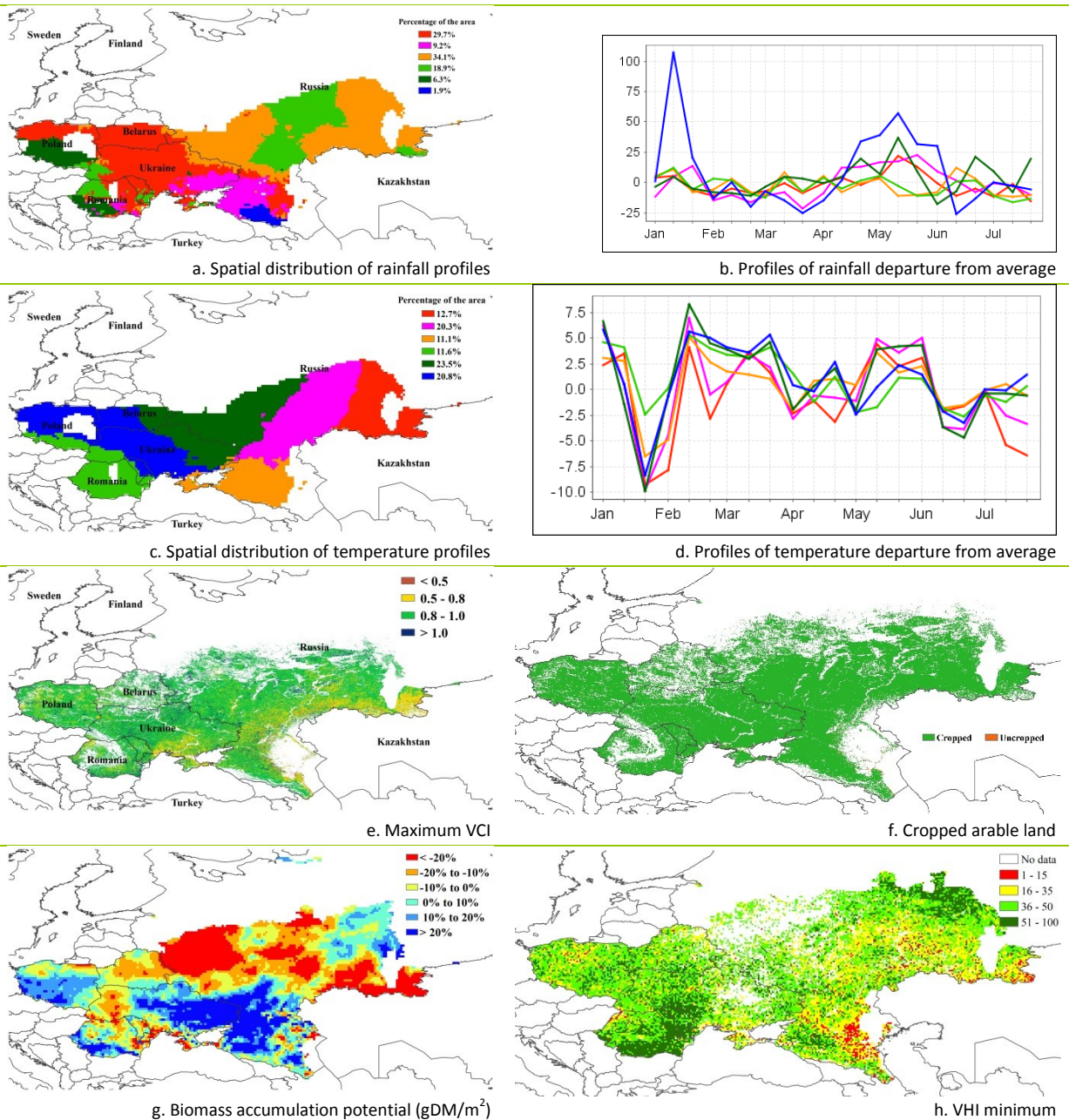
Most parts of the Central Europe to Western Russia MPZ present favorable conditions of winter and summer crop (average VCI<sub>x</sub>=0.87) over the monitoring period. On average, drier than usual weather has been experienced for the whole MPZ, with decreased rainfall (RAIN, -9%) and increased temperature (TEMP, +0.2°C). Radiation (RADPAR) increased 3% over the recent thirteen-year average.

The potential biomass is slightly lower than the five-year average (-2%). Due to the wet condition in April and May in most parts of Ukraine, Poland, and Russia's southwest, the accumulated potential biomass (BIOMSS) is above the five-year average (>20%).

Rainfall and temperature profiles show correlated variations in Romania, Poland, Ukraine, Belarus, and western Russia. During this monitoring period, for most parts of the MPZ, temperature was much higher than usual in May and lower in June. In July, temperature returned to average, except for cold weather in the northeast of the MPZ. In most of the parts of Russia that are included in this MPZ (except Volgograd, Krasnodar, and Rostov-on-Don), rainfall was close to average if the whole reporting period is considered. Rainfall was higher than the last thirteen-year average from April to early June in most areas (+10%), and significantly so (+50%) in the Chechen and Dagestan Republics.

Most arable land was actually cropped during this period (96.5%). Otherwise, as the VHI minimum shows, in most parts of Russia the cold and dry weather (VHI below 35) led to a significant drop in BIOMSS.

**Figure 2.6. Central Europe-Western Russia MPZ: Agroclimatic and agronomic indicators, April-July 2014**



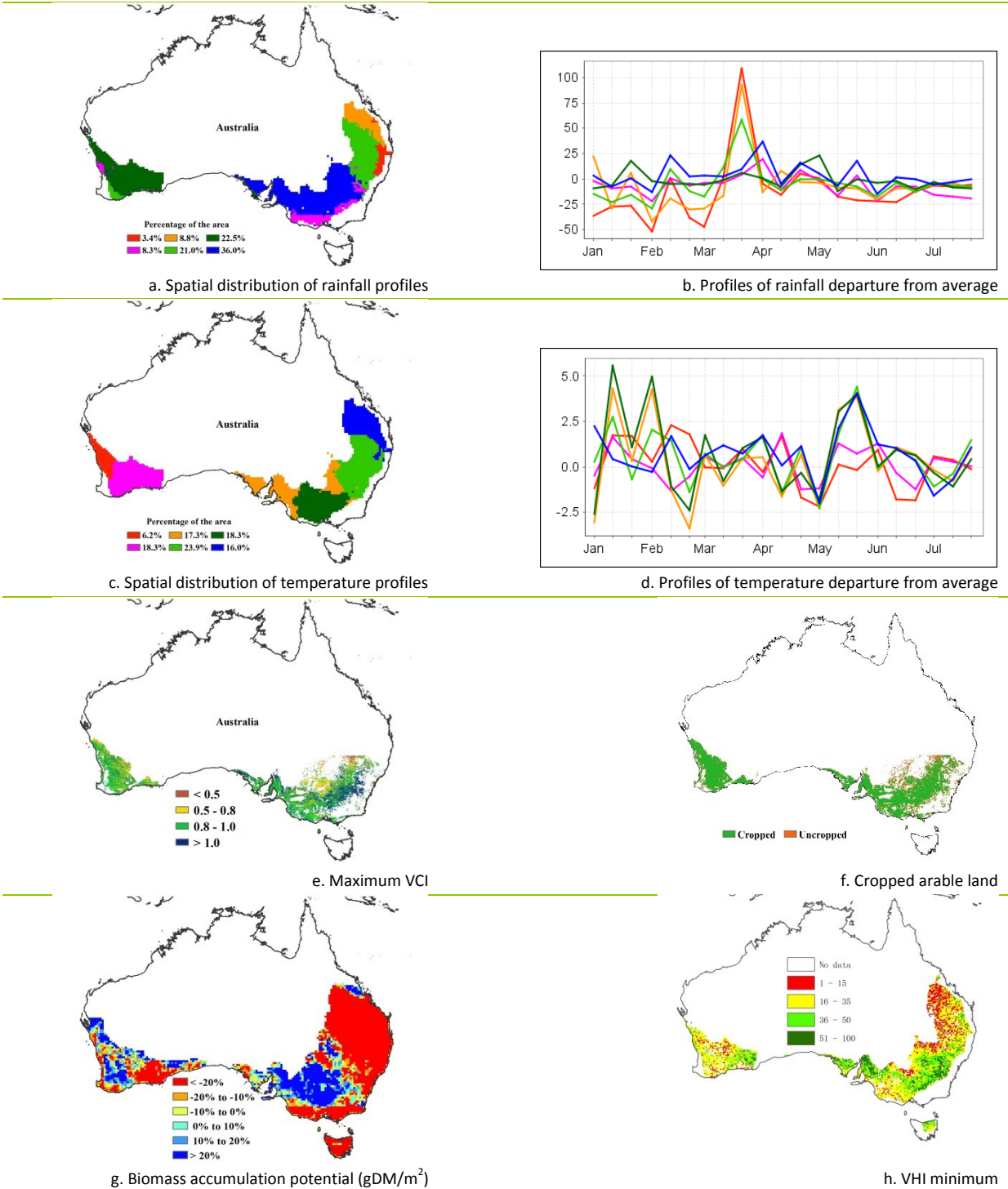
Note: For more information about the indicators, see Annex C.

## 2.8 Southern Australia

On the whole, when integrating the findings of the various CropWatch agroclimatic and agronomic indicators (see figure 2.7), crops in Southern Australia showed favorable condition between April and July. Most arable land was cropped (reaching 95.7% of the total), except for areas in eastern and south-western New South Wales. The maximum VCI of 0.89 indicates a normal to favorable crop growing situation for most region of the MPZ, except for some local areas in the central part of New South Wales. The biomass accumulation potential shows a similar pattern to that for maximum VCI. The low VHI minimum occurs in south-eastern Queensland and Eastern New South Wales, where precipitation was low based on the rainfall profiles.

The temperature profiles show a positive departure over 2.5°C in south-eastern Queensland, eastern New South Wales, southern Victoria and south-eastern South Australia in May, which, combined with below average rainfall, may have interfered negatively with crop development.

**Figure 2.7. Southern Australia MPZ: Agroclimatic and agronomic indicators, April-July 2014**



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

## Chapter 3. Main producing and exporting countries

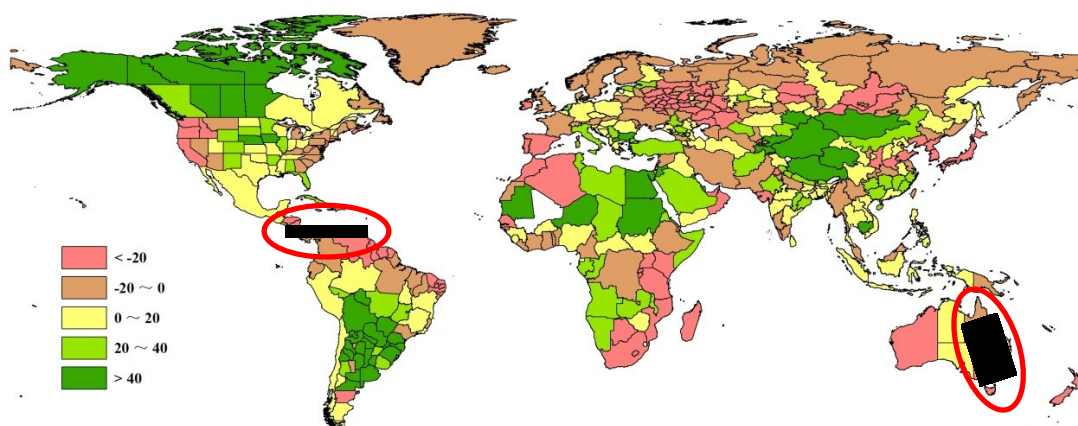
Building on the global patterns presented in previous chapters, this chapter assesses the situation of crops in 30 key countries that represent the global major producers and exporters or otherwise are of global or CropWatch relevance. For each country, maps present maximum VCI, spatial NDVI patterns, associated NDVI profiles, and an NDVI-based crop condition development graph. 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 2014 production estimates for Argentina, Australia, Brazil, Canada, and the United States.

### 3.1 Overview

Similar to the global findings presented in Chapters 1 and 2, rainfall—in terms of either abundance or lack of it—was a key variable for the reporting period. The global maps for rainfall, temperature, PAR, and biomass, presented in figures 3.1-3.4, show additional spatial detail at the national and sub-national level for the largest countries.

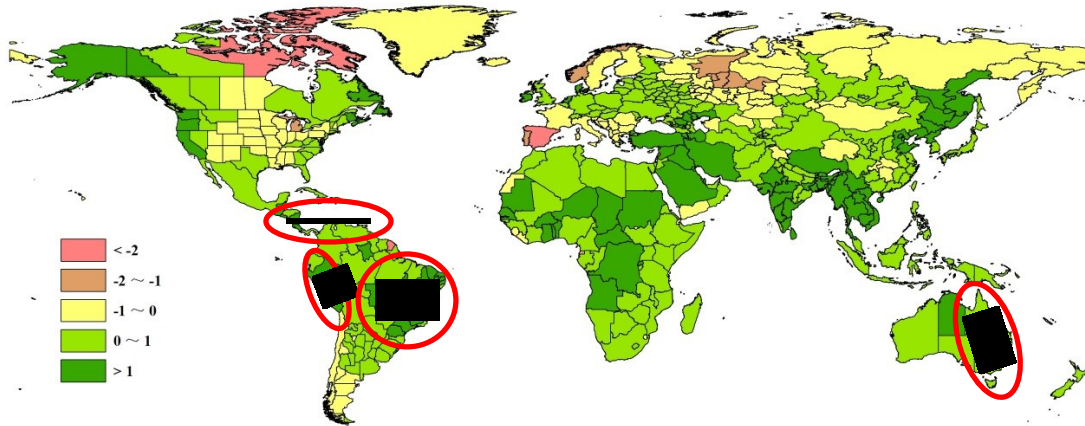
For rainfall, when analyzed by country, the largest positive departure for RAIN from the recent thirteen-year average was recorded over the agricultural areas of Jordan (+126%) and a cluster of areas in south America centered around Paraguay (+110%) and including (Bolivia, +84%), states of Brazil (Mato Grosso do Sul, +69%) and provinces of Argentina (figure 3.1). Compared to the recent thirteen-year average, the provinces of La Pampa, Catamarca, Cordoba, San Juan, Rio Negro, and Jujuy, had at least twice the average amount of rainfall. The rainfall benefited the crops of the current winter season; only limited areas reported floods. TEMP was average most of the time, but RADPAR often dropped by as much as 10%.

**Figure 3.1. Global map of rainfall (RAIN) by country and sub-national areas, departure from 13YA (percentage), April-July 2014**



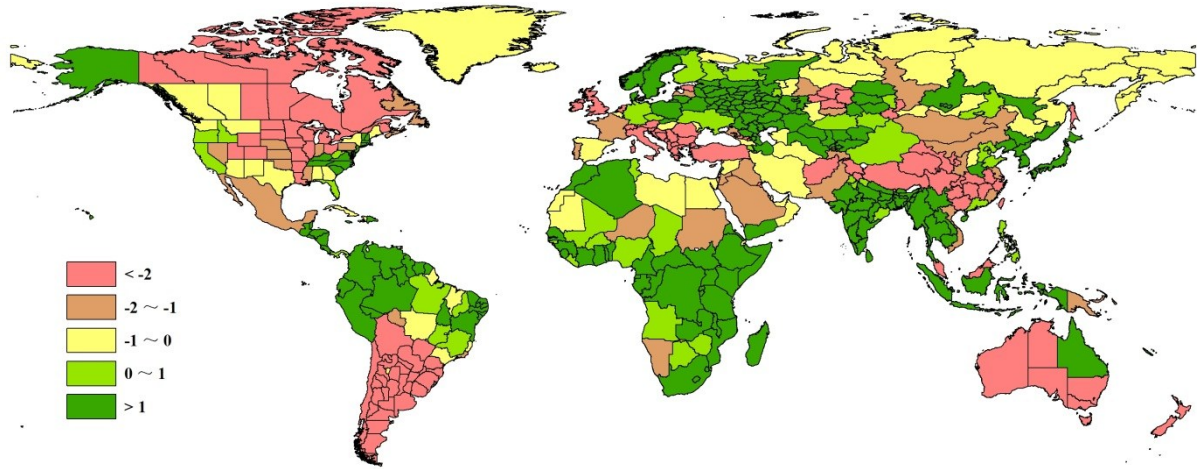
Note: Red circles indicate the areas coinciding with the “dry” areas of figure 5.2; see section 5.3 on El Niño.

**Figure 3.2. Global map of temperature (TEMP) by country and sub-national areas, departure from 13YA (degrees), April-July 2014**

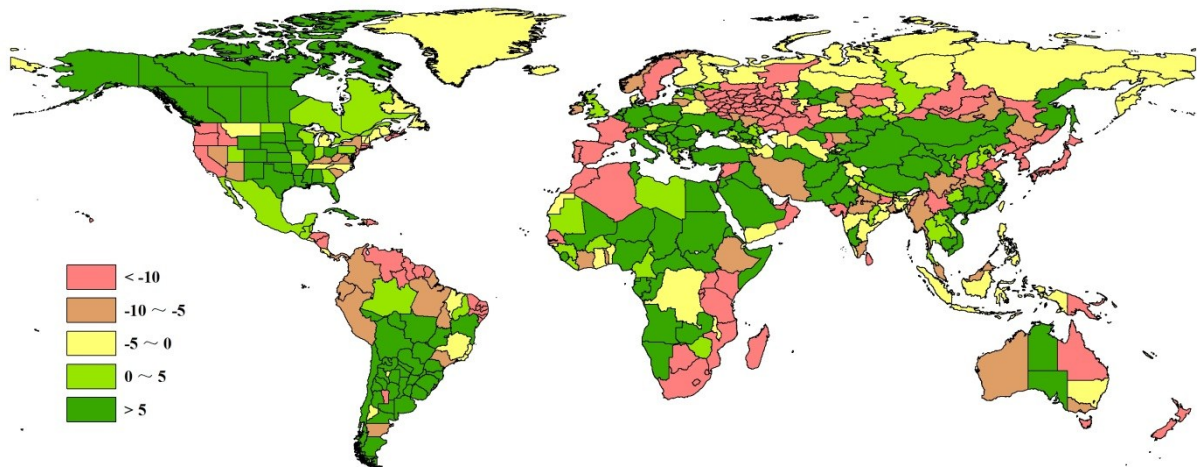


Note: Red circles indicate the areas coinciding with the “warm” areas of figure 5.2; see section 5.3 on El Niño

**Figure 3.3. Global map of PAR (RADPAR) by country and sub-national areas, departure from 13YA (percentage), April-July 2014**



**Figure 3.4. Global map of biomass (BIOMSS) by country and sub-national areas, departure from 13YA (percentage), April-July 2014**



In North America, areas where rainfall benefited the summer season (with excesses in rain of +30% to +95%) include Saskatchewan, British Columbia, and Manitoba in Canada, as well as Iowa, Nebraska, South Dakota and Arkansas in the United States. TEMP was slightly below average (above -1°C) and the decrease in sunshine usually did not exceed 5%.

Two additional areas with high rainfall include parts of central Europe and central Asia. In the first, floods were frequent and damaged summer crops especially in Macedonia (RAIN +65%), Bulgaria (+51%), Serbia (+35%), and Bosnia-Herzegovina. The floods were brought about by a single, very intense but short duration rainfall episode, except in Bulgaria and some neighboring Black Sea areas where two such events happened (see also section 5.2). Less damaging to crops was high rainfall in Cyprus (+77%) and Turkey (+34%). The area enclosed between Switzerland to Austria, Romania, Turkey, and Italy was characterized by low RADPAR (-5 to -7%). In Asia, places to mention include Kyrgyzstan (RAIN, +68%), Tajikistan (+51%), and some adjacent areas in China (Qinghai, +70%; Jiangxi, +35%; Fujian, +32%; Inner Mongolia, +26%), and Kazakhstan (Vostochno kazachstanskaya, +41%; Kyzylordinskaya, +36%).

Despite the excessive rainfall in many locations, the following areas experienced water stress:

- *Sahel*. In at least three Sahelian countries (Mali, -91%; Senegal, -27%; Gambia, -43%) rainfall was below average. Especially in Senegal and Gambia, the departures may point at a delayed onset of the season and warrant a closer monitoring. In the central and eastern Sahel, conditions are more favorable with close to average or above average precipitation (RAIN usually around +10%, with a maximum of +51% in Niger).
- *South America*. In both the Brazilian Nordeste (Sergipe to Ceara; -30 to -40%) and in an area from Amapa (Brazil) to Venezuela across the Guianas (-40%), RAIN was below average. In the Brazilian Nordeste, this was combined with large temperature anomalies such as in Rio Grande do Norte (TEMP, +1.9°C).
- *North America*. Below average rainfall was seen for the coastal areas in the western United States (Washington, Oregon and California, -30% to -40%) and eastern part of the country (Maine and New-York to Georgia, about -10% for RAIN). For California, this was combined with the second largest positive temperature departure of all locations examined by CropWatch (+2.5°C).
- *Mediterranean*. Below average rainfall was reported for the western Mediterranean (-51% in Portugal, -39% in Spain, and about -30% in Algeria and Morocco).
- *Africa*. Below average rainfall occurred in southern and eastern Africa up to Kenya and Uganda, with departures highest in the south (-60% in South-Africa to -90% in Swaziland; -30% to -40% from Mozambique to Kenya).
- *Russia*. Most of Russia experienced below average rainfall, with two areas in particular affected. The first area is centered around Nizhegorodskaya Oblast, from Smolensk Oblast to Aktyubinskaya in Kazakhstan; the second on the Oblasts of Tomsk, southern part of Krasnoyarsk and Irkutsk, as well as bordering areas to the south.
- *Eastern Asia*. In particular Japan (-34%), the Democratic People's Republic of Korea (-48%), the Republic of Korea (-52%), and eastern China (Shandong, -31%; Henan -25%; Shaanxi, -22%; Laoning, -21% and Hubei -16%) had below-average rainfall, mostly accompanied by low RADPAR.
- *Australia and New Zealand*. Both Southern Australia (RAIN about -20%) and New-Zealand (-40%) experienced below-average rainfall.

Only minor below average departures of temperatures were observed during the reporting period (in Norway, Lebanon), which, in itself is remarkable. The largest temperature anomalies are reported from

Belize (+3.4°C), the middle-east (Syria and Iraq, +2.2°C and +2.4°C respectively), in addition to the areas specified above.

**Table 3.1. CropWatch agroclimatic and agronomic indicators for April-July 2014, departure from 5YA and 13YA**

Country	Agroclimatic indicators			Agronomic indicators		
	Departure from 13YA (2001-13)			Departure from 5YA (2009-13)		Current
	RAIN (%)	TEMP (°C)	RADPAR (%)	BIOMSS (%)	CALF (%)	Maximum VCI
Argentina	72	0.5	-8	37	-0.7	0.83
Australia	-17	0.8	-3	-17	8.3	0.89
Bangladesh	2	1.6	9	0.2	-0.3	0.82
Brazil	12	1.1	-0.5	4	-0.4	0.86
Cambodia	43	1.0	3	13	4.7	0.85
Canada	29	0.3	-3	15	0.1	0.91
China	10	0.7	-2	3	1.6	0.87
Egypt	60	0.2	-0.3	49	2.8	0.84
Ethiopia	-10	0.3	1	-2	4.9	0.76
France	-15	-0.5	-1	-11	0.0	0.87
Germany	4	0.7	0.2	8	0.0	0.87
India	8	1.1	3	-3	8.6	0.68
Indonesia	3	0.7	2	-5	0.0	0.88
Iran	-10	1.2	-1	-9	1.1	0.69
Kazakhstan	5	0.0	1	4	2.2	0.74
Mexico	5	0.4	-2	9	2.1	0.80
Myanmar	-11	1.5	6	-3	0.0	0.78
Nigeria	4	0.4	1	6	5.5	0.76
Pakistan	-7	0.2	-2	4	8.3	0.76
Philippines	2	0.7	0.6	-7	0.0	0.87
Poland	12	0.4	1	8	0.0	0.88
Romania	0.3	-0.4	-4	3	0.2	0.89
Russia	-12	0.1	3	-5	4.1	0.87
South Africa	-60	0.3	3	-54	-12.6	0.83
Thailand	6	1.0	6	4	0.3	0.88
Turkey	34	1.1	-2	4	-6.7	0.76
United Kingdom	-10	0.3	-3	2	0.0	0.91
Ukraine	-0.5	0.3	0.9	8	0.0	0.88
United States	12	-0.1	-1	5	0.4	0.83
Uzbekistan	-5	0.4	1	2	0.7	0.68
Vietnam	17	1.2	-1	5	-0.1	0.86

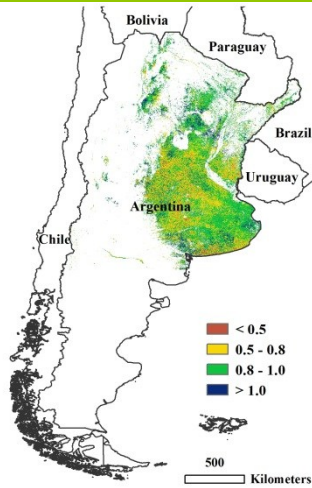
Note: Departures are expressed in relative terms (percentage) for all variables, except for temperature, for which absolute departure in degrees Celsius is given. Zero means no change from the average value; Relative departures are calculated as  $(C-R)/R*100$ , with C=current value and R=reference value, which is the five-year (5YA) or thirteen-year average (13YA) for the same period (April-July).

### 3.2 Country analysis

Subsequent pages present CropWatch results for each of the thirty key countries (China is addressed in Chapter 4). The maps refer to crop growing areas only and include (a) Maximum VCI (over arable land mask) for April 1-July 31, 2014 by pixel; (b) Spatial NDVI patterns from January or April (according to local cropping patterns) up to July 2014 (compared to the 5YA); (c) NDVI profiles associated with the spatial pattern under (b); and (d) Crop condition development graph based on NDVI average over crop areas, comparing the October 2013-September 2014 period to the previous season, to the five-year average (5YA), and the five-year maximum. See also Annex A, tables A.2-A.10, and Annex B, tables B.1-B.5, for additional information about indicator values and production estimates by country. Country agricultural profiles are posted on [www.cropwatch.com.cn](http://www.cropwatch.com.cn).

**Figures 3.5-3.34. Crop condition for individual countries ([ARG] Argentina- [ZAF] South Africa) for April-July 2014**

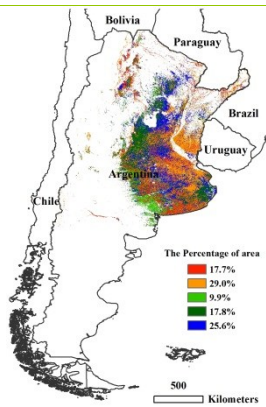
# [ARG] Argentina



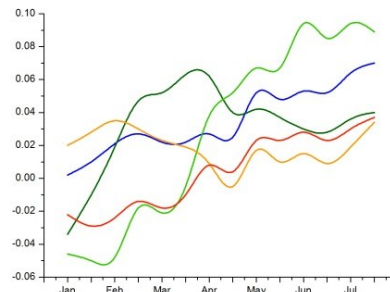
**Figure 3.5. Argentina crop condition, April-July 2014**  
(a) Maximum VCI

Crop condition in Argentina was generally favorable from January to July in 2014. Currently, the harvesting of maize and soybean and the planting of winter wheat are complete, while the planting of maize and soybean is still ongoing. From April to July, Argentina experienced wet and warm climatic conditions. The emergence and development of recently planted crops benefited from 72% more rainfall, 0.5°C degree higher temperature, and only slightly below average PAR. The VCIx map indicates that crop condition of most arable land in Argentina was above average (pixel value higher than 0.5). Favorable conditions can be confirmed by the significant above average BIOMSS indicator at both national and provincial levels. The only exception is San Luis, with 23% lower BIOMSS due to shortage of rainfall. As shown by the NDVI profiles, crop condition is either above or at the five-year average level, except for southeastern Buenos Aires and southern La Pampa from January to mid-March, central Córdoba, and scattered regions in Salta in January. Below normal NDVI in those regions is due to the hot weather and insufficient rainfall before March. The low maximum VCI in the same regions also confirms the impact of the persistent high temperature and shortage of rainfall on crop development. Although the national NDVI development graph shows crop condition well above last year and the five-year average, the persistent high temperature and shortage of rainfall during the grain filling stage hampered both maize and soybean yield. CropWatch revised down the yield of maize and soybean to the same level as last year. Since early April, generally favorable climatic conditions

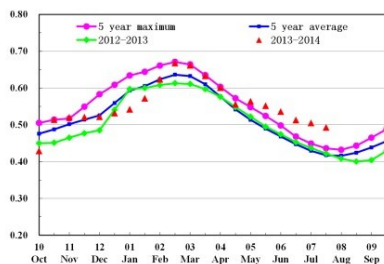
dominated most of Argentina. Winter wheat development was accelerated. Accordingly, crop condition is well above that of last year and the five-year average. CropWatch forecasts a wheat yield up 5.7% over the previous season. (See also table B.1 in Annex B.)



(b) Spatial NDVI patterns compared to 5YA



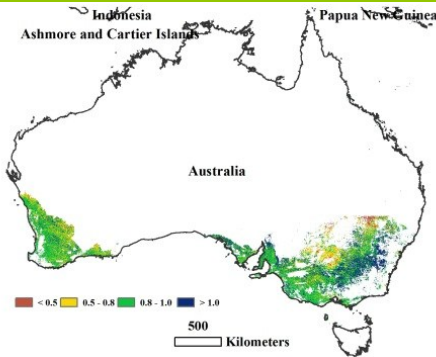
(c) NDVI profiles



(d) Crop condition development graph based on NDVI

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

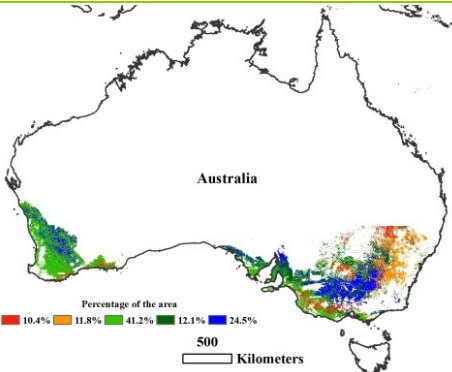
# [AUS] Australia



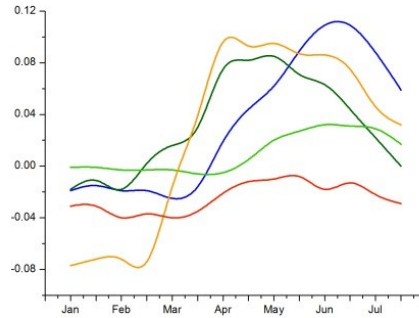
**Figure 3.6. Australia crop condition, April-July 2014 (a) Maximum VCI**

The crops in Australia showed generally average conditions during the reporting period from April to July. The country's spatial NDVI indicates a situation that on the whole is slightly better than the five-year average, except for some small patches in the central part of New South Wales, the southern part of Victoria, and the western border area between New South Wales and Victoria. This spatial pattern was also reflected by the maximum VCI in the different areas, with a VCIx of 0.89 for Australia overall. According to the crop condition map based on NDVI, Australia enjoyed a better situation than the five-year average throughout the reporting

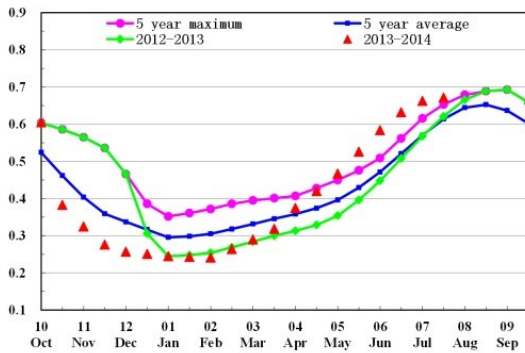
period and even better than the five-year maximum starting in May. The cropped arable land fraction increased by 8.3%, compared to the five-year average. The CropWatch TEMP indicator exceeded average by 0.8°C and RADPAR was 3% below the previous thirteen-year average. Although rainfall decreased by 17%, the agronomic indicators mentioned above all indicate a favorable condition for most winter crop areas of Australia for the time being. NDVI profiles, however, have been dropping in all areas starting in June, with the approach of winter. (See also table B.2 in Annex B.)



(b) Spatial NDVI patterns compared to 5YA

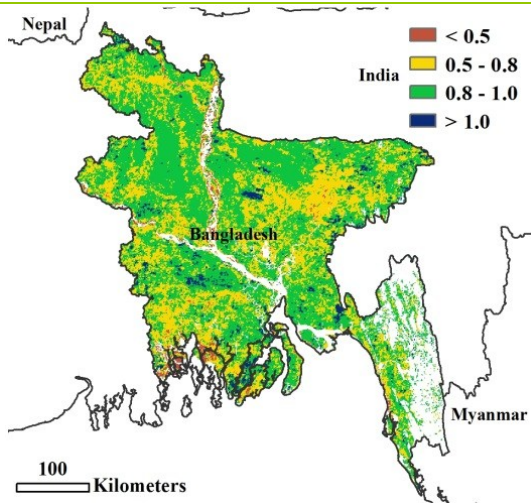


(c) NDVI profiles



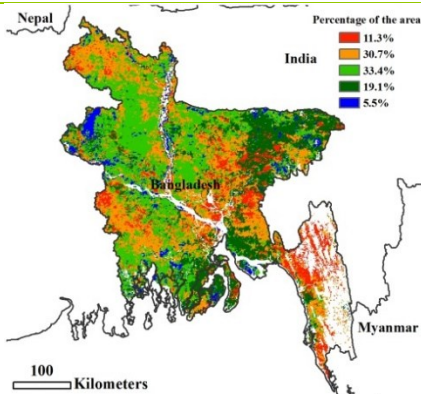
(d) Crop condition development graph based on NDVI

# [BGD] Bangladesh

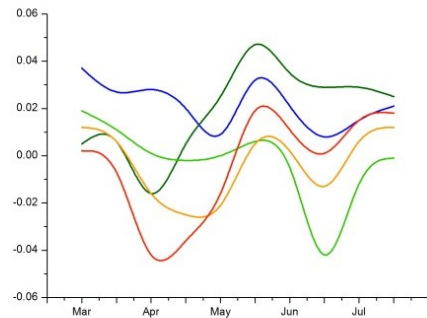


The reporting period covers the planting of Aman and Aus rice crops, as well as sorghum. Harvesting of Boro rice has been completed in June. During the monitoring period, crop condition was favorable over the main producing areas with a VCIx value of 0.82. At the national level, crop condition development was low when compared with last year and the five-year average. Biomass accumulation (BIOMSS) was also slightly below the thirteen-year average (-3%). The fraction of cropped arable land decreased 0.3%, again compared to the five-year average. CropWatch agroclimatic indicators show favorable conditions for crops due to increased RAIN, TEMP, and RADPAR.

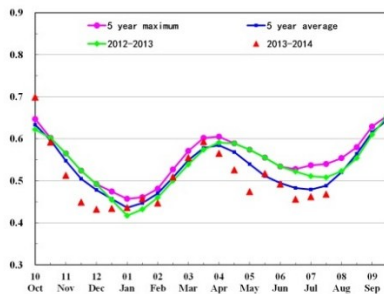
**Figure 3.7. Bangladesh crop condition, April-July 2014 (a) Maximum VCI**



(b) Spatial NDVI patterns compared to 5YA



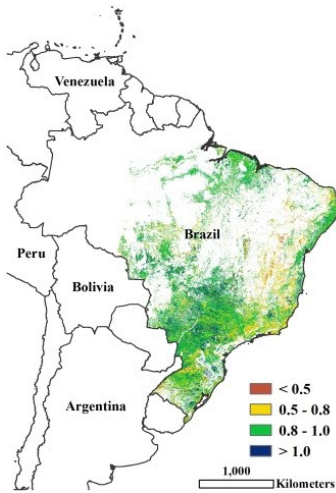
(c) NDVI profiles



(d) Crop condition development graph based on NDVI

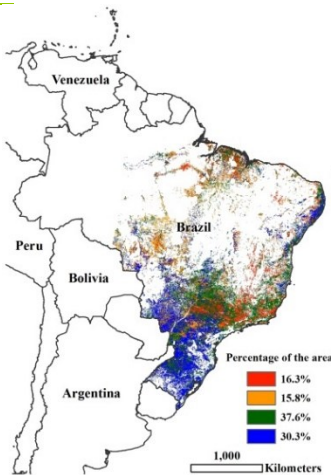
ARGAUS BGD **BRA** CAN DEU EGY ETH FRA GBR IDN IND IRN KAZ KHM MEX MMR NGA PAK PHL POL ROU RUS THA TUR UKR USA UZB VNM ZAF

# [BRA] Brazil

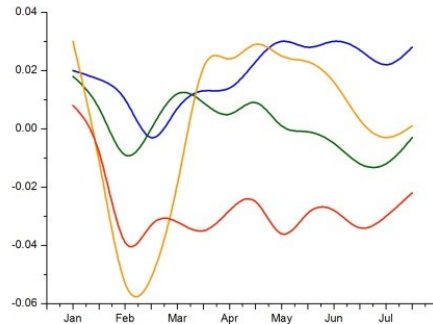


**Figure 3.8. Brazil crop condition, April-July 2014**  
(a) Maximum VCI

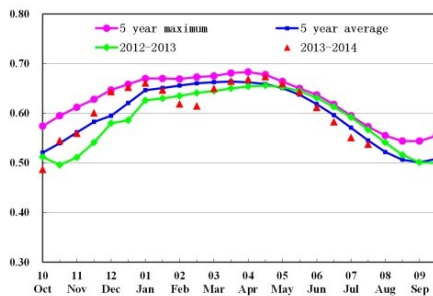
Crop condition in Brazil was generally average from January to July. Currently, the harvesting of maize, rice, and soybean and the planting of wheat have been completed. From April to July 2014, above average (5YA) precipitation (RAIN) and higher temperature (TEMP) dominated most of Brazil, resulting in well above average BIOMSS for most states except Ceara, São Paulo, and Minas Gerais. The first two are the only two states that experienced a shortage of rainfall, while Minas Gerais suffered from persistent high temperature. The maximum VCI map confirms that crop condition in São Paulo and Minas Gerais was not as good as other regions in Brazil, but still above the five-year average. Considering the spatial patterns of NDVI profiles, the south, central-west, and north-east regions of the country all experienced average to favorable conditions since April, while crop condition in the north and south-east, especially in São Paulo and Minas Gerais, was well below average from February to July. This is confirmed by the VCIx map. Generally, at the national scale, the crop condition development graph indicates the crop condition from April to July was slightly above last year and the five-year average. The rapid decrease of the NDVI profile in the crop condition development graph shows the advanced harvesting progress. CropWatch puts the yield for the country's second maize crop at 1.5% up from last year and estimates the average maize yield in 2014 to be comparable with 2013. (See also table B.3 in Annex B).



(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Crop condition development graph based on NDVI

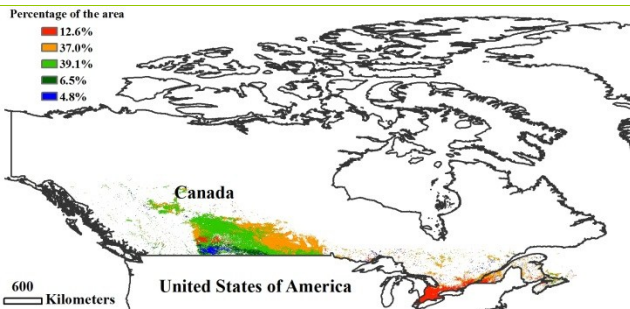
# [CAN] Canada



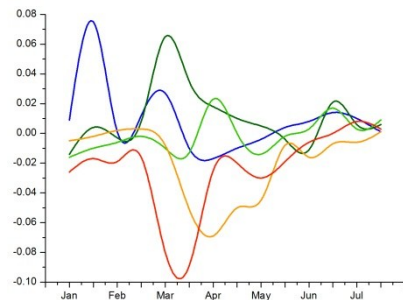
**Figure 3.9. Canada crop condition, April-July 2014**  
(a) Maximum VCI

Spring wheat and maize are the main grain crops of Canada; the crops are planted in early May for harvesting in October and the current monitoring period thus covers the initial stages. The condition of crops shows below-average to average conditions compared to the five-year average and conditions far below last year's, especially in the main maize zone in the south of Quebec and Ontario provinces. In the spring wheat zone, located in the south of Manitoba, Saskatchewan, and Alberta provinces, crop condition is below the last five-year average as well. However, in Saskatchewan and Alberta, spring wheat is doing fine, above average. For the environmental indices in general, temperature (TEMP) increased by 0.3°C, rainfall (RAIN) increased

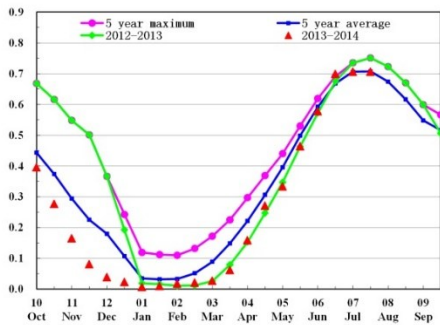
29% (Alberta, +42%, Manitoba, +59%, and Saskatchewan, +71%), while PAR (RADPAR) decreased -3% (Saskatchewan, -5%, Manitoba, -3%) compared to the thirteen-year averages. The next CropWatch monitoring period will cover the harvesting season of spring wheat and maize; for now, below-average maize and average to above-average spring wheat productions are expected. (See also table B.4 in Annex B.)



(b) Spatial NDVI patterns compared to 5YA



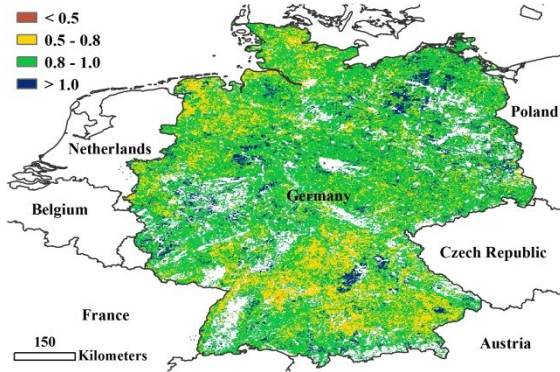
(c) NDVI profiles



(d) Crop condition development graph based on NDVI

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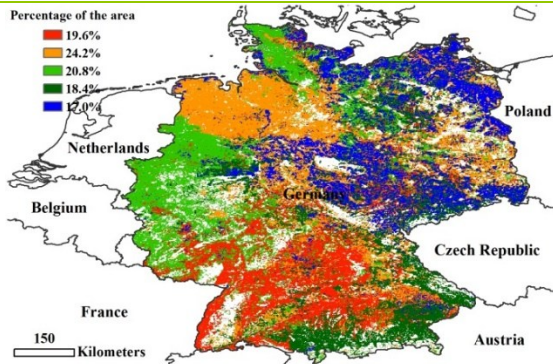
# [DEU] Germany



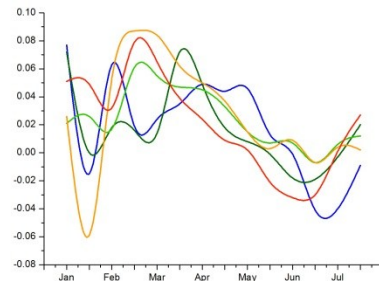
**Figure 3.10. Germany crop condition, April-July 2014**  
(a) Maximum VCI

Compared with the thirteen-year average, total precipitation (RAIN, +4%), average temperature (TEMP, +0.7°C), and PAR (RADPAR, +0.2%) were above average, resulting in above average BIOMSS. Currently, winter wheat has been harvested, while spring barley is in the vegetative stage. The CropWatch agroclimatic indices indicate generally favorable condition at the national scale for the period between April and July in 2014, which is confirmed by the BIOMSS increase of 8% and a VCix of 0.87. As shown by the NDVI profiles, national NDVI values were well above average and even higher than the five-year maximum in April, after which they were close to average from May to June. A sharp drop in NDVI in June was found in more than 50% of the country, especially central and northwestern Bavaria, northeast Baden-Wuerttemberg, Saxony, northern Brandenburg, and Thuringia. The maximum VCI map presents good crop condition everywhere, except in the

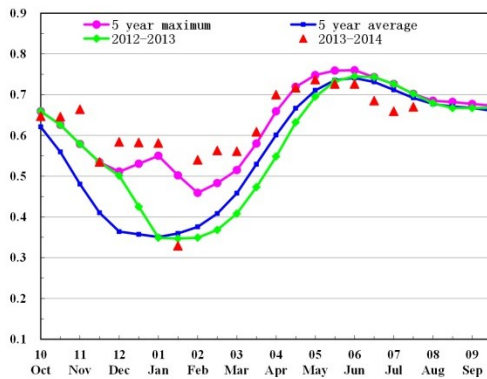
northwest of Lower Saxony, north Baden-Württemberg, and in Bayern, which is confirmed by the NDVI cluster map. In spite of some temporary variations in the indicators, CropWatch estimates winter crop did well and summer crop are fair.



(b) Spatial NDVI patterns compared to 5YA

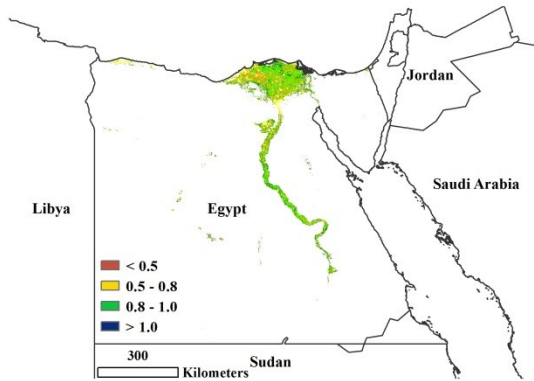


(c) NDVI profiles



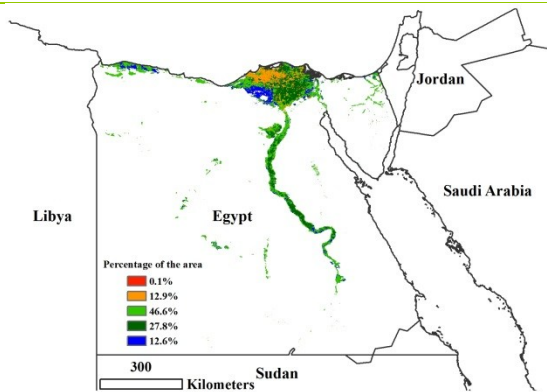
(d) Crop condition development graph based on NDVI

# [EGY] Egypt

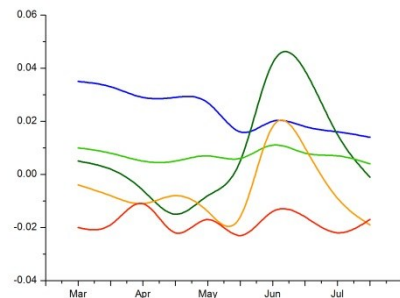


May is a central month for the harvesting of winter wheat and barley and for the sowing of summer crops, especially maize and rice. Throughout the winter wheat season, average NDVI has remained relatively low, reaching the lowest absolute values in May, which coincides with the harvest period. For the current monitoring season, for about half of the cropped areas (46.6%) NDVI was just above average, with a spot of lower than average conditions in the north western Delta, east of Al Gharbiyah (12.9% of agricultural pixels). For the ongoing summer crop season, production prospects appear to be average to slightly above average (VCix at 0.84) due to increased cropland (+2.8%).

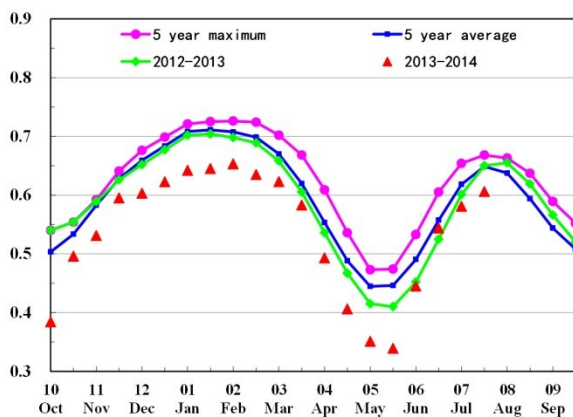
Figure 3.11. Egypt crop condition, April-July 2014



(b) Spatial NDVI patterns compared to 5YA



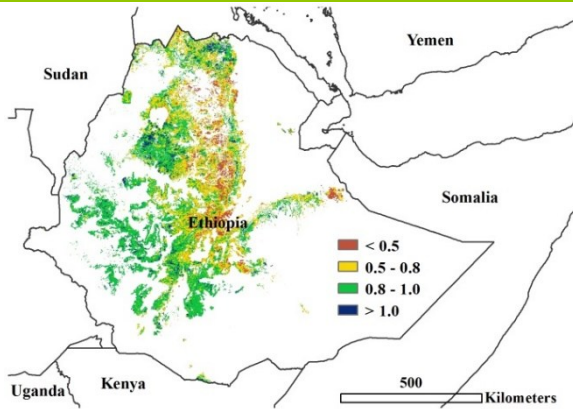
(c) NDVI profiles



(d) Crop condition development graph based on NDVI

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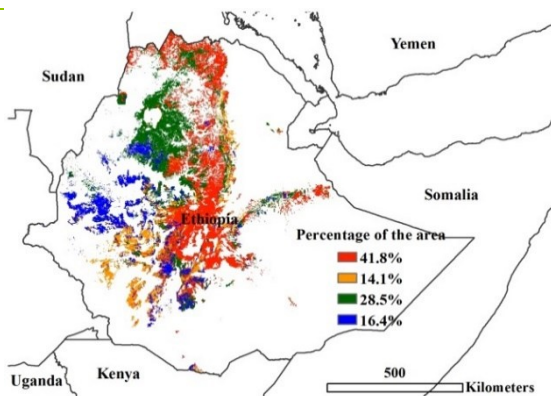
# [ETH] Ethiopia



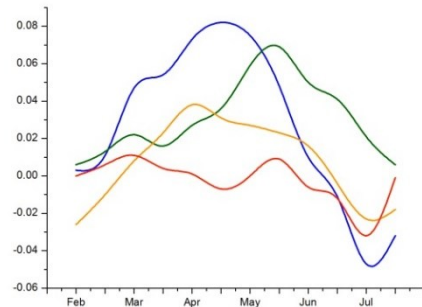
**Figure 3.12. Ethiopia crop condition, April-July 2014**  
(a) Maximum VCI

No environmental indicators very significantly depart from average conditions. RAIN is 10% below average, which, with slightly better than average RADPAR and TEMP, results in an overall drop of the BIOMSS indicator by 5%. Average national NDVI has generally been close to or even above the recent five-year period, but dropped to below-average values at the end of July. Altogether, conditions thus appear to have been conducive to belg crops. The low July NDVI values do not affect the whole country in the same way. NDVI was particularly favorable between and east of Wag Hemira and west Shewa up to the Sudanese border. South of west Shewa and as far as Gamo Gofa, conditions were favorable too, but only in Aril and May. In a large portion of the center of the country (about 42% of cropped areas), NDVI was just average up to early June, after which it deteriorated until early July, returning to average at the end of the month. The area concerned stretches from central Tigray to East Shewa

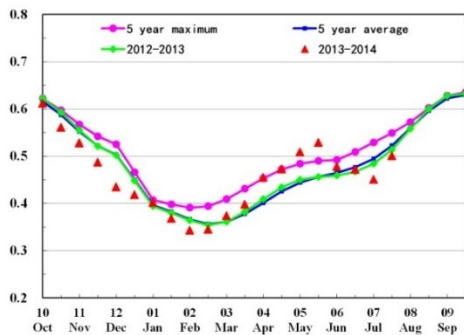
and Arsi and corresponds to some of the major production areas. The corresponding VCIx values are average or low (e.g., in South Wollo, west Shewa, and Jijiga) but recovering. Altogether, the assessment is positive for Belg crops and still uncertain for the late Meher season due to poor rainfall, in spite of cropped arable land fraction increases by 4.9% and maximum VCI at 0.76.



(b) Spatial NDVI patterns compared to 5YA



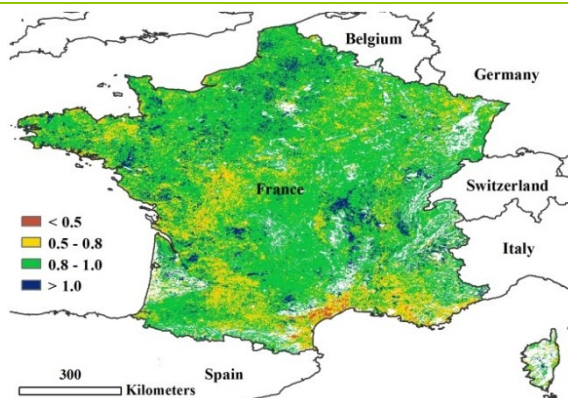
(c) NDVI profiles



(d)

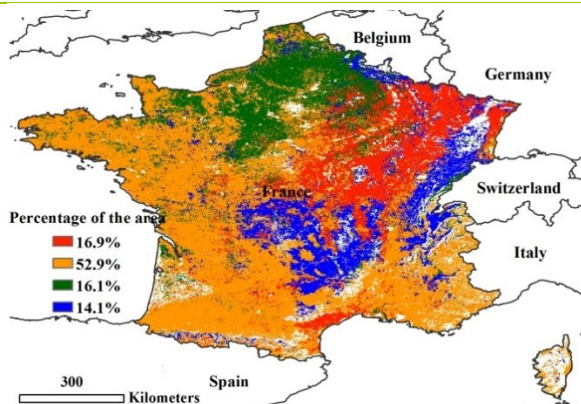
Crop condition development graph based on NDVI

# [FRA] France

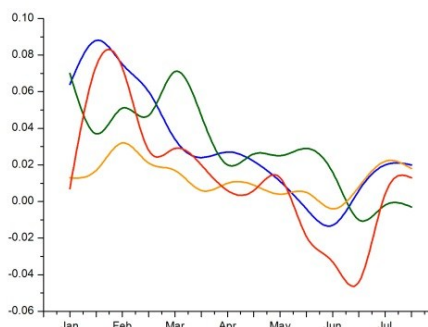


**Figure 3.13. France crop condition, April-July 2014**  
(a) Maximum VCI

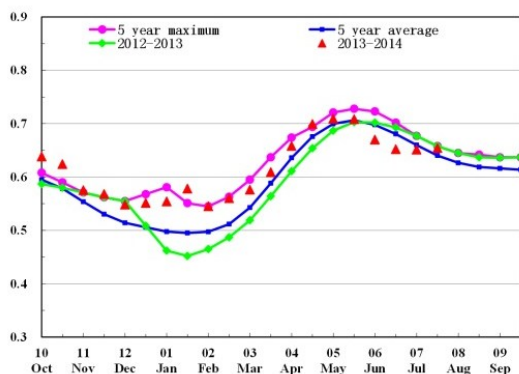
Compared with the thirteen-year average, total precipitation (RAIN, -15%), temperature (TEMP, -0.5°C), and PAR (RADPAR, -1%) were below average, resulting in below average BIOMSS. According to HGCA, 97% of the soft wheat area and 96% of spring barley was harvested, while maize is in the vegetative stage. The CropWatch agroclimatic indices indicate generally unfavorable condition at the national scale during the period between April and July in 2014, in spite of high VCIx (0.87), which is confirmed by the BIOMSS decrease of 11%. Crop condition was below average from early May to late June in the area of the Lorraine, Alsace, Champagne-Ardenne, Bourgogne, Franche-Comté, and east Languedoc-Roussillon, covering approximately 16.9% of the national territory (see the NDVI cluster map). The area, however, had mostly favorable conditions from April to May, or returned to normal after July. In general, the winter crop did well, but the summer crop shows some pockets of below average condition.



(b) Spatial NDVI patterns compared to 5YA



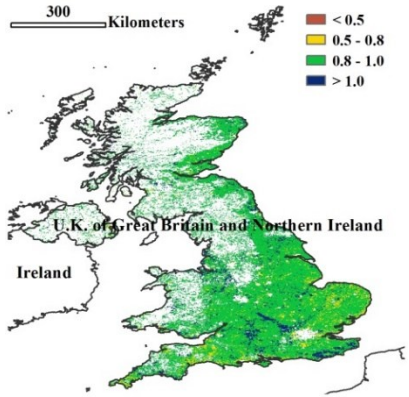
(c) NDVI profiles



(d) Crop condition development graph based on NDVI

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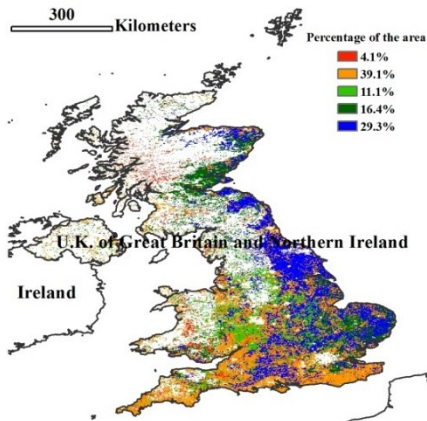
# [GBR] United Kingdom



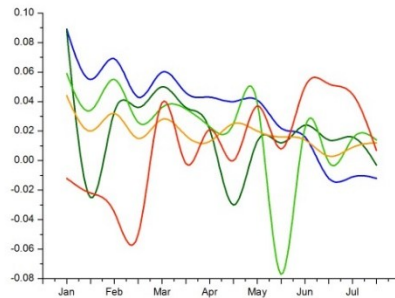
**Figure 3.14. United Kingdom crop condition, April-July 2014**  
(a) Maximum VCI

Compared with the thirteen-year average, temperature (TEMP) over the reporting period was above average. Although radiation (RADPAR) and total precipitation (RAIN) were below average, this higher temperature still results in above average BIOMSS. According to HGCA, 55% of the winter wheat area, all of the winter barley area, 40% of the spring barley area, 60% of the oat area, and 99% of the winter oilseed rape area have been harvested. The CropWatch agroclimatic indices indicate generally favorable condition at the national scale between April and July in 2014, which is confirmed by the BIOMSS increase of 2% and the VCIx of 0.91. This is also consistent with the NDVI profile, which shows that the national NDVI average is well above the recent five-year average and close to the five-year maximum value.

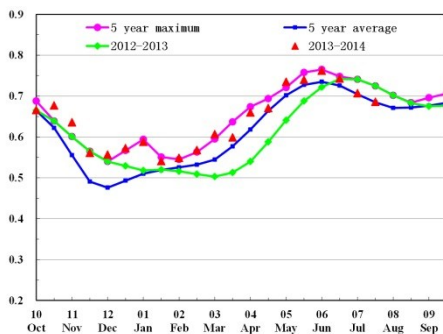
According to the NDVI clusters, the NDVI values across the country are above average, with the exception of the southeast and northern regions (Edinburgh, West Lothian, Falkirk, Dumfries and Galloway, Fife, Cambridgeshire, Suffolk and Kent), where NDVI values are below average in April (covering approximately 16.4% of the national territory), and the central and southern regions (South Yorkshire, Gloucestershire and Worcestershire), where NDVI values are below average in May (covering approximately 11.1% of the national territory). These findings are confirmed by the VCIx map. In general, the outcome of the winter crops was good; the outlook for summer crops is average.



(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Crop condition development graph based on NDVI

# [IDN] Indonesia

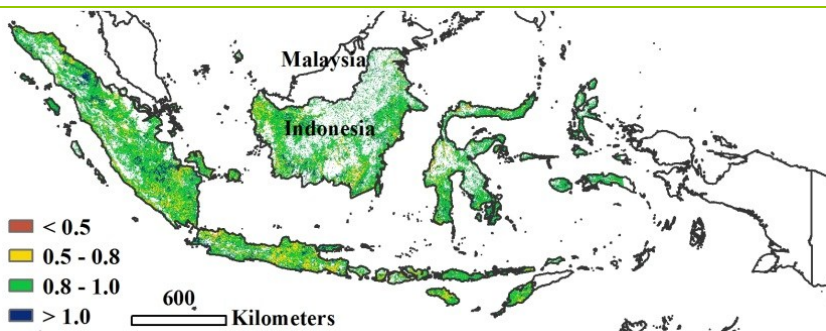
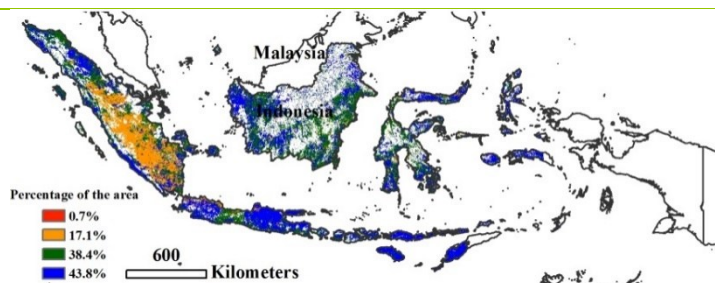
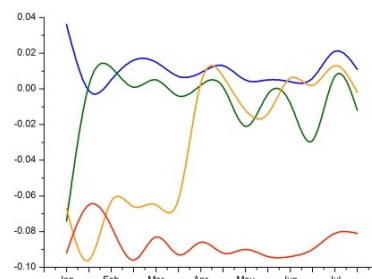


Figure 3.15. Indonesia crop condition, April-July 2014 (a) Maximum VCI

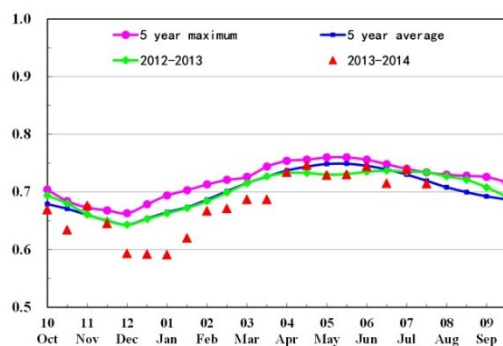
The crops in Indonesia generally show poor condition between May and July. The monitoring period covers the whole harvest of the main rice and rainy season maize, as well as the secondary rice that is sowed starting in July. Compared with the recent thirteen-year average for the same period, precipitation (RAIN) and temperature (TEMP) were slightly above average (3% and 0.7°C, respectively). Nevertheless, influenced by the low agroclimatic indicators at the beginning of the year (the key crop growing season), biomass accumulation (BIOMSS) was still below average. This is consistent with the NDVI profile, which shows that the average NDVI is slightly below the five-year average. According to the NDVI clusters, crops in Sumatra have recovered from poor growing conditions and reached average condition in the recent four months, which is confirmed by the maximum VCI map. Overall prospects are for an average to above average crop.



(b) Spatial NDVI patterns compared to 5YA



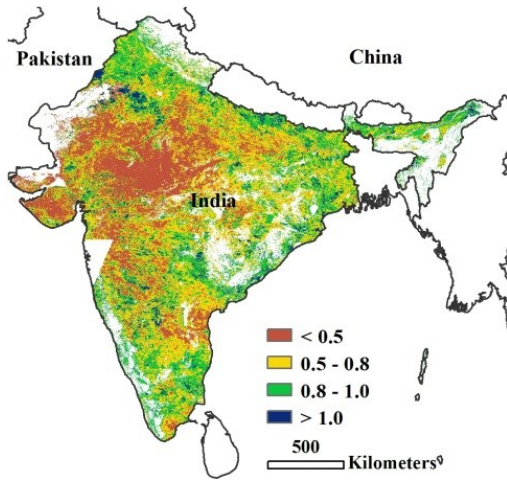
(c) NDVI profiles



(d) Crop condition development graph based on NDVI

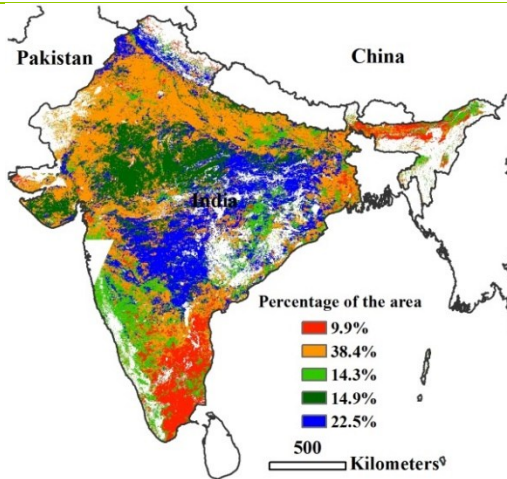
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# [IND] India

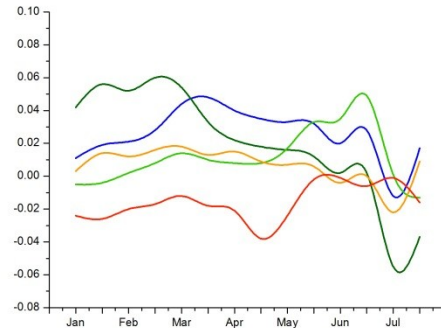


During the monitoring period, crop condition was favorable except in parts of Rajasthan, Madhya Pradesh, and Gujarat. The period corresponds mostly to the planting of Kharif (summer) rice and maize crops. The Rabi (winter) rice and wheat crop was harvested by June. Overall crop condition was average in India with a VCI value recorded as 0.68; in comparison with the recent thirteen years, TEMP was average and RAIN increased 8%. Crop development progress was satisfactory, in spite of a shortage of rainfall in June and July in the main producing areas, as also evidenced by the NDVI profiles. Biomass accumulation (BIOMSS) was slightly lower than average (-3%). Cultivated arable land fraction increased 8.6% compared to the five-year average, pointing at satisfactory output from the current season.

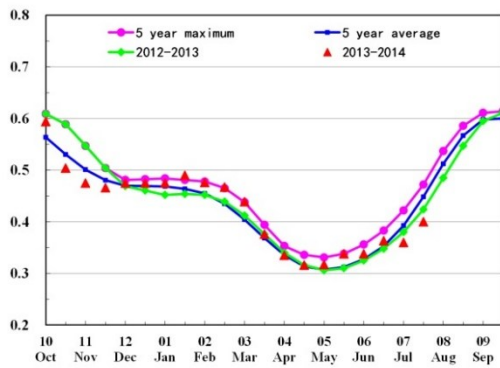
Figure 3.16. India crop condition, April-July 2014 (a) Maximum VCI



(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Crop condition development graph based on NDVI

# [IRN] Iran

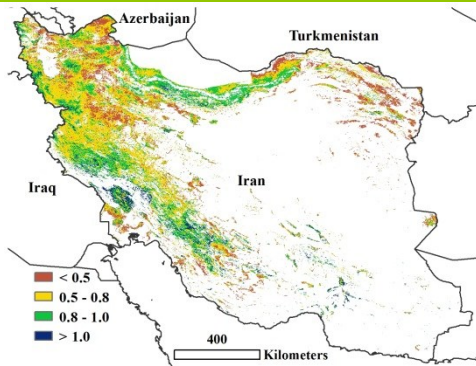
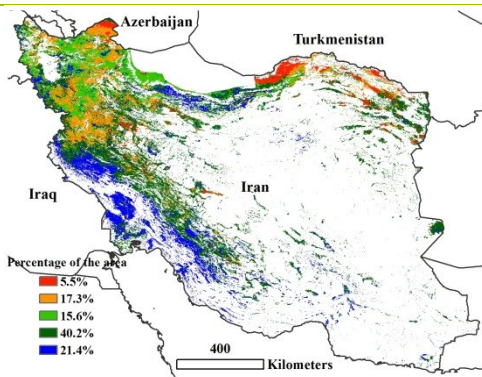
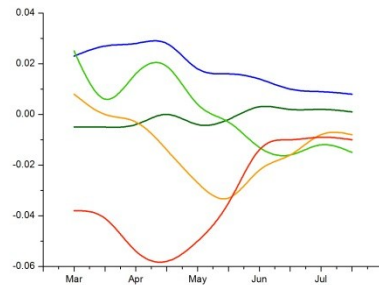


Figure 3.17. Iran crop condition, April-July 2014

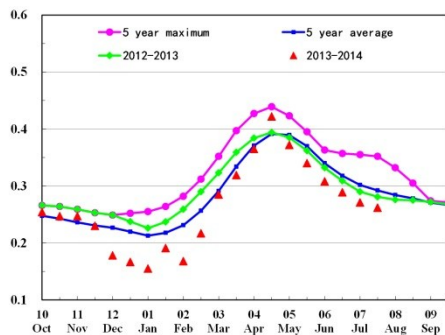
Accumulated rainfall and RADPAR for April to July 2014 were below the five-year and thirteen-year averages, while temperature was above average. Winter wheat was harvested from June to July, and the summer crops (potato and rice) were sown from May. The CropWatch agroclimatic indices for the current season indicate unfavorable conditions for winter and summer crops, which are confirmed by the decrease of biomass by 9%. The national average of VCIx (0.69) indicates just above average conditions. Poor growth conditions occurred in the Razavi Khorasan, north Khorasan, and the center of Golestan provinces of the northeast region, and the Ardabil, Zanjan, and Hamadan provinces of the northwest regions. Conditions close to or above the five-year average are mainly distributed in the Khuzestan, Kermanshah, and Fars provinces of the southwest region, and the Mazandaran and Gilan provinces of the central-north region. The major rice producing areas (the Mazandaran and Gilan provinces near the coast of the Caspian Sea) experienced favorable crop conditions. Overall, the outcome of winter crops and most summer crops is poor or mixed. The outcome of the rice season, however, is expected to be favorable.



(b) Spatial NDVI patterns compared to 5YA



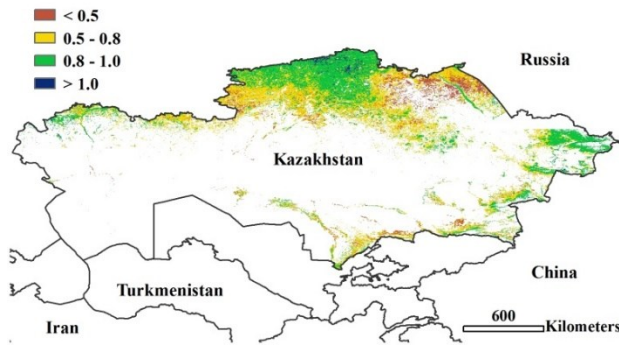
(c) NDVI profiles



(d) Crop condition development graph based on NDVI

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# [KAZ] Kazakhstan

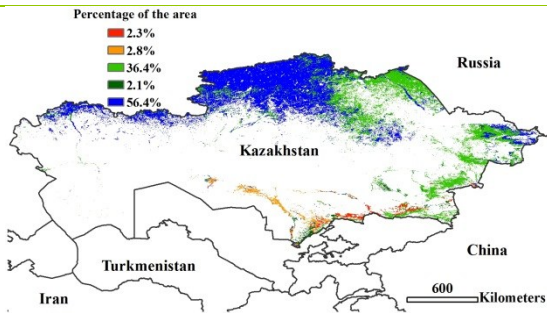


**Figure 3.18. Kazakhstan crop condition, April-July 2014**  
(a) Maximum VCI

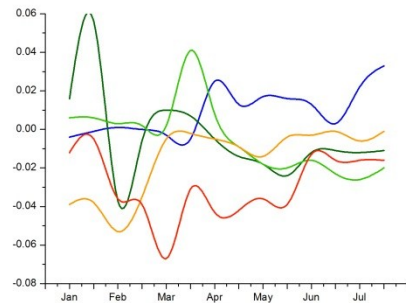
Spring barley and wheat were sowed before June and are currently growing; other cereals also entered into the vegetative stage. During the reporting period, crop condition was generally mixed.

Among the CropWatch agroclimatic indicators, RAIN and RADPAR were slightly above the past thirteen-year average (5% and 1% respectively), while TEMP was average. The crop condition development graph indicates a gradual drop below the five-year average from late May to July. Considering the NDVI profiles and spatial NDVI patterns, the areas that are below average after May include the oblasts of Severo-kazachstanskaya, Akmolinskaya, Kustanayskaya, Pavlodarskaya, and Vostochno-kazachstanskaya in the

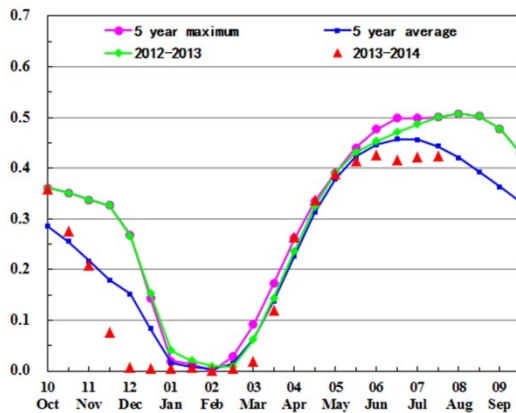
east; and Jambylskaya and Almatinskaya in the south. The poor crop condition in these areas resulted from uneven rainfall distribution in time and space. Thanks to national average rainfall above the past thirteen-year average in other areas, the center north and north-west of the country enjoy good crop condition.



(b) Spatial NDVI patterns compared to 5YA

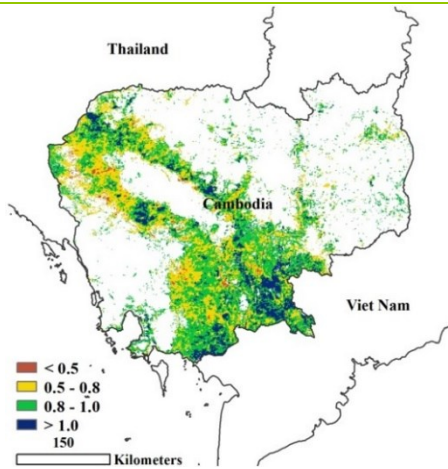


(c) NDVI profiles



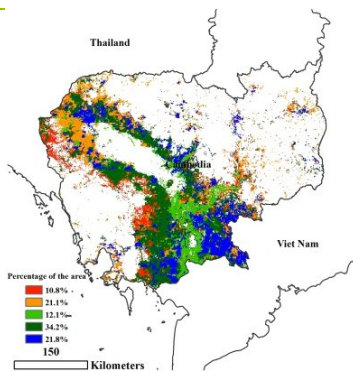
(d) Crop condition development graph based on NDVI

# [KHM] Cambodia

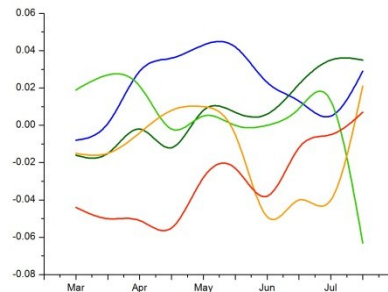


**Figure 3.19. Cambodia crop condition, April-July 2014**  
(a) Maximum VCI

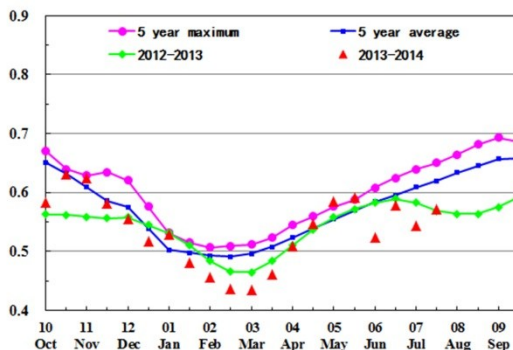
The period from April to July 2014 covers the harvest of the second (dry season) rice, the early stage of the main (wet season) rice, and the growing period of maize. Compared to the five-year average, crop condition changed from below average to above average in April and then turned to below average again in June and July. The CropWatch agroclimatic and agronomic indicators shows that Cambodia enjoyed high but favorable rainfall (as measured by RAIN), which was 43% above the thirteen-year average, while TEMP and RADPAR roughly kept balance with the average. BIOMSS shows a 13% decrease compared to average. On the contrary, the fraction of cropped arable land increased 4.7% compared to average. NDVI clusters and profiles show that 31.9% of the agricultural areas, mainly distributed in western Cambodia in Banteay Meanchey, Battambang, and Pailin provinces, have below average crop condition. VCIx ranges from 0.5 to 0.8. Well-above average crop condition was experienced by 21.8% of the areas from April to July, with VCIx values greater than 1.0 in Cambodia's Southeast, Kampot, Takeo, Prey Veng, and Kampong Cham. The national VCIx of the current period is 0.85, indicating good conditions over the whole period. Although unfavorable conditions affected the early stages of the main rice crops, they have since benefitted from abundant precipitation, leading to a rice production level comparable with last year's crop.



(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Crop condition development graph based on NDVI

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# [MEX] Mexico

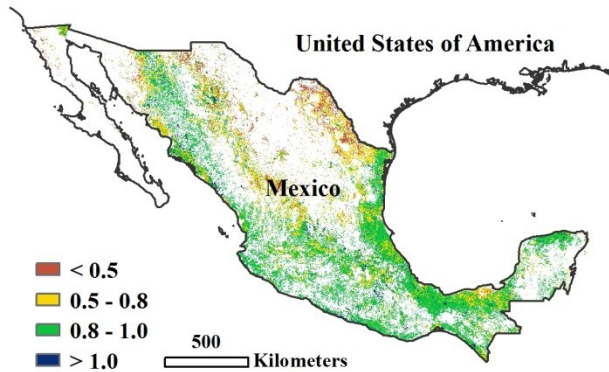
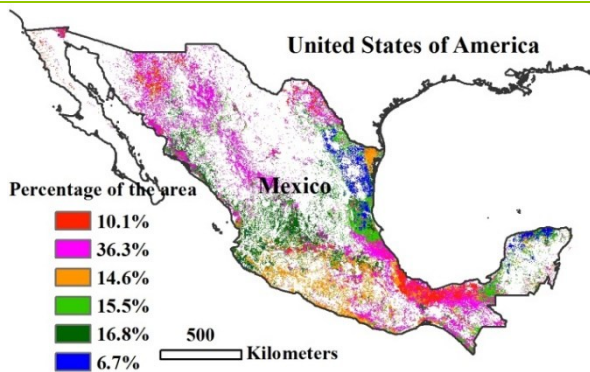
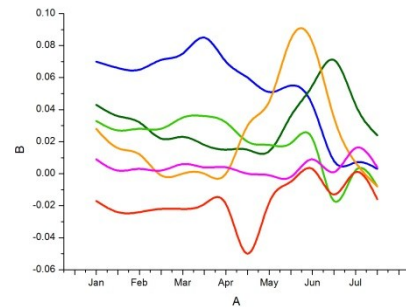


Figure 3.20. Mexico crop condition, April-July 2014  
(a) Maximum VCI

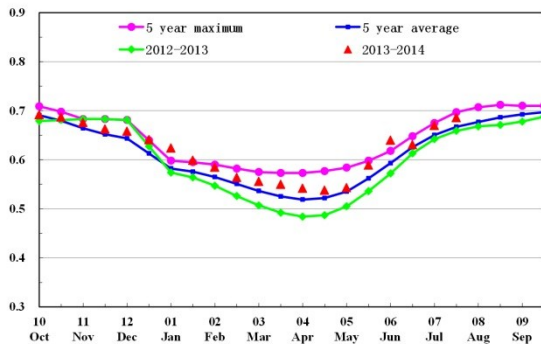
Maize and winter wheat are the main crops of Mexico. Winter wheat is planted in early October and harvested in late June, while the main maize crop grows from late May to late November. The current CropWatch monitoring period from May to July is the harvesting season of winter wheat and early growth stage of maize. Agroclimatic indices show an increase in RAIN of 5% compared to thirteen-year average, a slight decrease of RADPAR (-2%), and an insignificant increase in TEMP (0.4°C). The dry conditions were limited to the northern region. In general, rainfall was sufficient for maize. Currently, NDVI profiles and spatial clusters indicate that the condition of Mexican crops is above the last five-year average except in Veracruz-Llave and Tabasco states. The accumulation of biomass increased 9% compared to five-year average. VCI is 0.8, indicating good crop condition. If the favorable weather continues, a good production can be expected.



(b) Spatial NDVI patterns compared to 5YA

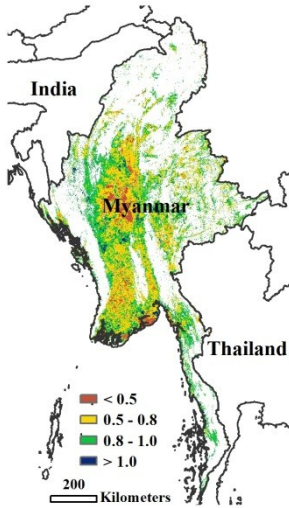


(c) NDVI profiles



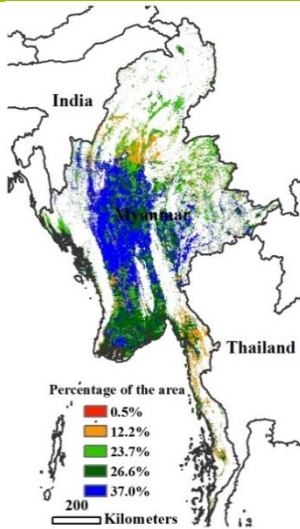
(d) Crop condition development graph based on NDVI

# [MMR] Myanmar

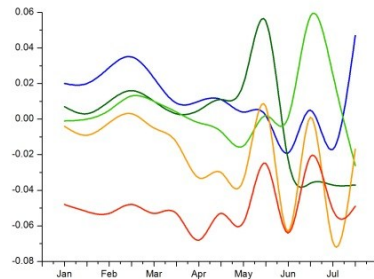


The crop condition from April to July was comparable to the situation in 2012-2013. During the reporting period, the harvesting of wheat and second rice has been completed, while the sowing of the main rice was done in May. NDVI shows a sharp increase from June to mid-July due to the growing period of the main season rice crop. For the period under consideration, the CropWatch agroclimatic and agronomic indicators show an increase in RADPAR (+6%), accompanied by an increase in TEMP (1.5°C), compared to the thirteen-year average. BIOMSS decreased by 5% compared to that same average as a result of the 11% below average precipitation (RAIN). The El Niño event has adversely affected and delayed crop growth. The NDVI profile sharply decreased to below average values in Bago and Yangon provinces in mid-May. NDVI profiles were well above average at mid-July in most of the central dry zone (almost 40% of the cropland area). The value for VCIx increased to 0.78, but presents low values in the central dry zone and in Bago and Yangon provinces, a finding consistent with the NDVI profiles.

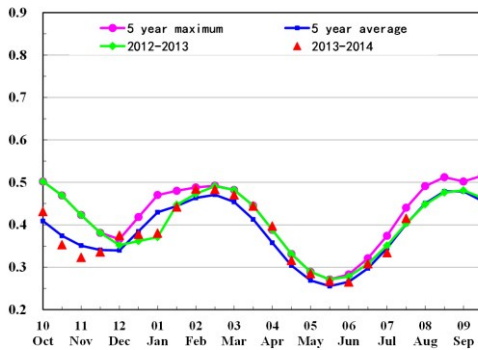
**Figure 3.21. Myanmar crop condition, April-July 2014**  
(a) Maximum VCI



(b) Spatial NDVI patterns compared to 5YA



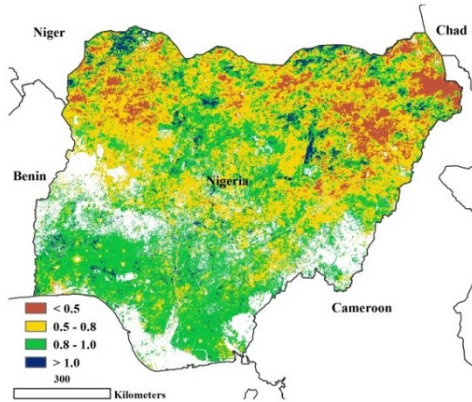
(c) NDVI profiles



(d) Crop condition development graph based on NDVI

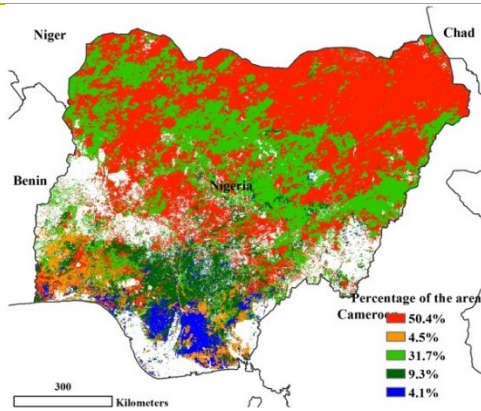
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# [NGA] Nigeria

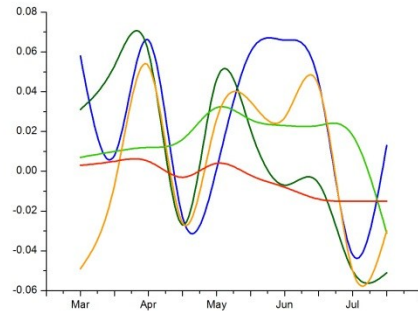


**Figure 3.22. Nigeria crop condition, April-July 2014**  
(a) Maximum VCI

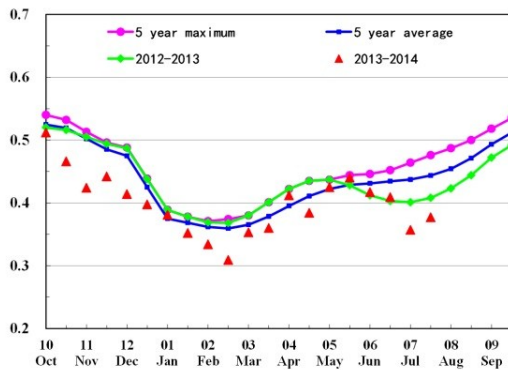
Climatic conditions vary greatly in Nigeria where the south enjoys a very long rainy season between April and November, while the northernmost areas usually plant maize in July to harvest in September. The major maize producing areas cover an east-west oriented area roughly between the latitudes of 7 and 11 degrees northern latitude, with planting varying from March-April (in the south of the area) to May (in the north). National CropWatch agroclimatic indicators have been close to average during most of the reporting period; national NDVI, indicating crop condition development, was close to the recent five-year average, except during the last two dekads of July when it dipped below average in about two thirds of the country. Negative departures for all CropWatch indicators do not play any major part in the main maize producing areas; instead, they tend to occur in the south, where plantations, cassava, and yams play a dominant role. These negative departures mostly affect parts of Kogi and Benue states. Altogether, crop condition in Nigeria appears to be average, with favorable production prospects (VCIx is 0.76) due to cropped arable land fraction increasing by 5.5% over the recent five-year average.



(b) Spatial NDVI patterns compared to 5YA

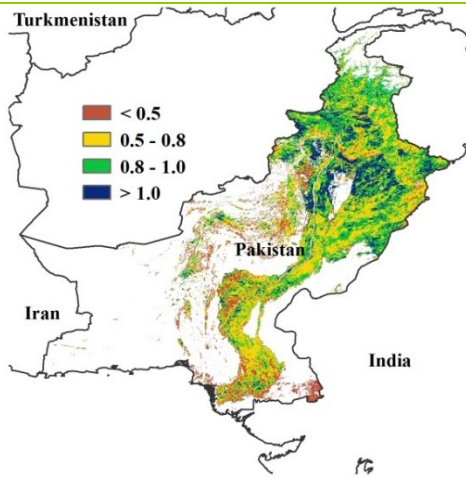


(c) NDVI profiles



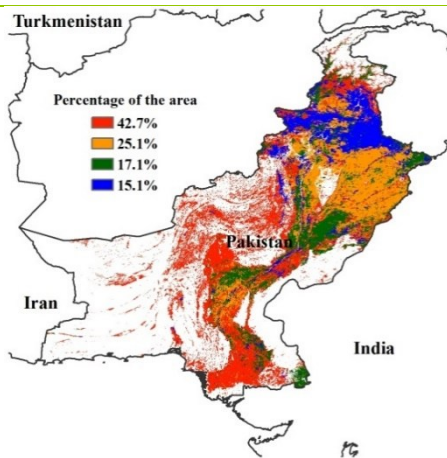
(d) Crop condition development graph based on NDVI

# [PAK] Pakistan

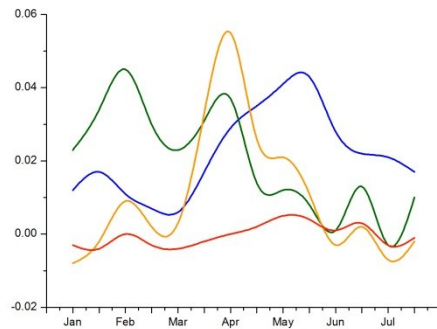


This monitoring period covers the harvesting stage of winter wheat and barley. Maize and rice have been sowed and are now growing. Generally, crop condition was favorable from April to July. Compared with the past thirteen-year average level, TEMP shows a slight increase (0.2%), while RAIN and RADPAR decreased more significantly (-7% and -2°C respectively). From June to July, crop condition gradually deteriorated in south and central Pakistan due to a drop in rainfall, but spatial NDVI patterns and clusters indicate that crop condition was still better than during both the previous year and the recent five-year average. Rice is the main crop in Pakistan. Most is planted in the provinces of Punjab and Sindh, representing 91% of the national planting area and 88% of national production. The high maximum VCI in two provinces confirms good crop condition. Currently, all available indicators concur to rank the crop as average or above throughout the country.

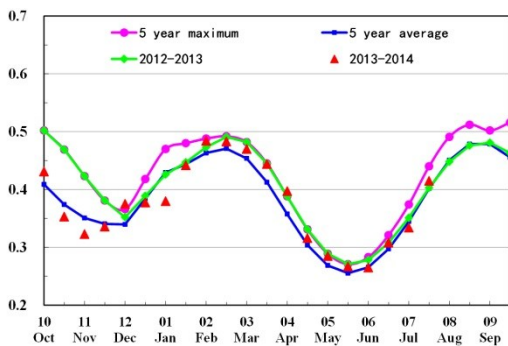
**Figure 3.23. Pakistan crop condition, April-July 2014**  
(a) Maximum VCI



(b) Spatial NDVI patterns compared to 5YA



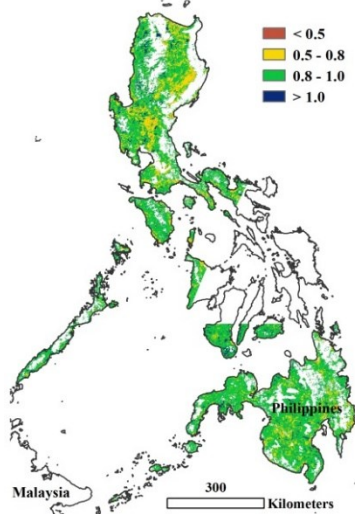
(c) NDVI profiles



(d) Crop condition development graph based on NDVI

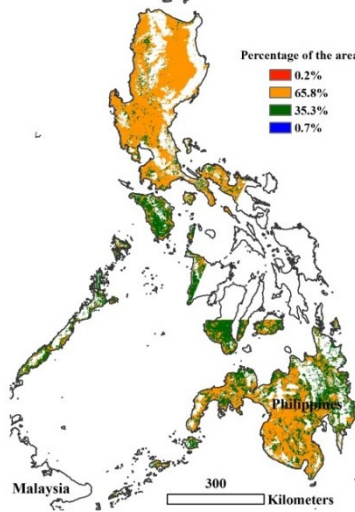
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# [PHL] The Philippines

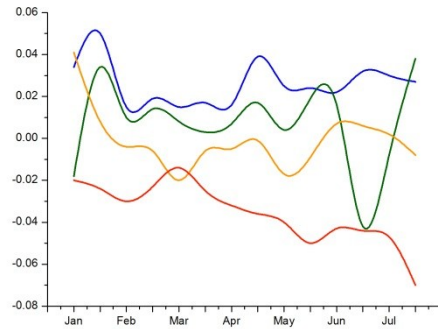


Crop condition in the Philippines was generally average from May to the end of July. The main rice crop is currently growing, while maize has reached maturity and is about to be harvested. During the monitoring period, CropWatch agroclimatic indicators were slightly above the recent thirteen-year average, which leads to favorable crop condition. The biomass accumulation (BIOMSS) shows an insignificant 1% decrease compared to that same average. Considering the spatial patterns of NDVI profiles, crop condition in Mimaropa and Visayas was below average in July and soon recovered, after having been affected by cyclone Rammasun (Glenda) in July (see also section 5.2), while other areas remained at an average level. The maximum VCI map shows good crop condition over the whole country. NDVI in July was close to the average of the recent five years and CropWatch estimates that the production of main rice will be average.

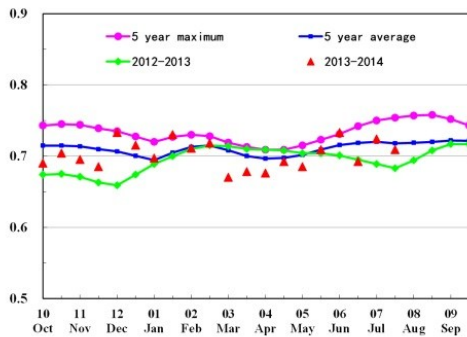
**Figure 3.24. Philippines crop condition, April-July 2014**  
(a) Maximum VCI



(b) Spatial NDVI patterns compared to 5YA

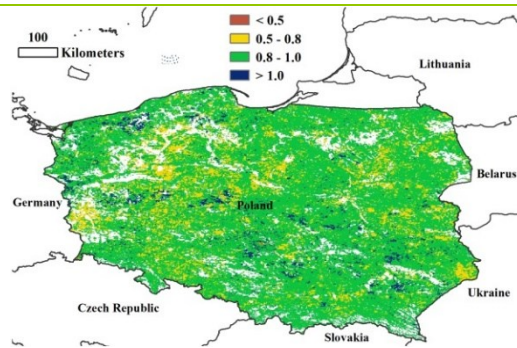


(c) NDVI profiles



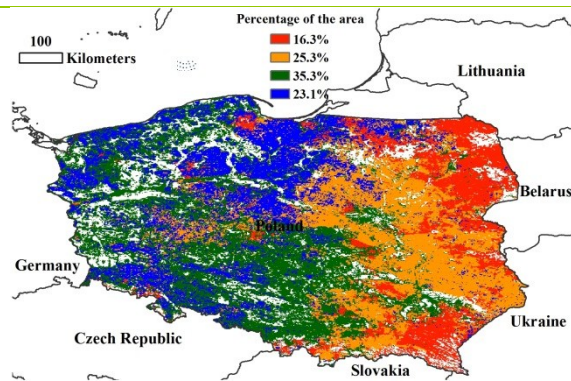
(d) Crop condition development graph based on NDVI

# [POL] Poland

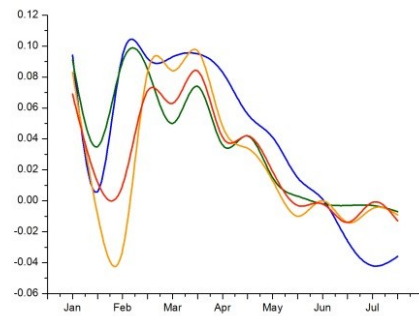


Poland presents favorable crop condition during April to July (VCIx=0.88), during which period most maize was planted. The fraction of cropped arable land was about the same as the last five-year average. Agroclimatic conditions were also better than the thirteen-year average, with TEMP up 0.4°C, RADPAR up 1%, and especially RAIN up 12%. The national NDVI patterns showed a downward trend in most parts of Poland from April to July. Because the winter and beginning of spring were warmer than usual, the peak of crop conditions was advanced by about 15 days. Altogether, conditions were favorable for winter crops and mixed—for the time being—for summer crops, particularly in the western half of the country.

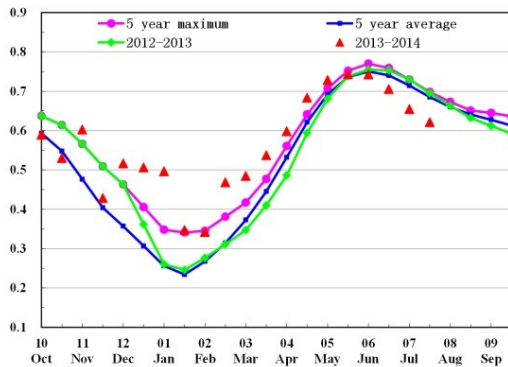
**Figure 3.25. Poland crop condition, April-July 2014** (a) Maximum VCI



(b) Spatial NDVI patterns compared to 5YA



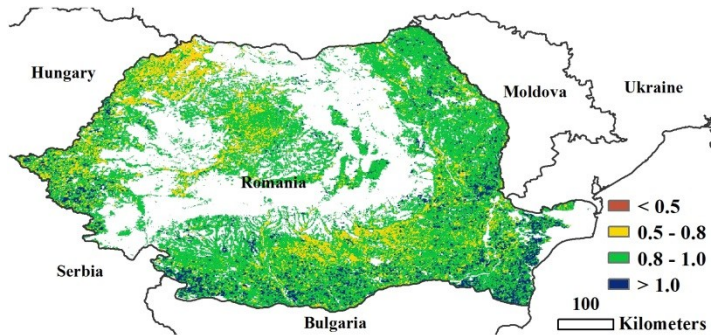
(c) NDVI profiles



(d) Crop condition development graph based on NDVI

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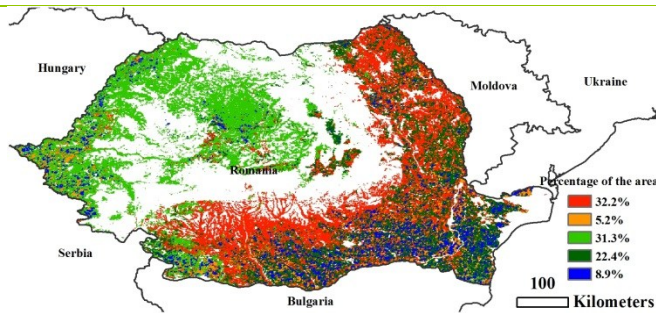
# [ROU] Romania



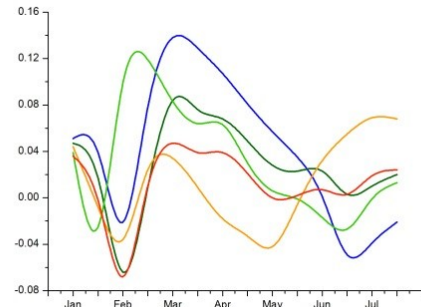
**Figure 3.26. Romania crop condition, April-July 2014**  
(a) Maximum VCI

Romania presents favorable crop condition during the reporting period ( $VCI_x=0.89$ ), which covers the harvest of winter wheat and the planting of summer crops, especially maize (planted before May). According to the CropWatch agroclimatic indicators, Romania experienced close to average environmental conditions: RAIN was up 0.3%, TEMP down 0.4°C, and RADPAR down 4% compared with the recent thirteen-year average. Due to the wet conditions, the potential biomass accumulation (BIOMSS) increased 5%. The area of actually cropped land was close to the five-year average. As the NDVI patterns show, in most parts (more

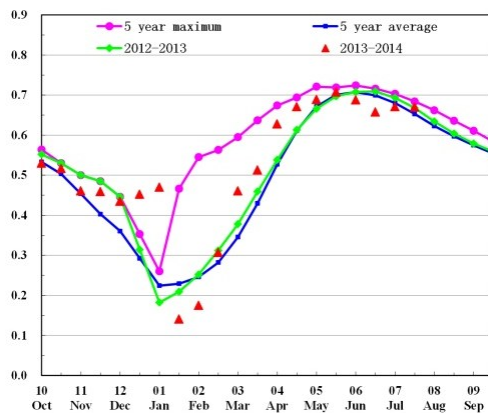
than 85%) of Romania, the NDVI trend was similar to the last five-year average from April to July. In the central south and south-east (including Constanta, Bucharest, and Craiova), the NDVI trend was below average starting in the end of June, due to excess rainfall. Altogether, the output of the summer season is expected to be close to the recent five-year average.



(b) Spatial NDVI patterns compared to 5YA

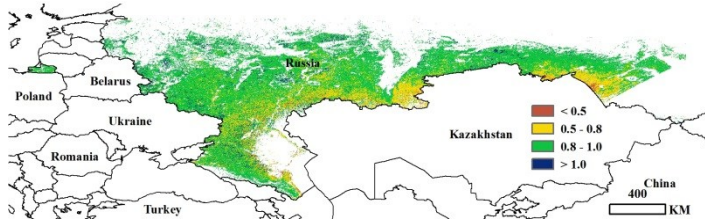


(c) NDVI profiles



(d) Crop condition development graph based on NDVI

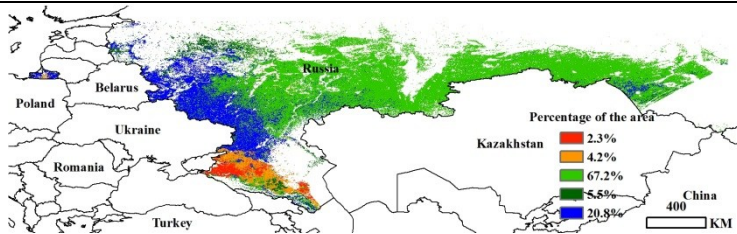
# [RUS] Russia



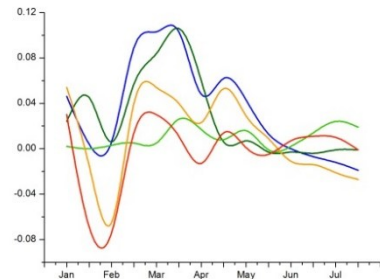
**Figure 3.27. Russia crop condition, April-July 2014**  
(a) Maximum VCI

During this monitoring period, about half of the wheat (48.5%) and barley (45.3%) in Russia have been harvested. RAIN was down 12%, while TEMP was up 0.1°C, and RADPAR up 3%, compared with the thirteen-year average. In most parts, crop condition was favorable ( $VCI_x=0.87$ ). Winter and spring wheat conditions are still generally favorable. The fraction of cropped arable land in this period increased as much as 4.1% compared to the five-year average. Most spring crop areas were cropped during this period. The

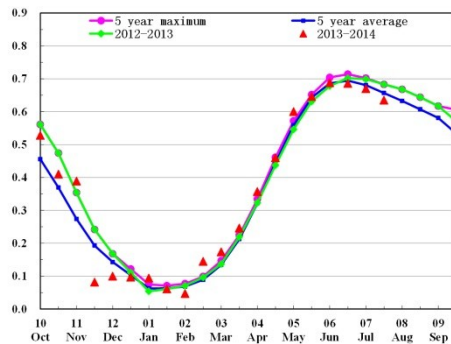
NDVI patterns show that in about 67% of the area in southern Russia, the NDVI profile is close to normal in April and May and above average in June and July. In other parts of southern Russia (about 21%, including Rostov Oblast, Voronezh Oblast, and Belgorod Oblast), the NDVI profile is significantly above average in April and May, before falling in June and July. In these areas, the potential biomass accumulation is significantly higher than the five-year average (20%). In the southeast of Russia (including Orenburg Oblast, Samara Oblast, and Saratov Oblast), the potential biomass is lower than average due to the cold and dry weather. As shown in the crop condition development graph, crop condition is close to average from April to July. Therefore, average to good yields can be expected for the spring crop in Russia.



(b) Spatial NDVI patterns compared to 5YA



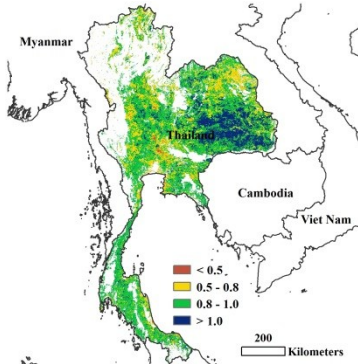
(c) NDVI profiles



(d) Crop condition development graph based on NDVI

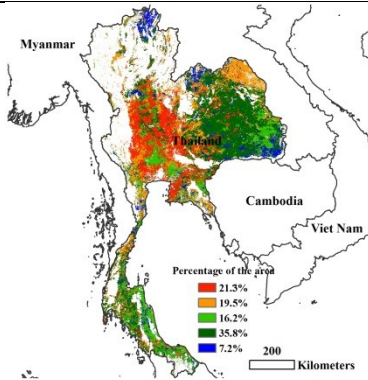
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# [THA] Thailand

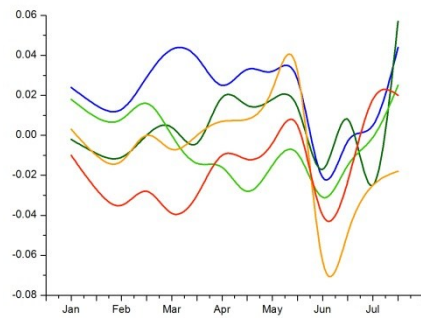


**Figure 3.28. Thailand crop condition, April-July 2014**  
(a) Maximum VCI

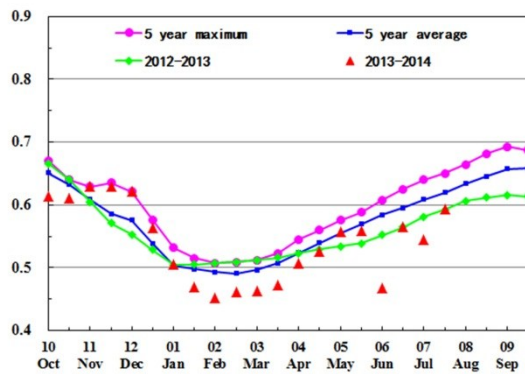
The main rice in most regions of Thailand is in the sowing stage, particularly in the Northeastern region. Meanwhile, the harvest of the country's second rice crop has concluded in May. For the period under consideration, crops show below average condition compared to the five-year average. The CropWatch agroclimatic and agronomic indicators show an increased PAR accumulation (RADPAR, +6%), rainfall (RAIN, +6%), biomass (BIOMSS, +4%), and temperature (TEMP, +1°C) compared to the thirteen-year average. NDVI gradually increased from February to mid-July, with a drop in June due to drought conditions, which reduced actually cultivated areas. The profiles also confirmed that crop condition was mostly below average, particularly in the area around the Chao Phraya river basin and in the northeastern region. Crop condition returned to average in July, as a result of increased precipitation. The overall VCI index of 0.88 is compatible with overall good crop condition, which is the case especially in Sisaket, Surin, Burirum, Roiet, and Yasothon provinces.



(b) Spatial NDVI patterns compared to 5YA

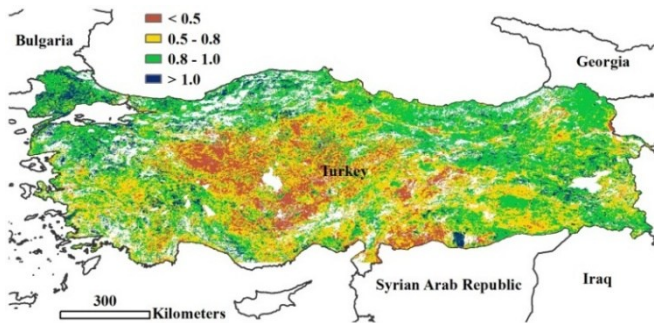


(c) NDVI profiles



(d) Crop condition development graph based on NDVI

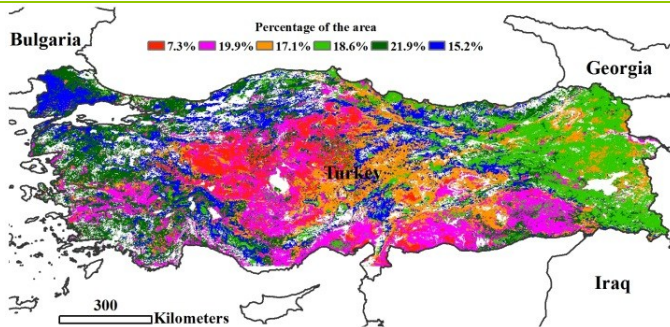
# [TUR] Turkey



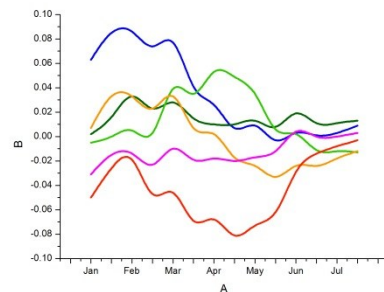
**Figure 3.29. Turkey crop condition, April-July 2014**  
(a) Maximum VCI

In Turkey, both accumulated rainfall and average temperature were above average for the reporting period (although less so for temperature), resulting in slightly above average BIOMSS in spite of lower than average RADPAR. During the monitoring period, the winter wheat harvest was completed, and summer crops (maize, rice, and potato) sown from April are still growing. The agroclimatic indices indicate favorable climate conditions for the crops in the current season, which is confirmed by the biomass increase of 10% over the five-year average and the average VCIx of 0.76. The VCIx map presents a spatial pattern consistent with that of the cluster map of NDVI compared to the five-year average. Crop condition

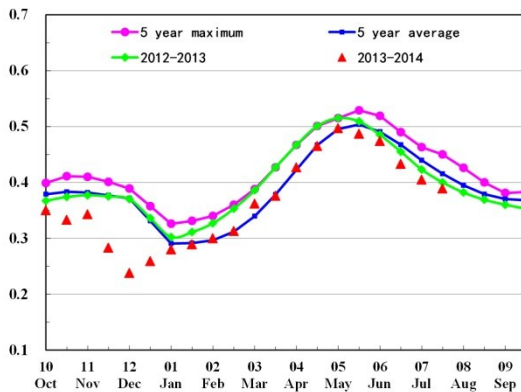
below average for May to July is found in the area from Eskisehir to Sivas and extending south and south-east as far as the Syrian border (Gaziantep and Sanliurfa), covering approximately 25% of the national territory. Other regions located in central-eastern Anatolia, Thrace, and north of the Bosphorus underwent favorable conditions mostly from March to April, or returned to normal from May to July. Overall, the outcome of the winter crops is poor and the outlook for this monitoring season is mixed.



(b) Spatial NDVI patterns compared to 5YA



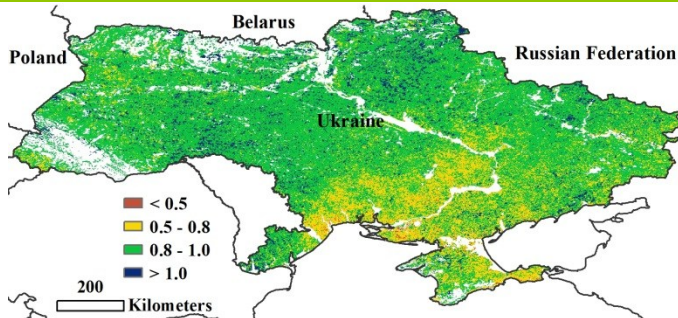
(c) NDVI profiles



(d) Crop condition development graph based on NDVI

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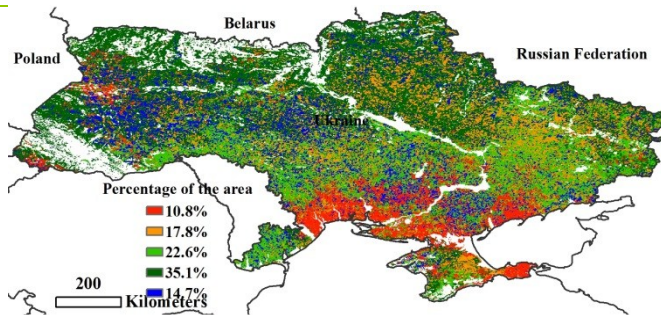
# [UKR] Ukraine



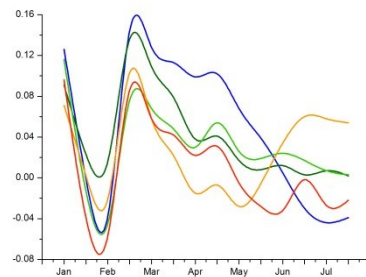
**Figure 3.30. Ukraine crop condition, April-July 2014**  
(a) Maximum VCI

Over the reporting period, Ukraine recorded very close to average rainfall conditions, with slightly above average temperature (+0.3°C) and RADPAR (+1.0%), resulting in an estimated biomass increase of 5%. As illustrated in the section on the central Europe and western Russia MPZ, the BIOMSS increase is largest in the center and the east of the country (up to +20%) while the western third had less favorable conditions with expected BIOMSS decreases usually around -10%. The countries suffered little from the large excess precipitation in some neighboring countries affected by the "Balkan floods" (see also section 5.2). The

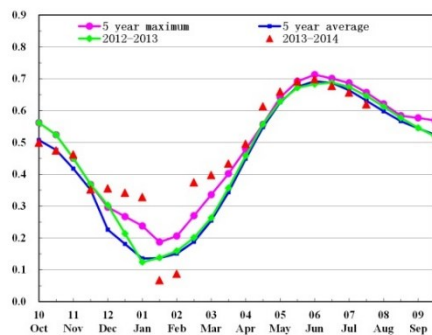
harvest of winter wheat started in July and is currently still underway, while NDVI is close to the reference values. Planting of summer crops (especially maize and soybeans) took place in April and May; very limited areas of arable land were not cultivated at the end of July (the average area of cropped arable land is comparable to that of the previous five years), mostly in the oblasts of Kherson and Mykolayiv. This area along with some areas to the east (from Kherson to Donets) show below average NDVI starting in May, possibly in relation with the prevailing security situation. In the west (Ternopil and east of the Oblast to central Ukraine) low NDVI was noted from June. In the east, many areas had positive NDVI departures since June. Altogether, with the exception of uncropped land, the situation of both winter and summer crops is generally favorable.



(b) Spatial NDVI patterns compared to 5YA

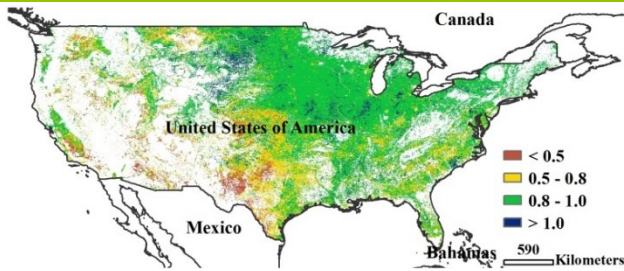


(c) NDVI profiles



(d) Crop condition development graph based on NDVI

# [USA] United States

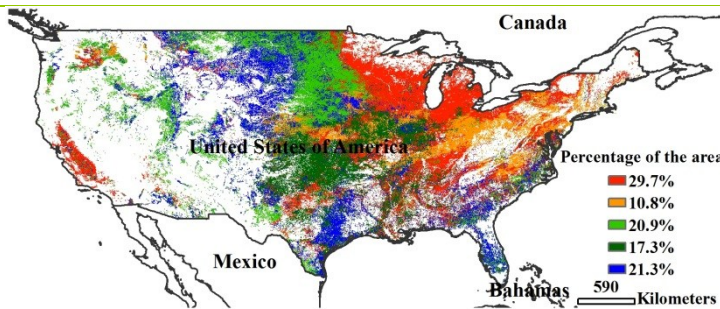


**Figure 3.31. United States crop condition, April-July 2014**

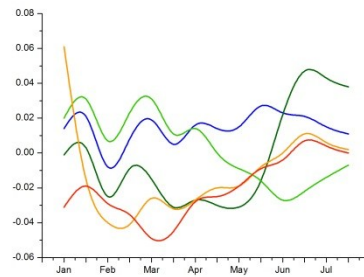
(a) Maximum VCI

Wisconsin, Illinois, Iowa, Indiana, Michigan, Ohio, and Kentucky; abundant rainfall in this region provided enough water for crop growth, but caused a correlated decrease of RADPAR. It negatively interfered with crop growth in Minnesota (RAIN, +33%, RADPAR, -7%), Iowa (RAIN, +58%, RADPAR, -6%), Wisconsin (RAIN, 14%, RADPAR, -6%), Nebraska (RAIN, +44%, RADPAR, -2%) and Illinois (RAIN, 20%, RADPAR, -2%). The decrease in PAR (RADPAR) reduced crop photosynthesis in the corn belt. According to the CropWatch environmental indices (national values), TEMP decreased by -0.1°C and RAIN increased 12%. Extreme drought occurred in the west of the country, especially in California (RAIN, -33%), Oregon (-41%), Washington (-28%), the Midwest (west part of Texas), and Southern Plains (Northern Texas, some regions of Oklahoma and Kansas). National RADPAR decreased 1% compared to the five-year average. CropWatch results also indicate that the accumulation of biomass (BIOMSS) increased 5% compared to the five-year average. The next CropWatch monitoring period is the harvesting season of maize, soybean and rice. Unless weather turns favorable, crop production is expected to be below-average. (See also table B.5 in Annex B.)

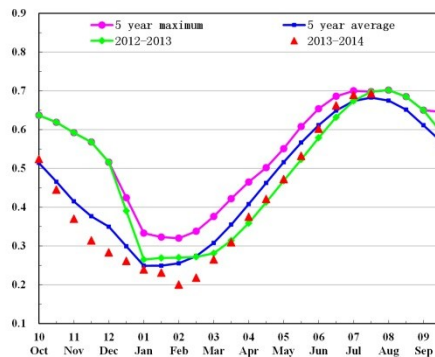
Winter wheat was planted in early October and harvested in late June. Other crops are currently on the field, with maize and rice planted in early May (harvesting in late September) and soybean planted in late May (harvesting in middle October). May to July is thus the main harvesting season of winter wheat and the key growing season of maize, rice, and soybean. For the period under consideration, the condition of crops is below-average to average compared to the last five-year average (2009-13), but above last year's conditions. The corn belt shows average conditions after June, including Minnesota,



(b) Spatial NDVI patterns compared to 5YA



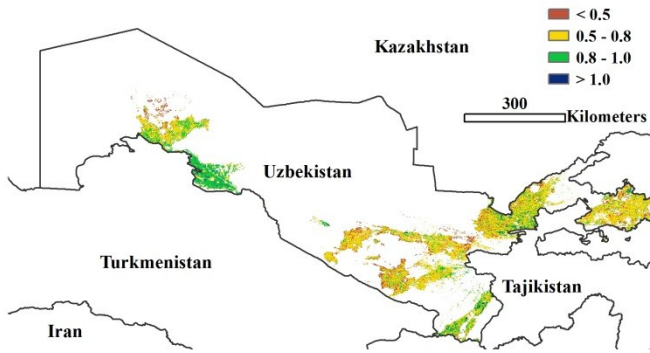
(c) NDVI profiles



(d) Crop condition development graph based on NDVI

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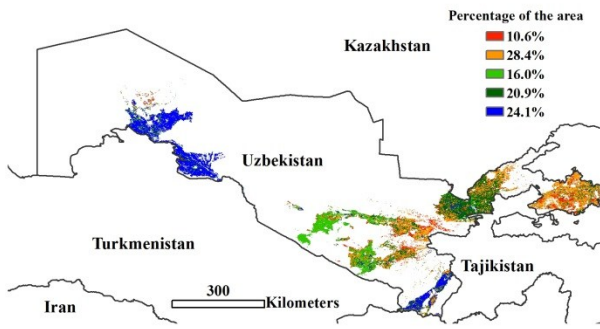
# [UZB] Uzbekistan



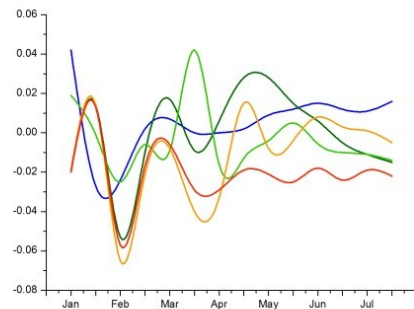
**Figure 3.32. Uzbekistan crop condition, April-July 2014**  
(a) Maximum VCI

This analysis covers the growing and harvesting stages of winter cereals, along with the sowing and key growth period of coarse grains and maize in Uzbekistan. Crop condition is generally poor. The country as a whole showed a decrease of rainfall (RAIN) and biomass (BIOMSS) (-5% and -0.6% respectively), while temperature (TEMP) and PAR (RADPAR) were just above the average (0.4°C and 1%, respectively) of the past thirteen-year. A detailed look at the indicators shows that maximum VCI is below 0.5 for areas throughout the country except for southeast Qoraqalpoghiston and Termez, generally indicating poor crop condition. The national NDVI development graphs suggest that crop condition was good in April, but from May to July dropped to slightly below the recent five-year average as a

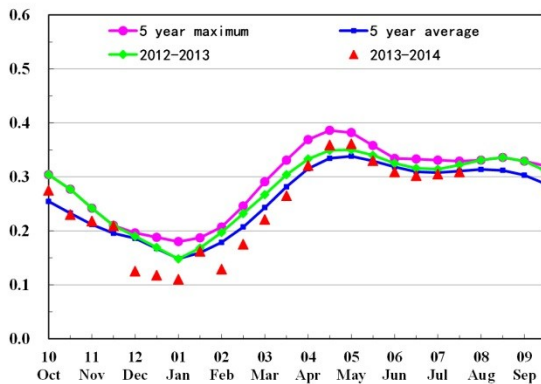
result of low rainfall and high temperature. More precise spatial information is provided by the NDVI clusters, which show that most areas (Bukhara, Kashkadarya, Samarqand, Jizzakh, Namangan, Andijan, and Fergana) have poor crops, except for parts in the west (mostly cotton areas) and south.



(b) Spatial NDVI patterns compared to 5YA

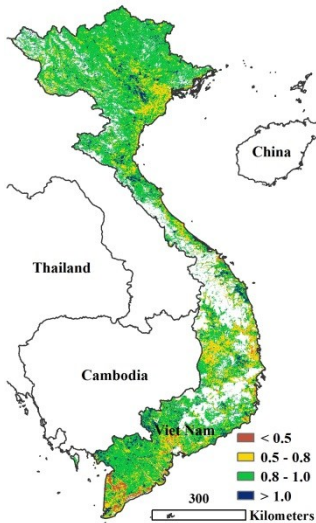


(c) NDVI profiles

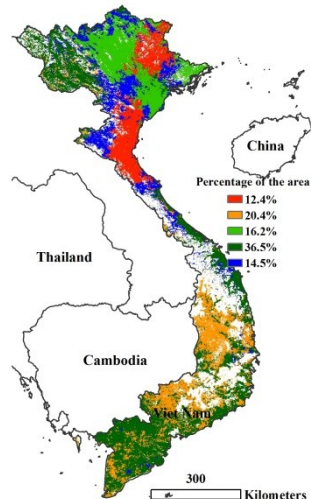


(d) Crop condition development graph based on NDVI

# [VNM] Vietnam



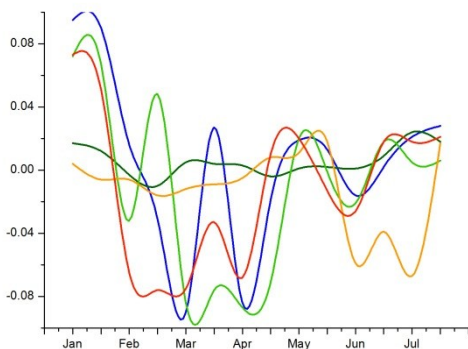
(a) Maximum VCI



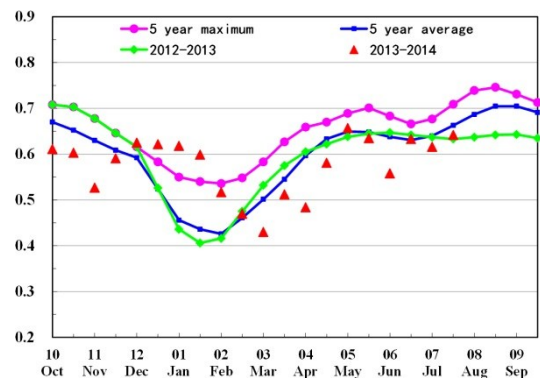
(b) Spatial NDVI patterns compared to 5YA

**Figure 3.33. Vietnam crop condition, April-July 2014**

The period from April to July 2014 mainly covers the harvesting period of winter/spring rice and also the sowing of the 10<sup>th</sup> month/North rice in Vietnam. Crop condition in April was inferior to the average of the previous five years, but reverted to close to average (except in early June). This is also confirmed by the profiles of NDVI: All five profiles of the NDVI clusters show below average conditions before and after May. More than 20% of the crops show fair conditions from late May to end of July, with those crops mainly distributed in Gia Lai, Phu Yen, Dak Lak, Binh Phuoc, and Lam Dong provinces, where the maximum VCI value ranges from 0.5 to 0.8. The average VCI of the current period is 0.86, indicating acceptable overall conditions. As can be seen from the results of the CropWatch agroclimatic and agronomic indicators monitoring, both RAIN (17%) and TEMP (1.2°C) were above the thirteen-year average. In contrast, RADPAR was slightly below that average. The ample rainfall and moderate temperature led to a 5% increase in biomass accumulation (BIOMSS). CropWatch forecasts an average 2014 rice production level in Vietnam.



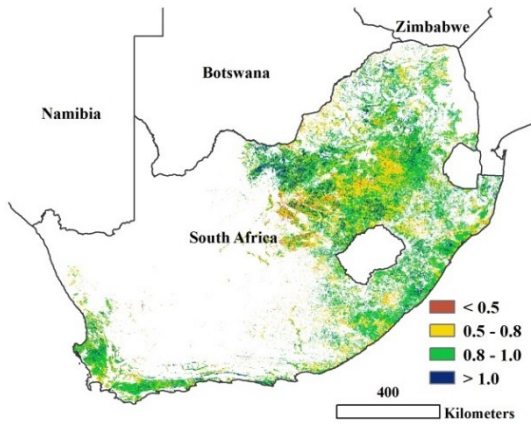
(c) NDVI profiles



(d) Crop condition development graph based on NDVI

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

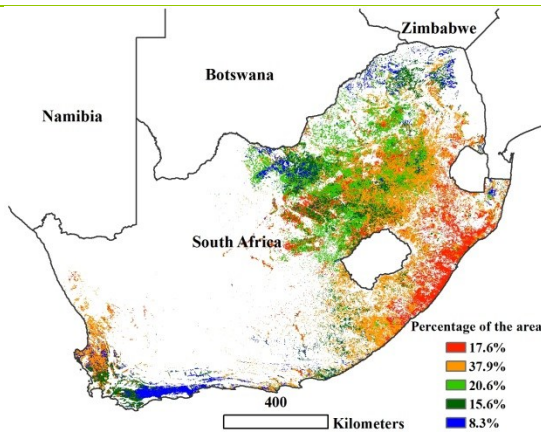
# [ZAF] South Africa



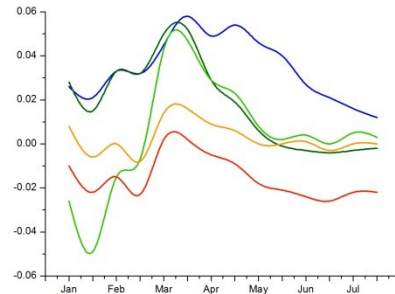
**Figure 3.34. South Africa crop condition, April-July 2014**

(a) Maximum VCI

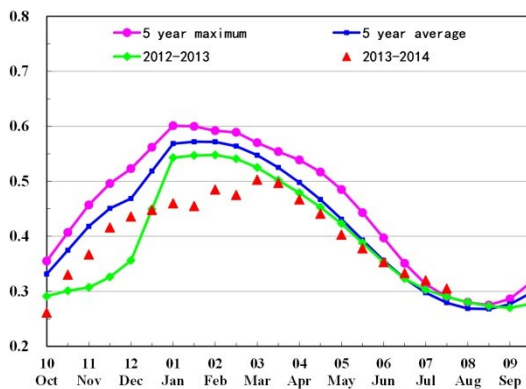
The period from May to June coincides with the planting of winter wheat in the very south and the harvest of summer crops, especially maize, which starts in the north east in May and reaches the north-western areas in June. The maize crop was favorable, as confirmed by maximum VCI at 0.83. During that period, NDVI was close to last year's values and the average of the last five years, but well below the last five years' maximum. Based on the NDVI profiles, there is a clear gradient of crop condition between the south-eastern coast (north of Eastern Cape and Kwazulu-Natal provinces, where NDVI was already below average at the end of last year) and the north-east, northern-central part (east of North-West Province), and the Northern Province. Although there are some regional differences, the South African maize crop can thus be described as good. Current cropped arable land estimates stay at -12.6% compared with the recent five years; combined with poor rainfall over the last 4 months (-60% for ZAF and -48% for the MRU-10 MRU, Western Cape), prospects are definitely below average for wheat.



(b) Spatial NDVI patterns compared to 5YA



(c) NDVI profiles



(d) Crop condition development graph based on NDVI

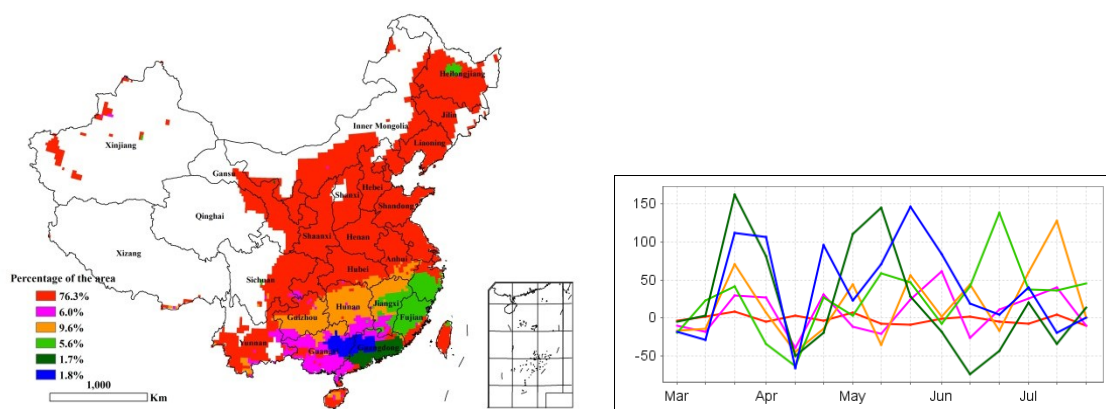
## Chapter 4. China

Chapter 4 presents a detailed CropWatch analysis for China, focusing on the seven most productive agro-ecological regions of the east and south. After a brief overview including a production outlook for 2014, detailed analysis including maps and profiles for NDVI, VCIx, CALF, and BIOMSS are provided for the individual regions. Additional information on the agroclimatic indicators for agriculturally important Chinese province are provided in table A.11 in Annex A.

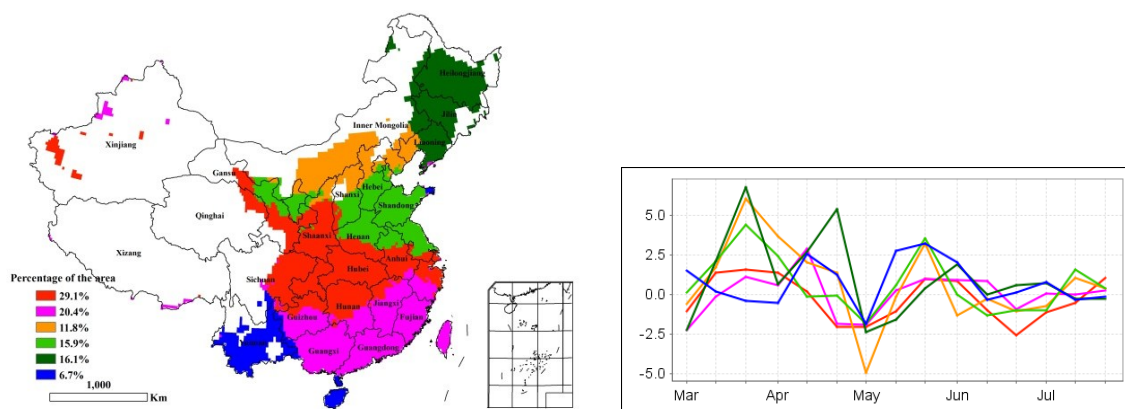
### 4.1 Overview

The current monitoring period is a crucial time for summer crops in China. In the northeast, maize and soybean were sowed in late April and early May. In the north, winter wheat has been harvested and maize has been planted, while in the south early rice was harvested and the planting of late rice began in late July. Figures 4.1-4.5 illustrate the distribution and profiles of RAIN and TEMP indicators, as well as the fraction of cropped arable land (CALF), maximum Vegetation Condition Index (VCIx), and minimum Vegetation Health Index (VHI<sub>n</sub>). Indicator values are provided in table 4.1.

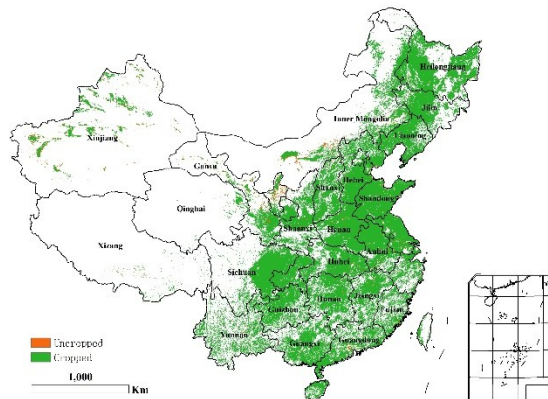
**Figure 4.1. China spatial distribution of rainfall profiles, April-July 2014**



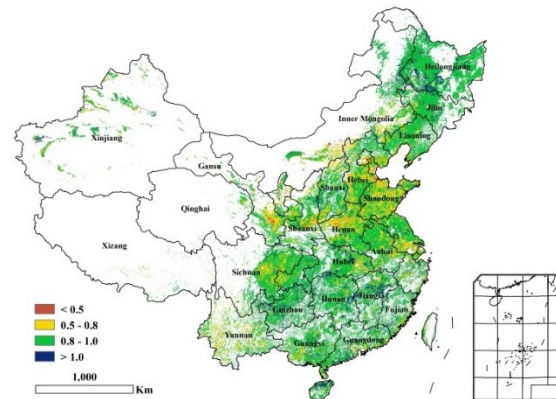
**Figure 4.2. China spatial distribution of temperature profiles, April-July 2014**



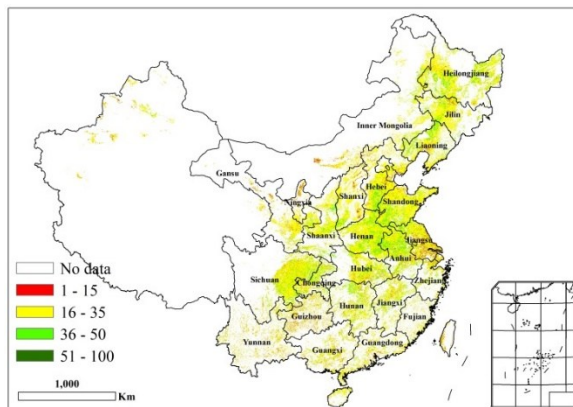
**Figure 4.3. China cropped and uncropped arable land, by pixel, April-July 2014**



**Figure 4.4. China maximum Vegetation Condition Index (VCIx), by pixel, April-July 2014**



**Figure 4.5. China minimum Vegetation Health Condition Index (VHI<sub>n</sub>), by pixel, April-July 2014**



When compared with the averages for the same period over the past thirteen years, RAIN increased 10%, TEMP increased 0.7°C, and RADPAR dropped 2%. The abundant rainfall and suitable temperature lead to a BIOMSS estimate of 2% above average. In more than 75% of the country, rainfall in the past five months was almost the same as the thirteen-year average, while it was above average in the north of Guangdong and Guangxi provinces. Temperature was below average in early March and May and above average during late March.

In Southern China, above average RAIN, TEMP, and RADPAR resulted in higher BIOMSS. In the Huanghuaihai region, below average rainfall led to water stress and the BIOMSS index decreased 11% compared to average. High VCIx values are mostly distributed in Southern China and in the Northeast. Low VCIx values are mainly located in the North and Northwest, in particular in Gansu and Henan provinces. Crop condition in the northeast of China is above the thirteen-year average (VCIx is 0.93), as temperature and PAR are higher than average and rainfall just slightly below.

The cropped arable land fraction (CALF) increased 1.6% during the monitoring period compared to the five-year average, with most of the uncropped land found in the central areas of Gansu and Shaanxi, in Inner Mongolia, and along the Yangtze River. China's Loess region and the Northeast are the only two regions with above average CALF (increases of 4.6% and 0.5%, respectively).

Minimum VHI indicates that drought was experienced by almost all regions in north China, along with the south of Hebei, eastern and southern Henan, southwest Shandong, north-east China, and northern Anhui (figure 4.5).

**Table 4.1. CropWatch agroclimatic and agronomic indicators for China, April-July 2014, departure from 5YA and 13YA**

Region	Agroclimatic indicators			Agronomic indicators		
	departure from 13YA (2001-2013)			departure from 5YA (2009-2013)		Current
	RAIN (%)	TEMP (°C)	RADPAR (%)	BIOMSS (%)	CALF (%)	Maximum VCI
Huanghuaihai	-25	1.0	1	-5	-0.7	0.81
Inner Mongolia	24	0.8	-1	16	-13.5	0.81
Loess region	-7	0.4	-0.7	-2	4.6	0.81
Lower Yangtze	22	0.4	-4	10	-0.4	0.89
North-East	-9	1.2	0.5	-12	0.5	0.93
Southern China	11	1.2	2	2	-0.1	0.85
South West	2	0.5	-5	-3	-0.1	0.89

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 thirteen-year average (13YA) for the same period (April-July). VCI=Vegetation condition index.

### China production outlook

Tables 4.2 and 4.3 list the estimated production numbers for maize, rice, wheat, and soybean in China, for 2014, with table 4.3 providing details about the 2014 rice production.

**Table 4.2. China, 2014 production (thousand tons) and difference with 2013 (percentage)**

	Maize		Rice (paddy)		Wheat		Soybean	
	2014	Δ%	2014	Δ%	2014	Δ%	2014	Δ%
Anhui	3632	-4	17151	3	11375	-2	1098	0
Chongqing	2099	3	4785	1	1119	-2		
Fujian			2812	1				
Gansu	4604	-7			4490	-4		
Guangdong			11073	2				
Guangxi			10983	2				
Guizhou	5004	6	5148	1				
Hebei	16237	-2			10609	-2	172	-1
Heilongjiang	26303	3	20231	4	1460	-7	4586	-1
Henan	16008	-4	3895	1	25747	-1	737	-5
Hubei			15912	3	4450	-3		
Hunan			25394	5				
Inner Mongolia	14360	-5			5762	-2	836	-1
Jiangsu	2227	3	16569	3	9501	1	781	-2
Jiangxi			17365	4				
Jilin	24032	0	5022	1			660	2
Liaoning	12889	-3	4709	1			511	-2
Ningxia	1797	7	545	0	2315	5		
Shaanxi	3870	-3	1040	0	3953	-8		
Shandong	18356	-1			21886	1	659	-5
Shanxi	9593	-2			2095	-5	187	-3
Sichuan	7101	1	14676	3	4596	2		
Yunnan	5613	-5	5332	1				
Zhejiang			2786	1				
<b>Sub-total</b>	<b>173725</b>	<b>-1</b>	<b>185430</b>	<b>0</b>	<b>96393</b>	<b>1</b>	<b>10227</b>	<b>-1</b>
Other 12 provinces	18226	0	15740	1	19140	3	2852	-1
<b>China total</b>	<b>191952</b>	<b>-1</b>	<b>201167</b>	<b>1</b>	<b>119735</b>	<b>1</b>	<b>13079</b>	<b>-1</b>

Note: Δ%=percentage difference with 2013.

As shown in table 4.2, the production of maize and soybean is estimated to decrease compared with the previous season, while winter wheat increases 1% and rice is average. The maize production is expected

to reach 192 million tons, which represents a decrease of 1% compared to 2013, mainly due to a decrease in yield. Soybean production will reach 13 million tons, with a drop of 1% because of the decrease in harvested area compared to last year. Rice production is just slightly above last year's due to low yield. Rice in China consists of "single rice," early rice, and late rice; for 2014, the production of single rice and late increases, while it falls for early rice (table 4.3).

Of the 17 monitored provinces, Chongqing, Guizhou, Heilongjiang, Jiangsu, and Ningxia all have an estimated increase in maize production above 2%. To the contrary, Gansu, Henan and Inner Mongolia have the largest decreases in maize production because of a drop in harvested area in Gansu and a yield decrease in Henan and Inner Mongolia. Liaoning and Henan are the two provinces with the largest decreases (3% below) in maize yield due to the server drought in August. Soybean in Henan shows the largest drop in production, as both area and yield are low. Due to an increase in area, soybean production in Anhui and Jilin rises by 1% and 2%, respectively. The single rice production in Shaanxi and Henan province decreases by 1% and 5% respectively, mostly because of drought. In Ningxia, single rice production increases by 18% thanks to an increase in cultivated area.

Overall, CropWatch puts the combined production of cereals, legumes, and tubers in China for 2014 at 563 million tons, a stagnation in production compared with the 2013 output (-0.1%). Total outputs for summer crops is projected at 405 million tons, a decrease of 2 million tons (-0.5%) compared with 2013.

**Table 4.3. China, 2014 single rice, early rice, and late rice production and difference with 2013, by province (thousand tons).**

	Single rice		Early rice		Late rice	
	2014	Δ%	2014	Δ%	2014	Δ%
Anhui	13448	3	1910	-1	1792	1
Chongqing	4785	-2				
Fujian			1680	0	1132	-1
Gansu						
Guangdong			5207	-1	5866	1
Guangxi			5428	-1	5556	2
Guizhou	5148	0				
Hebei						
Heilongjiang	20231	1				
Henan	3895	-5				
Hubei	10688	1	2399	-2	2826	-1
Hunan	8338	3	8278	-3	8777	-1
Inner Mongolia						
Jiangsu	16569	-1				
Jiangxi	2876	3	7297	2	7192	-1
Jilin	5022	-1				
Liaoning	4709	0				
Ningxia	545	18				
Shaanxi	1040	-1				
Shandong						
Shanxi						
Sichuan	14676	1				
Yunnan	5332	5				
Zhejiang			1509	-1	1277	-1
<b>Sub total</b>	<b>117302</b>	<b>1</b>	<b>33708</b>	<b>-1</b>	<b>34418</b>	<b>0</b>
Other provinces	12865	3	1679	-1	1196	8
<b>China</b>	<b>130167</b>	<b>1</b>	<b>35387</b>	<b>-1</b>	<b>35614</b>	<b>0</b>

Note: Δ%=percentage difference with 2013.

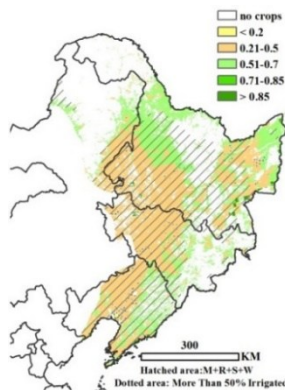
## 4.2 Regional analysis

Figures 4.6 through 4.12 present crop condition information for each of China's seven regions. The provided information is as follows: (a) General setting: NDVI background; combined maize, rice, soybean and wheat cultivation area, and areas where more than 50 percent of the land is irrigated; (b) Crop condition development graph based on NDVI, comparing the October 2013-September 2014 period to the previous season, to the five-year average (5YA), the five-year maximum; (c) Spatial NDVI patterns from March to July 2014 (compared to the (5YA); (d) NDVI profiles associated with the spatial patterns under (c); (e) maximum VCI (over arable land mask); (f) Cropped arable land fraction (CALF); and (g) biomass for April-July. Additional information about agroclimatic indicators and BIOMSS for China is provided in Annex A, table A.11.

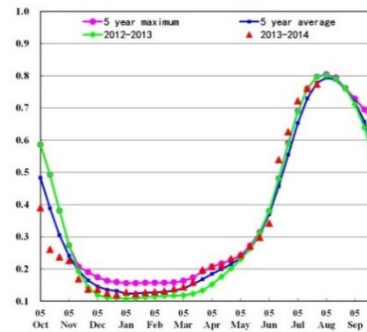
# North-east region

In China's Northeast, the period from April to July 2014 mainly covers the growing of spring maize, spring wheat, one-season rice, and soybean. Overall and across the monitoring period, crop condition was slightly above the recent five-year average. The NDVI clusters and profiles also illustrate this, with 30.6% of the area being below average (mostly Liaoning and the central part of Jilin province). This also coincides with maximum VCI (VCIx) values between 0.5 and 0.8. Overall, the average VCIx of the area for the current period is 0.85, indicating good crop condition. Over the reporting period, only 0.5% of arable land was uncropped. The CropWatch agroclimatic and agronomic indicators indicate that the region experienced a 9% drop in rainfall (RAIN) (compared to the thirteen-year average), while air temperature (TEMP) and PAR (RADPAR) accumulation were just above average. Biomass accumulation (BIOMSS) was 42% above the five-year average. Some reports from local governments focus on the severe drought that occurred in some areas, especially in Jilin and Liaoning in July, but the drought did not affect all crops in the region.

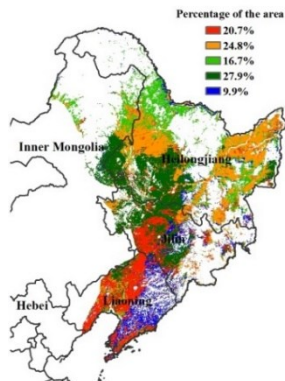
**Figure 4.6. Crop condition China North-east region, April-July 2014**



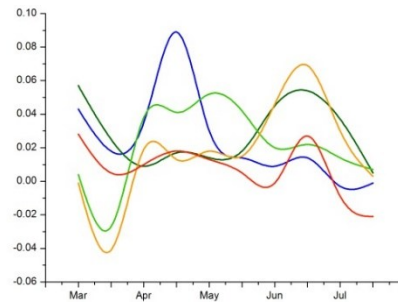
(a) NDVI background



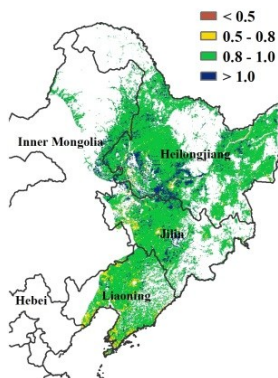
(b) Crop condition development graph based on NDVI



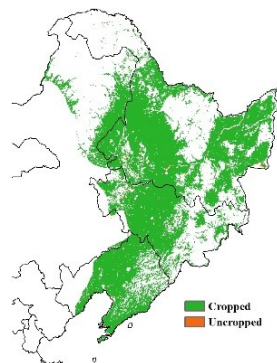
(c) Spatial NDVI patterns compared to 5YA



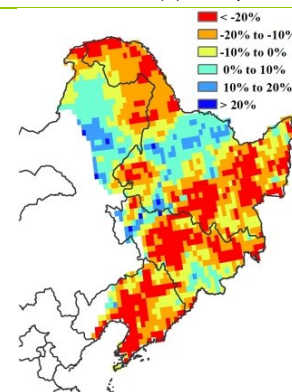
(d) NDVI profiles



(e) Maximum VCI



(f) Cropped arable land fraction

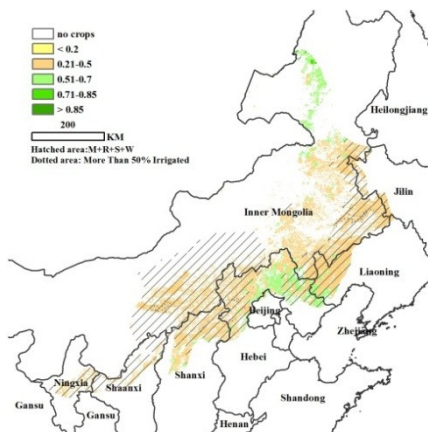


(g) Biomass

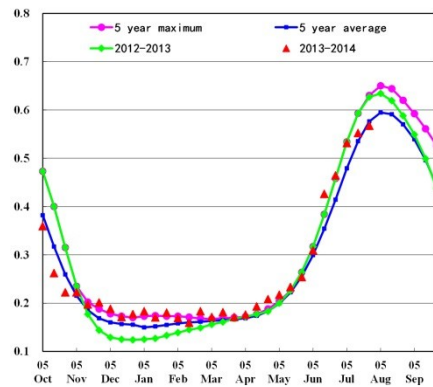
# Inner Mongolia

The condition of spring crops is generally favorable in Inner Mongolia for the current reporting period: Rainfall (RAIN) and temperature (TEMP) indices were above the thirteen-year average (24% and 0.8°C), which benefited crop growth and resulted in a significant BIOMSS increase (16%). As a result, conditions were favorable for the sowing and growing of spring crops, as illustrated in the crop development graph from April to June. In July, however, dry weather affected crop growth, which is clearly shown by sharply decreasing NDVI profiles. West Liaoning, central and southeastern parts of Inner Mongolia, northern Ningxia, Shaanxi, Shanxi, and Hebei all suffered unfavorable vegetation condition according to the VCIx map, as further confirmed by the map of uncropped areas and potential BIOMSS.

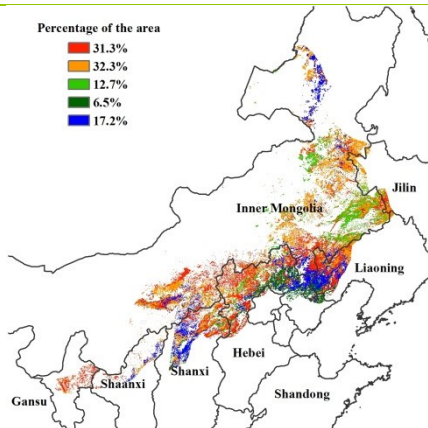
**Figure 4.7. Crop condition China Inner Mongolia region, April-July 2014**



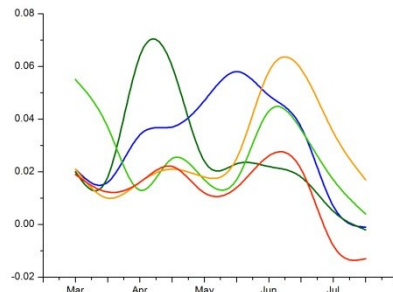
(a) NDVI background



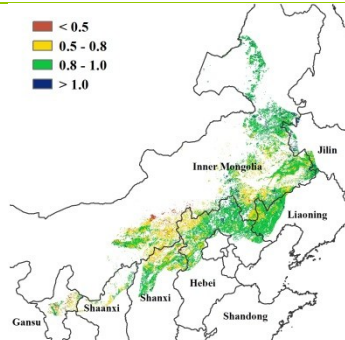
(b) Crop condition development graph based on NDVI



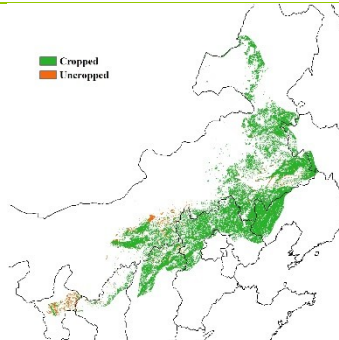
(c) Spatial NDVI patterns compared to 5YA



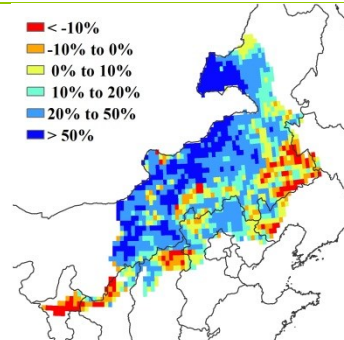
(d) NDVI profiles



(e) Maximum VCI



(f) Cropped arable land fraction

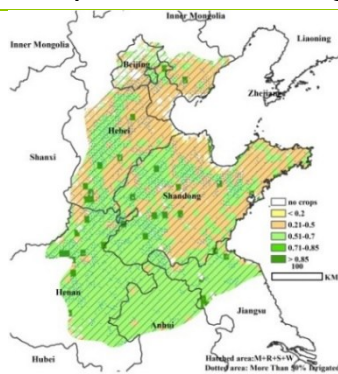


(g) Biomass

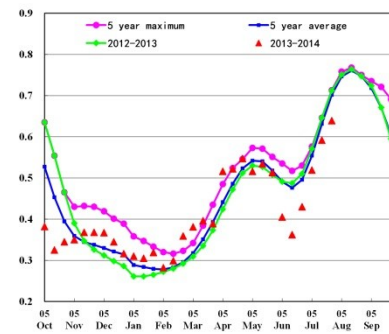
# Huanghuaihai

Crop condition in Huanghuaihai region was generally unfavorable from April to July. The harvesting of winter crops (mainly winter wheat and rapeseeds) concluded in June. Currently, maize is in the tasseling stage. Huanghuaihai experienced generally below normal precipitation and above average temperature, which induced a 5% decrease in BIOMSS. The most severe decline in BIOMSS was observed in central Henan, central Hebei, and central and eastern Shandong due to drought. According to the spatial NDVI patterns (compared to the 5YA) and the corresponding NDVI profiles, NDVI for most areas in the region is at an average level, with the exception of central Shandong and the west coast of Bohai Bay. Across the region, the crop condition development graph shows that crop condition is below both last year's and the five-year average, indicating a decreased expectation of maize yield. Meanwhile, cropped arable land was 0.7% below average for the region from April to July, a significant decrease in planted area. Areas with low VCIx value are found mostly in the north-east of the region, which is consistent with the distribution of BIOMSS and other indicators.

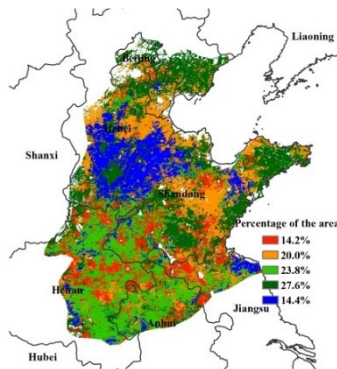
**Figure 4.8. Crop condition China Huanghuaihai region, April-July 2014**



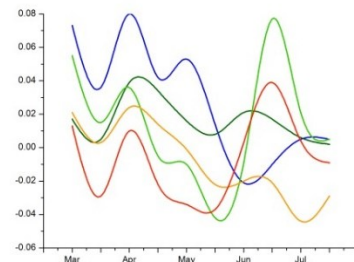
(a) NDVI background



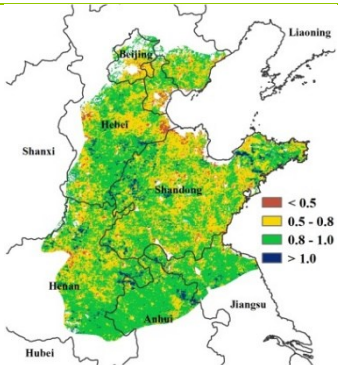
(b) Crop condition development graph based on NDVI



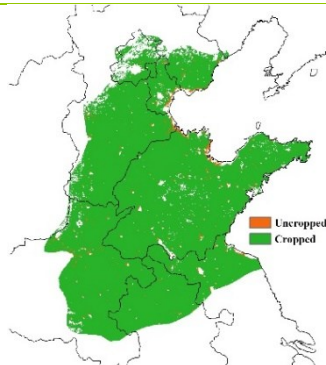
(c) Spatial NDVI patterns compared to 5YA



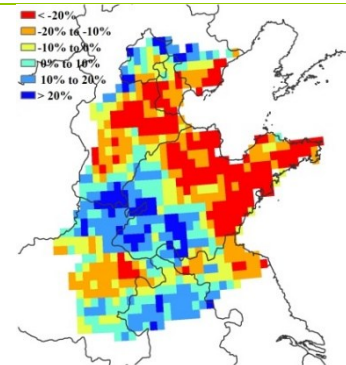
(d) NDVI profiles



(e) Maximum VCI



(f) Cropped arable land fraction

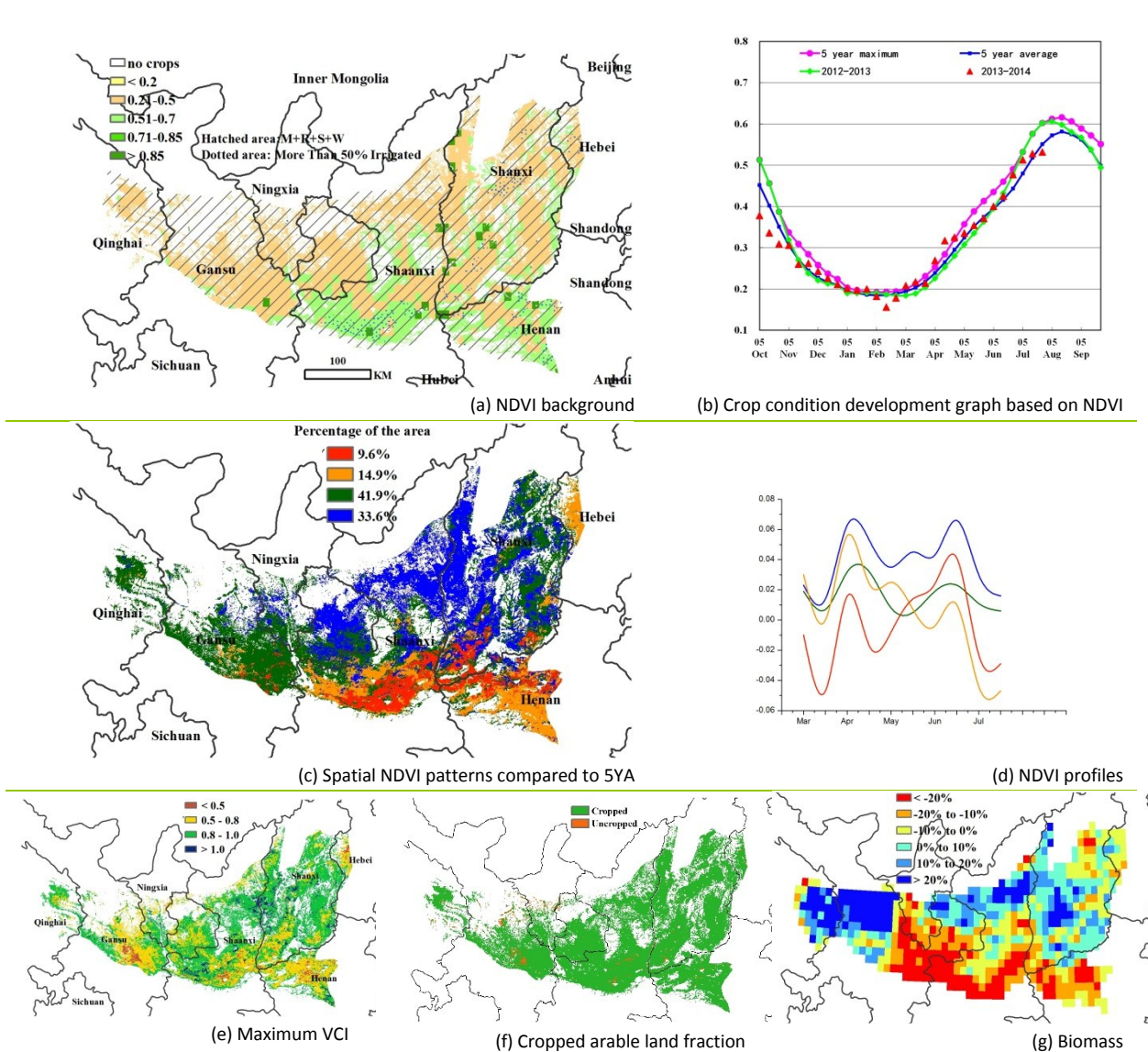


(g) Biomass

# Loess region

The Loess region has two main crops: winter wheat and maize. When compared to the thirteen-years average, temperature increased by 0.4°C, while precipitation and PAR accumulation decreased by 7% and 0.7%, respectively. Over the monitoring period, winter wheat in the region was harvested (by late June) and maize has been sowed. By the end of July, the condition of crops is below both the recent five-year average and last year's values, with a VCIx of 0.81. The analysis of spatial NDVI clusters and profiles indicates that crop condition is favorable in central Gansu, north of Shaanxi, and in most parts of Shanxi, due to the abundant rainfall and suitable temperature and sunlight. On the contrary—and mostly because of severe drought (as confirmed by the maps of potential biomass and VCIx), crops are in poor condition (compared to the five-year average) in the north of Henan and the center of Shaanxi. The fraction of arable land actually cropped increased 4% due to suitable temperature and PAR, while uncropped arable land is mainly located in Gansu, central Shaanxi, and scattered areas of Henan province.

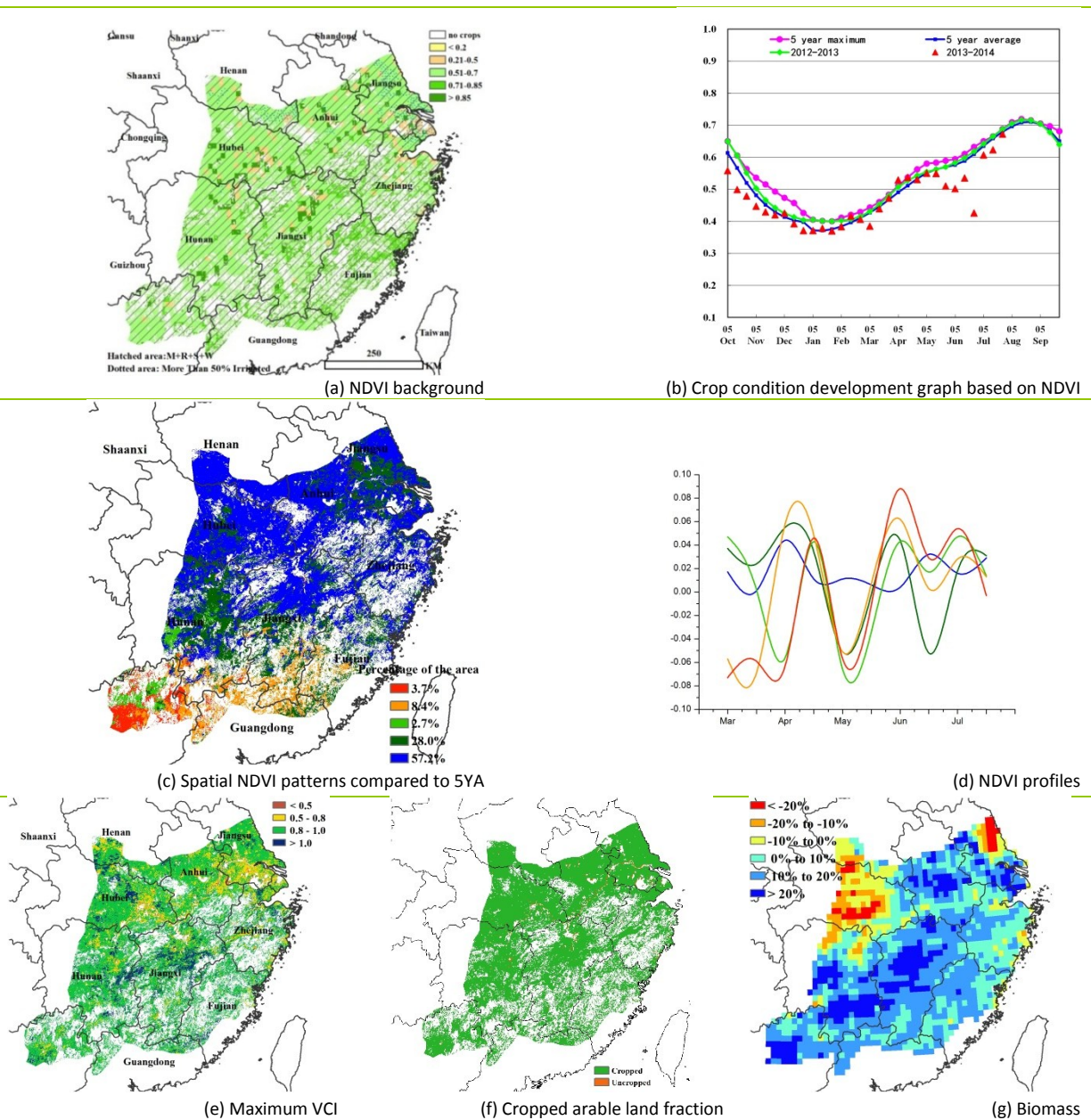
**Figure 4.9. Crop condition China Loess region, April-July 2014**



# Lower Yangtze region

Rice is the main crop in this area, although winter wheat and rape are also planted. The analysis shows that TEMP and RAIN are above average, while RADPAR is below average by 4%. Potential biomass (BIOMSS) shows an increase of 10% when compared to the five-year average. During the past five months, early rice has been planted and harvested, while late rice has been planted in some parts of the region. Average regional NDVI and NDVI profiles indicate that crop condition approaches the average of the last five years. Although NDVI fluctuated widely, crop condition in the central and north of the region remained above average, which is confirmed by the average VCIx value of 0.89 and the VCIx map. In late May and June, crop condition in the south and southwest of the region (in particular in northeast Guangxi and northern Guangdong province) dropped sharply because of heavy rainfall. Only a small amount of arable land is uncropped, with those sites mainly scattered along the Yangtze River. The map of the potential biomass also shows that crop condition in most parts better than the five-year average, with a spectacular BIOMSS increase of 10 percent when compared to the five-year average.

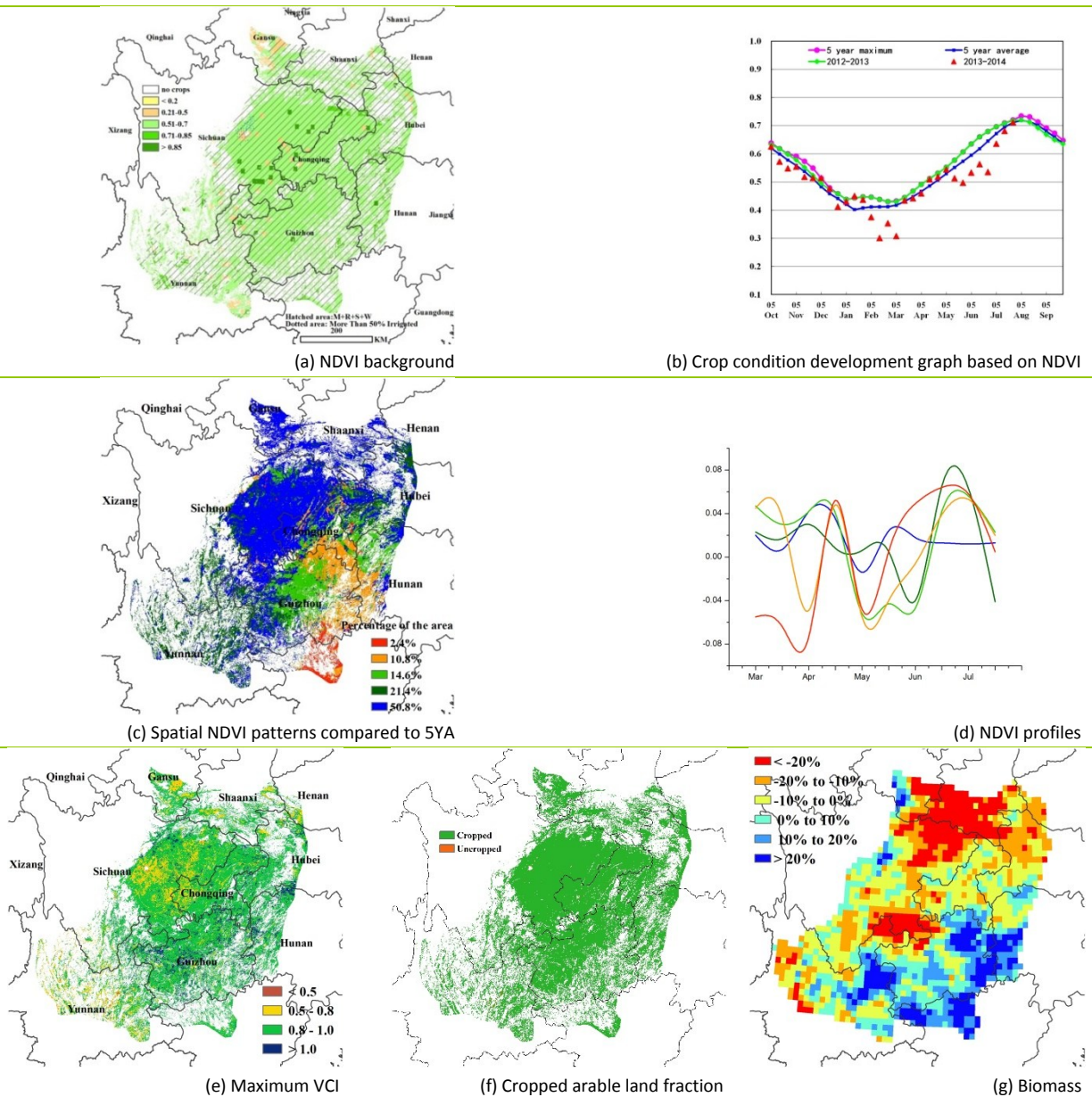
Figure 4.10. Crop condition Lower Yangtze region, April-July 2014



# South-west China

The ongoing season in South-west China shows overall below average conditions. Compared with the thirteen-year average, precipitation (RAIN) in South-west China slightly increased by 2%, temperature (TEMP) increased by 0.5°C, while PAR (RADPAR) decreased by 5%. This resulted in an overall decrease of biomass potential (BIOMSS) by 3%, compared to the five-year average. According to the crop condition development graph based on NDVI, in April and July, crop condition in the region reached the five-year average level, while in May and June, it was below, especially in northern Yunnan, Guizhou, western Hunan, and north-west Guangxi. This is also reflected by the spatial NDVI pattern and profiles. The other regions, accounting for 50.8% of Southwest China, including eastern Sichuan, southern Gansu, southern Shaanxi, western Hubei, and western Chongqing areas, showed a relative stable situation according to the NDVI profiles. Nearly all arable land was actually cropped over the region, with fraction of cropped arable land reaching 0.98. The BIOMSS indicator shows a favorable situation in Guizhou, north-west Guangxi, south-west Hunan, and north-east Yunnan. On the contrary, poor conditions in north-east and south-east Sichuan and in the south of Shaanxi province will need close monitoring in the coming months.

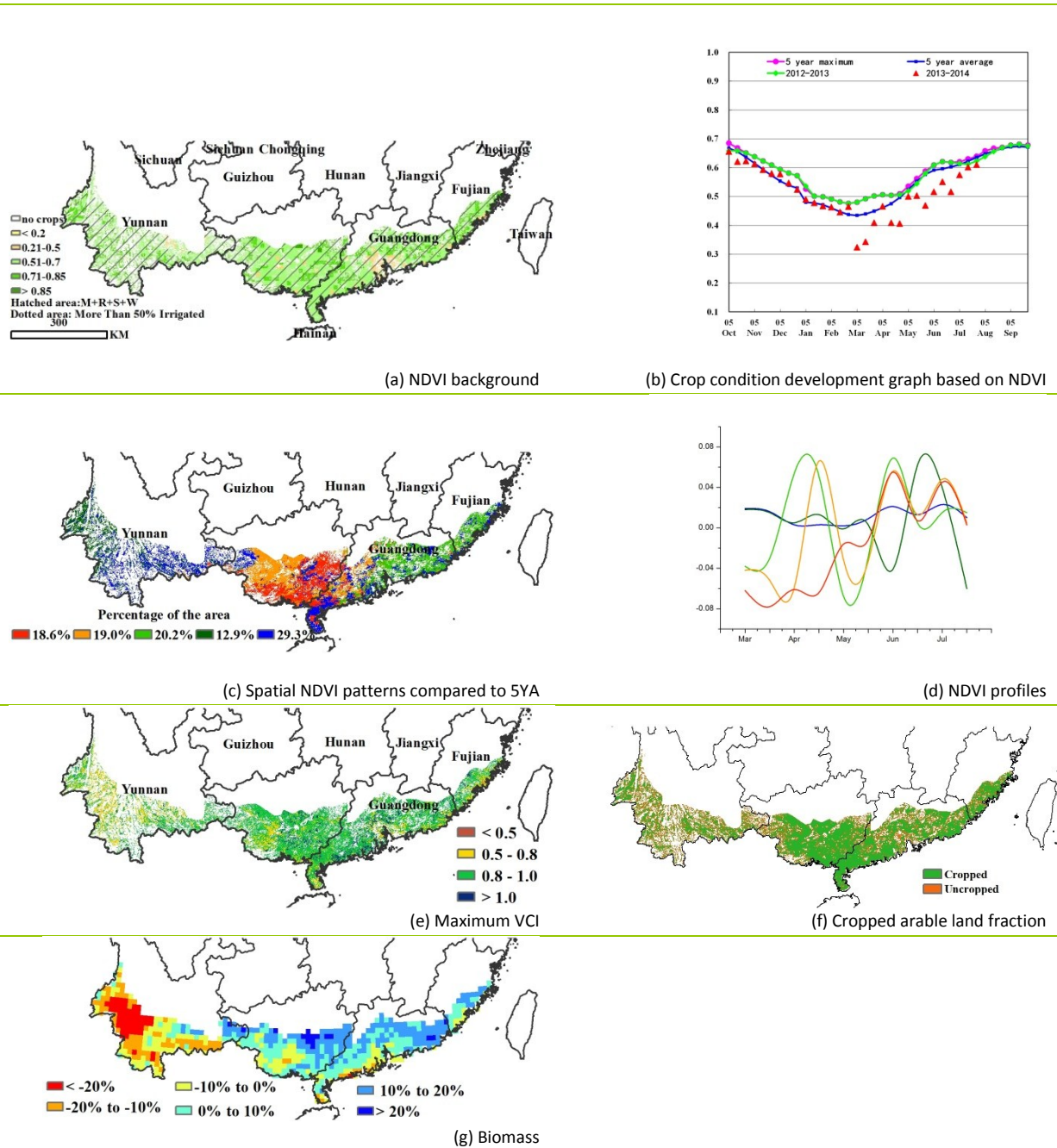
**Figure 4.11. Crop condition Southwest China region, April-July 2014**



# Southern China

The period from April to July 2014 covers the growing period of early rice, one-season rice, spring maize, and summer maize. Crop condition was below the average of the recent five years during the whole monitoring period, especially in late April (central and eastern part of Guangxi province) and June (western part of Yunnan province), which is well illustrated by the NDVI clusters map and the graphs of corresponding profiles. The CropWatch agroclimatic and agronomic indicators show that RAIN was 11% above the recent thirteen-year average, while the region also recorded increased TEMP (+1.2°C) and RADPAR (+2%). As a result, BIOMSS shows a 81% increase compared to the five-year average. Most of the uncropped arable land is distributed in the southern part of Yunnan province, where the biomass accumulation was 20% below average.

**Figure 4.12. Crop condition Southern China region, April-July 2014**



## Chapter 5. Focus and perspectives

This focus section complements CropWatch analyses presented in chapters 1 through 4 by presenting a global outlook for 2014 production, as well as other topics of relevance to global agriculture. After a summary of the provisional CropWatch estimates for 2014 production (section 5.1), section 5.2 highlights extreme atmospheric factors—disaster events—that have interfered with crop production in recent months. Next, sections 5.3 and 5.4 focus on El Niño and maize, respectively.

### 5.1 Production outlook for 2014

CropWatch preliminary production estimates for 2014 are presented in table 5.1, including crops already harvested and those to be harvested between the time of reporting and the end of the year. The methodology is explained in Annex C. Important methodological points are also listed in the note to table 5.1. For several larger countries—Argentina, Australia, Brazil, Canada, and the United States, more detailed information is provided in Annex B.

Overall, CropWatch forecasts a 2.7% drop in maize production and a 4.4% increase for soybeans, while a small increase is foreseen for both rice and wheat. For all crops, a large difference is noted between the 31 countries more closely monitored by CropWatch and the "other countries" for which a linear trend based on 2001-2013 data is used to estimate production. "Others" outperform the major producers for maize (+8.6% vs. -4.0%) and rice (+6.4% vs. -0.1%), while they underperform for wheat (-2.9% vs. 0.8%) and soybean (-26.5% vs. +6.8%).

*Maize.* The drop in maize production is brought about by a decrease in virtually all countries except Mexico, Nigeria, Russia, Ukraine (+6.1%), and two countries in south-east Asia (Cambodia, +9.3%; Philippines, +1.4%). For the countries that have already harvested maize, and those where the crop is currently growing, it is generally easy to associate the drop with environmental conditions. The largest drops are those projected to occur in Canada, the United States, India, and several European countries.

*Rice.* Because the crop is irrigated (rainfed lowland rice is considered here as a form of irrigation), fluctuations are usually smaller than those that affect other crops. Significant increases (in the range of 2-3%) are projected only in Egypt, Iran, Russia, and the Philippines, with a larger increase (+14.6%) in the United States. Decreases worth mentioning included those for India, Indonesia, and Vietnam, while production stagnated in Thailand.

*Wheat.* Among the major exporters of wheat, Argentina, Brazil, France, and the United Kingdom all enjoyed sizeable increases of production (3.0 to 27.3%), contrary to the United States where CropWatch projects the production to drop (-2.3%). Decreases are also expected for Turkey (-6.0%) and most central Asian countries.

*Soybean.* Large increases in soybean production are listed for Brazil, Canada, the United States, Ukraine, and Thailand (all larger than 4%), resulting in an overall increase of soybean production by 4.4% compared to last year. The numbers could be an indication that the production share of currently minor exporters (when compared to Brazil, Argentina and the United States) keeps increasing.

Total cereal (maize, wheat and rice) output of China is forecast to be close to 513 million tons, a value almost identical with the 2013 output (see also section 4.1). Winter wheat (+1.3%) enjoyed reasonably

favorable conditions while summer crops suffered drought resulting in a stagnation in production for rice (-0.5%) combined with a 1.1% drop for maize. The production of soybean, altogether a minor crop by Chinese standards, continues the downward trend that started about ten years ago, with a decrease of 1.3% that matches this trend.

**Table 5.1. Estimated rates of change of production compared with 2013 for maize, rice, wheat, and soybean (thousand tons) and derived 2014 production in selected countries**

	Maize		Rice (paddy)		Wheat		Soybean	
	2014	Δ%	2014	Δ%	2014	Δ%	2014	Δ%
Argentina (A)	24312	-1.8			13371	27.3	50430	0.5
Australia					29269	1.1		
Bangladesh	2251	0.5	51346	-0.3	1291	2.9		
Brazil	78298	-2.8	11777	0.2	7010	22.6	89036	9.0
Cambodia	996	9.3	9026	-0.2				
Canada (A)	11656	-17.9			34733	-7.5	5422	4.3
China (B)	191952	-1	201167	0	119735	1	13079	-1
Egypt	6149	-5.4	6986	3.5	9432	-0.3		
Ethiopia	6741	1.0	183	-0.8	4483	11.0		
France	15053	0.0	82	-0.6	39772	3.0		
Germany	4396	0.2			25545	2.1		
India	20682	-11.2	156812	-1.5	95661	2.3	11613	-2.8
Indonesia	18364	-0.8	70068	-1.7			775	-0.7
Iran	2507	-1.3	2616	3.0	13594	-2.9		
Kazakhstan	574	0.8	345	0.2	13843	-0.7		
Mexico	23049	1.7	180	0.4	3659	9.0		
Myanmar	1685	-0.9	28140	0.5				
Nigeria	10743	3.3	4756	1.2				
Pakistan	4810	0.2	9780	-0.2	23843	-1.6		
Philippines	7480	1.4	18956	2.8				
Poland	3860	-4.5			9564	1.0		
Romania	10962	-3.4			7435	1.9		
Russia	11751	1.0	970	3.7	53289	2.3	1508	-7.8
South Africa	12056	-2.5			1866	6.0	673	-14.3
Thailand	4992	-1.4	38710	-0.2			220	15.6
Turkey	5977	1.3	906	0.7	19702	-6.0		
United Kingdom					12648	6.1		
Ukraine	32837	6.1			23089	1.3	3854	38.9
United States (A)	326581	-7.7	9990	14.6	56728	-2.3	99213	10.9
Uzbekistan					6389	-6.6		
Vietnam	5079	-2.2	43195	-2.0				
<b>Sub total</b>	<b>871300</b>	<b>-4.0</b>	<b>676153</b>	<b>-0.1</b>	<b>621750</b>	<b>0.8</b>	<b>278987</b>	<b>6.8</b>
Others	112878	8.6	78629	6.4	94678	-2.9	14770	-26.5
<b>World</b>	<b>984178</b>	<b>-2.7</b>	<b>754782</b>	<b>0.5</b>	<b>716429</b>	<b>0.3</b>	<b>293757</b>	<b>4.4</b>

Note: Rates of change of production were computed as the product of the rates of change of yield and area: Refer to Annex C for additional details about the method; this method was applied for most countries, except those marked (A) and (B). (A) indicates that the areas are pure remote-sensing estimates (neither FAOSTAT nor national data were used for calibration); (B) indicates that no FAOSTAT or national data were used for area and yield estimates. Wheat productions for Argentina, Australia, and Brazil refer to the crop planted in 2014 and to be harvested in late 2014 to early 2015. Cells are left empty for crops not grown in a country or when the crops are a minor production; in that case, the country was included in the "Others" category, as for instance maize and rice in Australia, wheat in Myanmar and Nigeria, and soybean in France, Mexico, Kazakhstan, and Nigeria.

## 5.2 Disaster events

This note on disasters is prepared at a time of much insecurity in the world, with war and civil unrest across a number of countries centered on the middle-east and in an area from the eastern Gulf of Guinea to western Asia. According to the June 2014 Global Trends report of The UN Refugee Agency (UNHCR),

refugees and internally displaced persons now outnumber those at the end of the Second World War. In addition, the ongoing outbreak of Ebola hemorrhagic fever is creating many problems and fears in West Africa—essentially the region covered as the Gulf of Guinea MPZ in this report. The situation entails serious food security issues, which compound problems from disasters.

Fortunately, however, few major geophysical disasters took place during the latest reporting period for this bulletin. Nonetheless, a large number of micro-disasters—in particular floods and landslides—occurred in many countries. Some of these floods, such as those in April in Dar es Salaam (Tanzania), occurred in cities. Although those floods in urban areas do not usually lead to reports about losses in the agricultural sector, they do destroy vegetable gardens (which play a major qualitative role in nutrition) and infrastructure. As a result, the long-term effect of these smaller events may be felt well after the disaster proper has ended.

The sections below briefly report on some of the major weather-related disaster events, including cyclones, rains, and floods, that have made a significant impact on agriculture over the reporting period.

### **Cyclones**

From April to July, the most significant cyclones occurred in Asia, with the largest impacts caused by cyclone Rammasun (also known as Glenda) in the Philippines, Vietnam, and China. Other cyclones included those in Japan and the Bahamas.

Cyclone Rammasun impacted the Philippines, Vietnam, and China between July 9 to 20. The most agricultural damage from the cyclone was reported for the Philippines, where the cyclone damaged areas in central Luzon, Calabarzon, Bicol, and East Visayas; total losses for agriculture are estimated at US\$ 212 million. Rice and maize were affected, but according to FAO the total impact of the event on production will be limited. In China, Rammasun hit the country's southernmost island Hainan, where it made landfall on July 18 and subsequently was rated one of the strongest cyclones of the last 41 years, destroying an estimated 41,000 hectares of various crops. In Vietnam, several provinces including Haiphong, Thái Bình, and Nam Định were hit. Similar to the Philippines, no major impact on production is currently feared for the country, although 4,200 hectares of cropland are reported lost. Minor impacts were felt in Thailand, where some fields (about 500 hectares) were flooded.

A second Asian cyclone, Neoguri, took place in Japan in July but did little damage outside the country. From July 2 to 13, the cyclone mostly hit Okinawa prefecture, with total damage to the agricultural sector amounting to US\$22 million, predominantly in the fisheries sector.

In the Americas in early July, hurricane Arthur affected the Bahamas and the east coast of the United States from the first to the seventh of the month, but no major impact is reported on agriculture. Similarly, several storms occurred in the North Indian Ocean, but without casualties or significant damage to agriculture in the region.

### **Excessive rain, floods, and landslides**

Over the reporting period, Afghanistan and Europe both experienced very intense floods. In other regions, several more isolated flooding events took place.

Floods in Afghanistan started in April and culminated with the Baghlan floods in May and June. In late April, thousands of hectares were lost in the provinces of Jawzjan, Faryab, Sar-e-Pul, Baghlan and Balkh. Baghlan province (Gazargah-e-Noor district), but also Bamyán and Badakhshan provinces were the worst

hit areas, with more than 2500 lives lost—although estimates vary—due to flash floods and associated mudslides. Much of the damage was due to the persistent high rain.

In south-eastern Europe, a sequence of high rainfall events that started around mid-May (May 15-17) led to the worst floods in 120 years—known as the 2014 Balkan flood—in Serbia, Bosnia and Herzegovina and, to a lesser extent, in Croatia, Romania, and Slovakia. Neighboring countries from Macedonia and Austria to Poland also experienced flooding events. The excessive precipitation was brought about by a rare event: a Mediterranean cyclone named Tamara. Agriculture was hit hard, with 10,000 hectares impacted in Serbia alone. Total damage, still being estimated, goes into the billions of dollars and it is estimated that recovery will take five years for the worst-hit areas.

About a month after the Balkan flood, between June 17 and 20, the eastern half of Bulgaria and parts of Romania and Turkey had very intense rainfall. Over 3,000 individual landslides were reported, as well as damage to health and sanitation infrastructure.

In addition to these large-scale flooding events, the following more isolated happenings also contributed to suffering, but at a rather local scale:

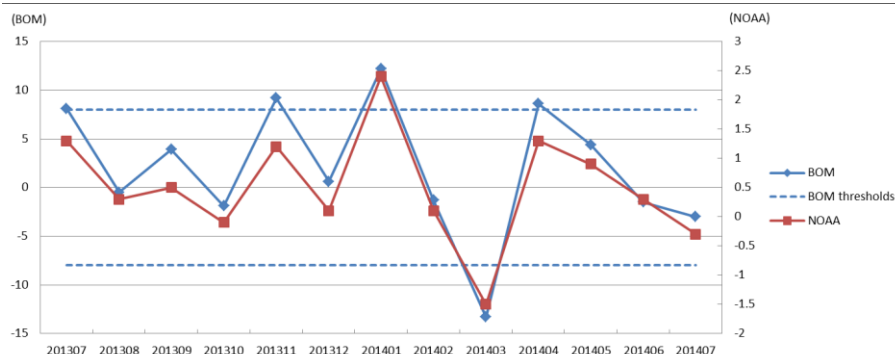
- *Asia.* In Asia, heavy rain and landslides occurred in the south-west of China's Guizhou province on June 4; in Jiangxi, Fujian, Guangxi, and again Guizhou on June 22; and in Yunnan on July 10. In India (in Assam) and Sri Lanka, heavy rainfall took place at the beginning of June. Tajikistan had floods in April and May, but few crops are reported lost. During late May and in June, floods occurred in southern Siberia in Russia (Republics of Khakassia and Altai) and the north Caucasus.
- *Africa.* In Africa, heavy rain was recorded in the coastal areas of Tanzania (Dar es Salaam) in April; in Sudan, the Kordofan region experienced floods in late June and in July.
- *South America.* Paraguay and adjacent areas in neighboring countries suffered floods in May.

### Fires

Fires are reported mostly from South America and the United States. In South America, the "Great Fire of Valparaiso" started on April 12 in the City of Valparaiso in Chile. In the United States, the Washington State wildfires started on July 8, while most fires in California took place during May and up to late June.

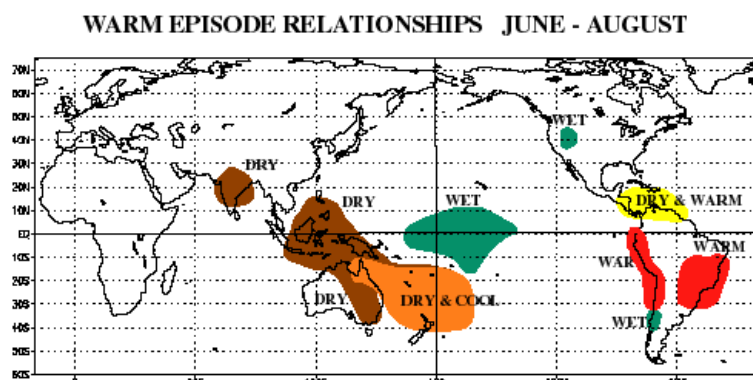
### 5.3 El Niño

El Niño is gaining increased attention this year. The two sets of values for the Southern Oscillation Index (SOI), from both the Australian Bureau of Meteorology (BOM) and the U.S. National Oceanic and Atmospheric Administration (NOAA) (figure 5.1), illustrate that the El Niño pattern kept neutral from July 2013 (within the range from -8 to 8). Following a large drop in March and subsequent increase in April, the index has steadily declined since then.

**Figure 5.1. Comparison between monthly BOM and NOAA SOI datasets from July 2013 to July 2014**

Note: The dashed blue lines are the El Niño thresholds in the BOM method; sustained negative values of SOI below  $-8$  may indicate an El Niño event, while sustained positive values above  $+8$  are typical of a La Niña event. Values within the range  $(-8$  to  $+8)$  indicate neutral conditions. The data and methodology description of the two datasets can be found at <http://www.bom.gov.au/climate/glossary/soi.shtml> and <http://www.cpc.ncep.noaa.gov/data/indices/>.

Although the risk of a full-fledged El Niño has eased, the possibility of an El Niño event in 2014 or the Spring of next year cannot yet be ruled out. By comparing the typical climate anomalies associated with El Niño events (figure 5.2) with CropWatch global maps of rainfall and temperature departures (figures 3.1 and 3.2 in Chapter 3), it is evident that both “dry” and “warm” climate anomalies associated with El Niño for June to August have been identified by CropWatch. The El Niño characterized dry conditions in northern South and Central America and south and east parts of Australia are consistent with the large negative rainfall departure in these regions in figure 3.1. The El Niño featured “warm” events in northern South and Central America, central–northern Andes, the east of Brazil, and southern Australia also correspond well with the above average temperature anomalies in these areas shown in figure 3.2.

**Figure 5.2. Typical climate anomalies associated with El Niño events for June to August**

Source: NCDC, <http://www.ncdc.noaa.gov/paleo/ctl/images/warm.gif>.

Information from other sources also indicates strong potential for El Niño. BOM declared on August 12 that the chance of an El Niño developing in 2014 is at least 50%, further suggesting that an El Niño event (though not a strong one) in 2015 was likely. In the latest El Niño-Southern Oscillation (ENSO) Diagnostic Discussion<sup>1</sup>, the NOAA National Weather Service’s Climate Prediction Center states that “The chance of El Niño has decreased to about 65% during the Northern Hemisphere fall and early winter.” In the next few months, CropWatch will keep a close eye on the developments of El Niño and report about the regions that shown sensitivity to this event.

<sup>1</sup> [http://www.cpc.ncep.noaa.gov/products/expert\\_assessment/ENSO\\_DD\\_archive.shtml](http://www.cpc.ncep.noaa.gov/products/expert_assessment/ENSO_DD_archive.shtml)

## 5.4 Maize trends

### Global areas and uses of maize

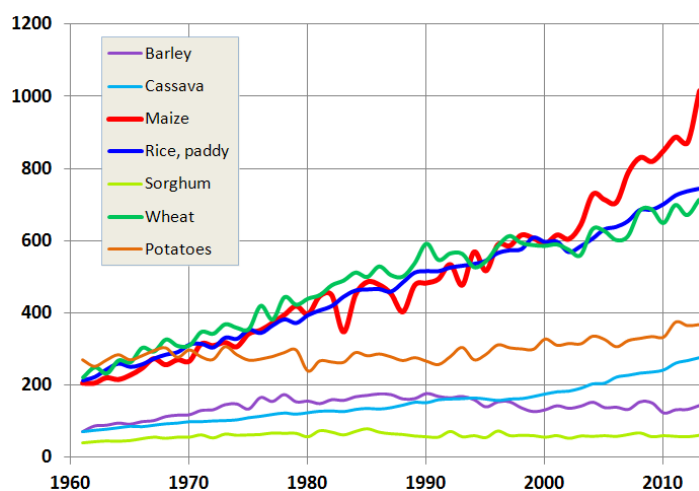
About 73% of the world's maize growing areas are located in developing countries, with most areas in low and lower-middle income nations. Maize is predominantly grown under rainfed conditions by smallholders and resource-limited farmers, thus playing an important role in the livelihoods of millions of poor people in Latin America, sub-Saharan Africa, and Asia.

In all continents except Africa, most of the maize production is used for feed stock, but the use of maize (and maize derived products, including residues) covers the spectrum from food (grain, oil starch, syrup, and feed) to non-food, including energy (ethanol and bio-diesel), green manure, and paper. In the United States for example, 38% of maize is processed into animal feeds, followed closely by ethanol and derived products (35%), while only 10% of maize production is used for food ingredients and just 1% directly for human food, mostly as cereal. Maize does, however, play a major role as a food source in places such as Mexico, where it is used for tortillas and tamales, in limited areas in Europe (used as polenta), in some Asian highlands in Nepal, Bhutan, and India, and in many African countries. In the African countries, the preferred maize type is white maize, with the crop used mostly as boiled flour (ugali or nshima).

### Growing yields and production

The many uses for maize have ensured a growing demand for the crop and production has been able to keep up due mostly to growing yields and the crop's genetic plasticity. Maize production actually "took off" at the end of the 20th century and the crop now dominates rice and wheat in terms of total annual production (figure 5.3). The productions of other major crops, such as barley, sorghum, and potatoes have essentially been stagnating since the 1980s, while cassava follows a weak upward trend, mostly because of demand for animal feeds. For the period 2003-2012, the seven countries with the highest crop production growth rates are Bangladesh (0.16), Cambodia (0.14), Ukraine (0.14), Russia (0.11), Ethiopia (0.08), Myanmar (0.08), and Indonesia (0.07).<sup>2</sup>

**Figure 5.3. Worldwide production of major cereals and tubers since 1961 (million tons)**

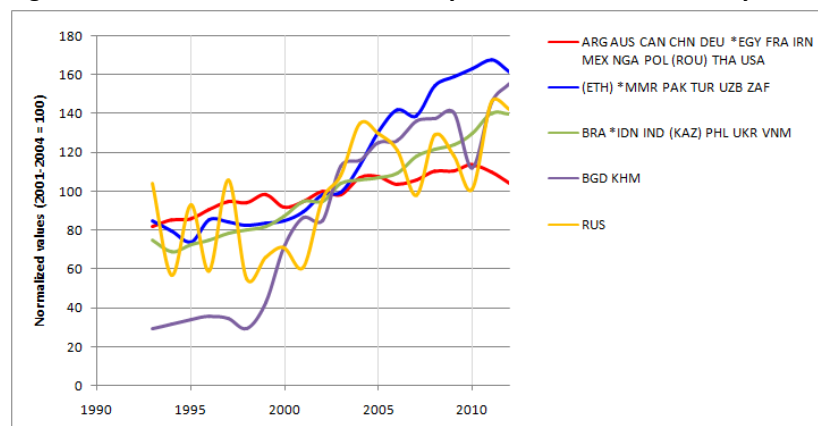


Source: Authors, based on FAOSTAT data.

<sup>2</sup> Growth rates are expressed as the ratio between the slope of the 2003-2012 trend line (expressed in tons/year by country) divided by the average 2003-2012 production (in tons) (FAOSTAT data).

The increase in maize production has been achieved not only through increases in yield, but also a growth in the share of maize area at the expense of other cereals. This indicates that maize has become, in many countries, the preferred cereal. Figure 5.4 illustrates national variations in maize yield for groups of countries, clustered based on the similarities in their variations over time.

**Figure 5.4. National variations in maize yield since 1993 for country clusters**



Note: Countries are identified by their three-letter ISO codes (see also Chapter 3). Variables are expressed as an index compared to the average value for the period 2001-2004, which was taken as 100. For each cluster, the most typical country is indicated with an asterisk, while the one that is farthest from the center of the cluster is shown between brackets. The figure was prepared using ADDATI software, available at [http://circe.iuav.it/~silvio/addawin\\_site/addawin\\_en.html](http://circe.iuav.it/~silvio/addawin_site/addawin_en.html).

Source: Authors, based on FAOSTAT data.

As illustrated in figure 5.4, major maize producers, such as Argentina, France, and the United States, have experienced yield variations between index values of 80 to 110 for the 1993-2005 period, but yields have since remained relatively stable around an index value of 115. Meanwhile, rapid increases in maize yield took place in three groups of countries, as indicated by the green, blue, and purple trend lines. The first (in green), shows a 40% increase over the last decade, including Brazil, Indonesia, India, Kazakhstan, the Philippines, Ukraine, and Vietnam. The other two (in blue and purple) indicate as much as a 60% increase, representing trends for Ethiopia, Myanmar, Pakistan, Turkey, Uzbekistan, and South Africa (blue) and Bangladesh and Cambodia (purple), with large yield fluctuations for the last two countries. The data suggest a sustained and successful effort to increase maize production in Myanmar, Ukraine, and South Africa. Although some of the spectacular increases have been those of the minor producers, those dramatic increases may have still markedly affected national production patterns and diets within those countries.

The share of maize among other cereals is illustrated in table 5.2 for selected countries. The first six countries—Myanmar to Laos—are characterized by having more than doubled their already substantial share of maize in the national cereal production from 1994-2004 to 2004-2013. (The large yield increases for Myanmar and Ukraine were illustrated in figure 5.4). The second set of countries—Germany to China—are the world's top ten producers, from China in first to Germany in tenth place. Russia ranks as the world's fourth country in terms of production, but is listed in the top of the table for having a factor 3.2 increase in its relative share of maize production among all cereals. With the exception of France, where the share of maize in the total cereal output decreased 10% (factor 0.9) and Brazil, where it remained unchanged, all major producers have increased the relative share of maize in their cereal output over the last ten years by 10 to as much as 40 percent (India).

In addition to the countries highlighted in the table, very spectacular increases (more than twentyfold) were observed for a few other countries. While their increases are mostly due to those countries' very low starting values for share of maize production, increases in Lithuania, neighboring Belarus, and in

Bangladesh still mark a dramatic change. In other countries, also coming from very low starting values, relatively more modest but still significant increases are reported for Laos (above factor 4) and Saudi Arabia (factor 9). In the case of Saudi Arabia, this increase is part of the overall increase of food production in the country as a result of irrigation with deep water, which will be phased out completely in 2016. Of the remaining countries with an increase in maize share, less than half (39%) have achieved this increase through an increase in maize area at the expense of other cereal production areas.

Finally, among the 100 major producers worldwide, six countries have actually undergone a decrease of the share of maize in the total cereal production. This includes Japan and Morocco as well as several central Asian countries (Turkmenistan, Afghanistan, and Uzbekistan). In all countries the drop is close to 30%, except in Uzbekistan where it reaches 75%.

**Table 5.2. Relative maize production and increases in area and production for select countries**

	Rank based on 2004-2013 annual production average	Factor of increase in the share of maize area and production among national cereal area and production between 1994-2003 and 2004-2013		Percentage of maize in national cereal output (2011-13)
		Area	Production	
<b>Countries with fastest growing share of maize</b>				
Myanmar (MMR)	19	1.4	2.1	5
Ukraine (UKR)	11	2.1	2.3	45
Sri Lanka (LKA)	43	1.3	2.6	5
Cambodia (KHM)	35	2.0	2.7	9
Russian Federation (RUS)	4	2.4	3.2	11
Laos (LAO)	56	2.9	4.4	26
<b>Top ten of countries (incl. Russian Federation)</b>				
Germany (DEU)	10	1.3	1.3	11
Bangladesh (BGD)	9	14.8	22.7	3
Canada (CAN)	8	1.3	1.3	23
France (FRA)	7	0.9	0.9	23
Brazil (BRA)	6	1.0	1.0	77
Indonesia (IDN)	5	0.1	1.3	21
India (IND)	3	1.3	1.4	8
United States (USA)	2	1.2	1.1	60
China (CHN)	1	1.3	1.3	38

Source: Authors, based on FAOSTAT data.

### Looking forward

Looking forward, expectations are that maize will continue to be a leading crop. However, it is unlikely that the fast pace of maize production increase can be sustained more than 10 or 15 years, even if pockets of fast increases persist.

First, land is limited and productions are getting close to their potential based on available sunlight. Many recent publications have discussed the problem of yield gaps—the difference between current yields and those that could be achieved by optimally using resources. The rate of yield change is already low in some major producing countries such as China and India and in some countries with advanced agriculture. Techniques are being examined that may have the potential to maintain the growth for some more time,

in places not ideally suited for the crops or by improving the management of resources, but increasing maize yields in some countries will come only at an unacceptably high economic and environmental cost.

Second, in the longer run, climate change impacts may result in a relative advantage of other (non-C4) cereals over maize, particularly in tropical countries where maize is expected to suffer more (or benefit less) than some other crops from CO<sub>2</sub> fertilization and improved water use efficiency. New varieties will be needed that are resistant to drought, heat, water-logging, and sub-optimal soil nitrogen, with varieties tuned to specific locations to solve anticipated problems.

Finally, it is important to note that maize yields are also more variable than those of other crops, which has an impact on food security. This variability is due, among other factors, to the crop's high water use, as well as management and genetic factors. Contrary to lower yielding crops, maize production systems often amplify environmental variability, especially the variability of water supply.

Maize will continue to dominate the cereals production scene, although the links between the agriculture and energy sectors through both the supply side (energy is an important input in crop production) and demand side (maize as source of biofuels) have the potential to stress markets. For the immediate future, FAO and OECD foresee no dramatic price fluctuations. In the longer term, competition for land with other established crops, variable but stagnating yields in many countries, as well as competition from plants with higher water use efficiency, are all likely to work against maize and modify the balance between cereals.

## 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).

**Table A.1. April to July 2014 agroclimatic indicators and biomass by global Monitoring and Reporting Unit, current value and departure from 13YA**

65 Global MRUs	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	13YA dep. (%)	Current (°C)	13YA dep. (°C)	Current (MJ/m <sup>2</sup> )	13YA dep. (%)	Current (gDM/m <sup>2</sup> )	13YA dep. (%)
Equatorial Central Africa	365	-5	25.2	1.1	1132	6	1085	-2
East African Highlands	458	-18	20.7	0.3	1175	2	1319	-12
Gulf of Guinea	640	-0.5	28.2	0.5	1108	2	1743	0.4
Horn of Africa	139	-32	23.8	0.5	1187	4	484	-25
Madagascar(main)	141	-36	22.1	0.2	944	2	470	-25
SW Madagascar	28	-64	22.2	0.0	977	1	130	-57
North Africa Mediterranean	75	-19	21.6	0.4	1528	0.7	315	-12
Sahel	401	25	32.2	1.1	1362	0.1	1154	20
Southern Africa	73	-26	20.1	0.6	991	2	234	-28
S. Africa Western Cape	96	-48	12.5	0.1	680	-1	429	-36
British Columbia To Colorado	237	19	10.4	0.5	1406	-1	833	7
America northern great plains	458	34	16.1	-0.3	1299	-3	1313	14
America corn belt	441	3	16.1	-0.1	1213	-2	1389	-0.7
America cotton belt Mexican coastal plain	469	9	23.1	-0.1	1327	-0.3	1390	8
Sub boreal north America	428	51	10.5	-0.1	1166	-2	1351	20
America West Coast	62	-48	16.3	2.1	1498	0.1	261	-37
Sierra Madre	428	9	20.9	0.4	1420	-2	1106	7
SW Mexico and N. Mexico highlands	115	-1	20.5	0.4	1576	-0.2	435	-5
Northern South and Central America	679	-13	27.8	0.8	1153	3	1572	-9
Caribbean	722	6	26.9	0.4	1335	1	1737	0
Central Northern Andes	338	-22	16.0	1.1	991	3	786	-9
Brazil Nordeste	191	-14	26.8	2.0	1035	2	627	-6
Central Eastern Brazil	295	25	24.0	1.0	932	-1	865	19
Amazon	618	-6	27.5	0.8	960	2	1495	-2
Central north Argentina	180	83	17.5	0.5	647	-9	494	43
SE Brazil Concepcion Bahia Blanca	622	62	16.1	0.7	638	-7	1358	32
SW southern cone	578	14	6.9	-0.1	467	-5	1058	12
Semi-arid southern cone	125	83	9.4	-0.1	636	-6	432	55
Caucasus	253	5	18.0	1.1	1345	0	892	-1
Central Asia Pamir mountains	222	12	17.8	0.2	1455	-2	709	3
Western Asia	86	-3	23.5	1.0	1466	0	349	-3
China Gansu Xinjiang	240	114	17.4	0.2	1406	-0.1	743	70
China Hainan	911	26	28.2	1.2	1219	5	1835	5
China Huanghuaihai	302	-25	23.0	1.0	1276	1	1060	-11
China Inner Mongolia	317	24	16.7	0.8	1268	-1	1137	20
China Loess region	252	-7	18.3	0.4	1280	-0.7	1002	-1
China Lower Yangtze	981	22	23.6	0.4	1035	-4	2016	8
North East China	326	-9	16.9	1.2	1191	0.5	1086	-9
China Qinghai Tibet	852	31	11.9	1.1	1183	-2	1242	9
Southern China	985	11	24.6	1.2	1030	2	1945	0.5
South West China	604	2	20.5	0.5	981	-5	1528	-6
Taiwan	773	-19	24.3	0.6	1113	-3	1641	-5
East Asia	305	-40	16.0	1.2	1185	4	1072	-21
Southern Himalayas	897	7	27.3	1.1	1186	4	1517	-3

65 Global MRUs	RAIN		TEMP		RADPAR		BIOMSS	
	Current	13YA	Current	13YA	Current	13YA	Current	13YA
	(mm)	dep. (%)	(°C)	dep. (°C)	(MJ/m <sup>2</sup> )	dep. (%)	(gDM/m <sup>2</sup> )	dep. (%)
Southern Asia	719	9	30.3	1.2	1192	4	1314	-2
Southern Japan and Korea	511	-33	19.2	0.3	1141	3	1376	-22
Mongolia region	355	184	16.2	0.4	1445	-0.3	988	82
S. Asia Punjab to Gujarat	318	-2	32.4	0.9	1375	1	732	1
SE Asia islands	927	0.4	26.4	0.8	1010	0.7	2016	-2
SE Asia mainland	992	7	29.0	1.1	1119	4	2046	5
Eastern Siberia	216	-9	10.6	0.9	1142	-1	921	-8
Eastern Central Asia	243	3	11.4	0.6	1250	0.5	963	-1
North Australia	250	6	24.2	0.8	991	-0.5	582	-0.9
Australia Queensland to Victoria	123	-26	13.0	0.8	667	-3	544	-13
Australia Nullarbor Darling	178	-21	14.0	0.4	647	-5	687	-9
New Zealand	197	-44	9.0	0.1	443	-7	733	-29
Boreal Eurasia	251	-11	9.6	-0.6	1086	0.6	1000	-8
Ukraine to URAL Mountains	208	-13	15.2	0.1	1169	3	889	-12
Mediterranean Europe and Turkey	172	4	16.8	-1.0	1386	-2	638	-6
W. Europe (non Mediterranean)	299	1	15.1	0.0	1141	-2	1182	4
Boreal north America	396	52	6.9	1.0	1068	2	1094	14
URAL to Altai Mountains	214	5	13.8	-0.2	1217	0.2	843	-3
Australian Desert	107	17	14.5	0.4	705	-4	448	11
Old World Deserts	52	30	29.2	0.6	1532	-1	198	13
Sub-Arctic America	197	266	-7.1	-3.3	514	-2	605	374

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 thirteen-year average (13YA) for the same period between April and July.

**Table A.2. April to July 2014 agroclimatic indicators and biomass by country, current value and departure from 13YA**

31 Countries	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	13YA Departure (%)	Current (°C)	13YA Departure (°C)	Current (MJ/m <sup>2</sup> )	13YA Departure (%)	Current (gDM/m <sup>2</sup> )	13YA Departure (%)
Argentina	348	72	14.7	0.5	613	-8	839	37
Australia	144	-17	14.1	0.8	692	-3	562	-10
Bangladesh	1410	2	30.0	1.6	1106	9	2080	-3
Brazil	402	12	24.6	1.1	933	-0.5	1015	8
Cambodia	1169	43	29.7	1.0	1145	3	2355	16
Canada	385	29	11.0	0.3	1174	-3	1284	18
China	663	10	21.0	0.7	1102	-2	1371	2
Egypt	10	60	24.3	0.2	1565	-0.3	53	73
Ethiopia	540	-10	22.0	0.3	1181	1	1505	-5
France	247	-15	14.7	-0.5	1190	-1	1003	-10
Germany	298	4	15.6	0.7	1100	0.2	1254	9
India	706	8	30.2	1.1	1236	3	1195	-3
Indonesia	968	3	26.4	0.7	992	2	2006	-1
Iran	81	-10	22.6	1.2	1483	-1	302	-8
Kazakhstan	171	5	15.8	0.0	1284	1	681	-5
Mexico	458	5	24.7	0.4	1379	-2	1053	5
Myanmar	919	-11	28.0	1.5	1087	6	1808	-5
Nigeria	628	4	29.1	0.4	1177	1	1663	6
Pakistan	192	-7	27.6	0.2	1441	-2	569	6
Philippines	945	2	27.2	0.7	1153	0.6	1961	-1
Poland	302	12	15.3	0.4	1101	1	1285	16
Romania	328	0.3	16.1	-0.4	1163	-4	1257	5
Russia	210	-12	14.2	0.1	1188	3	880	-12
South Africa	40	-60	13.5	0.3	869	3	193	-52
Thailand	809	6	28.9	1.0	1145	6	1989	4
Turkey	244	34	17.8	1.1	1397	-2	851	10
United Kingdom	262	-10	12.1	0.3	995	-3	1184	2

31 Countries	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	13YA Departure (%)	Current (°C)	13YA Departure (°C)	Current (MJ/m <sup>2</sup> )	13YA Departure (%)	Current (gDM/m <sup>2</sup> )	13YA Departure (%)
Ukraine	255	-0.5	17.0	0.3	1175	0.9	1090	5
United States	415	12	18.6	-0.1	1326	-1	1142	5
Uzbekistan	94	-5	22.5	0.4	1467	1	377	-0.6
Vietnam	962	17	27.5	1.2	1081	-1	2074	6

See note table A.1.

**Table A.3. Argentina, April to July 2014 agroclimatic indicators and biomass (by province), current value and departure from 13YA**

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	13YA Departure (%)	Current (°C)	13YA Departure (°C)	Current (MJ/m <sup>2</sup> )	13YA Departure (%)	Current (gDM/m <sup>2</sup> )	13YA Departure (%)
Buenos Aires	375	92	11.7	0.2	548	-9	964	37
Chaco	367	66	18.7	0.9	631	-10	1005	49
Cordoba	226	109	13.7	0.6	633	-8	572	36
Corrientes	513	33	17.7	0.7	643	-7	1440	28
Entre Rios	454	53	15.0	0.5	623	-5	1172	29
La Pampa	285	167	11.5	0.1	544	-14	776	83
Misiones	1201	98	18.2	0.7	669	-7	2083	34
Santiago Del Estero	157	69	17.1	0.8	630	-11	503	52
San Luis	80	-13	12.1	0.7	626	-9	280	-23
Salta	88	57	17.2	0.4	713	-7	270	23
Santa Fe	377	91	15.9	1.0	633	-7	969	47
Tucuman	-1	0	-1.0	0.0	-1	0	-1	0

See note table A.1.

**Table A.4. Australia, April to July 2014 agroclimatic indicators and biomass (by state), current value and departure from 13YA**

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	13YA Departure (%)	Current (°C)	13YA Departure (°C)	Current (MJ/m <sup>2</sup> )	13YA Departure (%)	Current (gDM/m <sup>2</sup> )	13YA Departure (%)
New South Wales	129	-19	12.4	0.8	680	-4	562	-2
South Australia	187	9	13.2	0.8	574	-6	749	13
Victoria	174	-20	11.4	0.8	504	-9	711	-9
Western Australia	174	-20	14.7	0.4	678	-4	671	-8

See note table A.1.

**Table A.5. Brazil, April to July 2014 agroclimatic indicators and biomass (by state), current value and departure from 13YA**

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	13YA Departure (%)	Current (°C)	13YA Departure (°C)	Current (MJ/m <sup>2</sup> )	13YA Departure (%)	Current (gDM/m <sup>2</sup> )	13YA Departure (%)
Ceara	240	-34	27.8	1.7	1089	1	819	-21
Goias	189	35	24.4	1.3	1029	0.4	613	27
Mato Grosso Do Sul	475	66	22.8	0.5	860	-5	1340	44
Mato Grosso	261	31	26.7	1.1	1010	-0.9	826	25
Minas Gerais	135	2	22.5	1.6	945	0.7	477	-0.5
Parana	782	54	19.3	1.2	759	-3	1737	26
Rio Grande Do Sul	837	45	16.2	0.6	640	-6	1828	20
Santa Catarina	885	57	16.4	1.0	650	-7	1676	13
Sao Paulo	224	-17	21.4	1.3	874	-0.3	814	-9

See note table A.1.

**Table A.6. Canada, April to July 2014 agroclimatic indicators and biomass (by province), current value and departure from 13YA**

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	13YA Departure (%)	Current (°C)	13YA Departure (°C)	Current (MJ/m <sup>2</sup> )	13YA Departure (%)	Current (gDM/m <sup>2</sup> )	13YA Departure (%)
Alberta	368	42	11.2	0.6	1249	-0.3	1258	20
Manitoba	468	59	11.3	-0.9	1192	-3	1455	26
Saskatchewan	436	71	11.1	-0.1	1184	-5	1372	31

See note table A.1.

**Table A.7. India, April to July 2014 agroclimatic indicators and biomass (by state), current value and departure from 13YA**

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	13YA Departure (%)	Current (°C)	13YA Departure (°C)	Current (MJ/m <sup>2</sup> )	13YA Departure (%)	Current (gDM/m <sup>2</sup> )	13YA Departure (%)
Arunachal Pradesh	1313	-18	23.1	1.1	916	6	2063	-5
Andhra Pradesh	455	10	31.6	1.2	1217	2	1140	-3
Assam	1689	14	29.3	1.6	1005	11	2400	-2
Bihar	698	5	32.1	1.0	1266	4	1290	-10
Chandigarh	-1	0	-1.0	0.0	-1	0	-1	0
Chhattisgarh	892	38	30.8	0.8	1196	3	1390	0.3
Daman and Diu	294	-32	30.8	1.6	1289	4	675	-15
Delhi	228	-20	32.4	0.4	1381	1	878	-3
Dadra and Nagar Haveli	971	-7	29.5	0.9	1225	6	716	-43
Gujarat	360	-23	32.5	1.4	1328	2	581	-28
Goa	965	-32	28.8	0.4	1082	4	1628	3
Himachal Pradesh	703	26	16.2	0.2	1382	-2	1272	3
Haryana	246	-17	31.6	0.3	1386	0.4	953	6
Jharkhand	698	10	30.9	1.4	1232	1	1413	-5
Kerala	1015	-24	27.4	0.7	1034	9	2162	-4
Karnataka	607	-10	27.7	1.0	1146	5	1432	7
Meghalaya	2361	3	25.7	1.5	1031	10	2450	3
Maharashtra	724	10	30.3	1.1	1215	4	1155	-2
Manipur	942	-15	24.3	1.9	1114	15	1896	-13
Madhya Pradesh	584	7	32.0	1.1	1292	5	1012	-8
Mizoram	1570	8	26.3	1.5	1147	12	2137	-6
Nagaland	1218	0.1	24.2	1.4	1084	11	2059	-9
Orissa	916	24	30.5	0.9	1145	0	1628	0
Puducherry	1296	-28	27.5	0.5	1056	7	2111	-3
Punjab	237	-24	31.0	0.1	1383	0.3	858	-3
Rajasthan	324	25	33.3	1.0	1397	2	780	14
Sikkim	1769	51	15.7	1.6	1120	-5	1620	7
Tamil Nadu	335	-0.3	30.5	1.9	1260	4	1028	-8
Tripura	2008	33	29.1	1.5	1100	13	2345	0.2
Uttarakhand	891	37	20.2	0.3	1323	0.4	1304	3
Uttar Pradesh	461	-6	32.5	0.8	1341	4	1013	-9
West Bengal	983	4	31.1	1.7	1162	2	1775	-5

See note table A.1.

**Table A.8. Kazakhstan, April to July 2014 agroclimatic indicators and biomass (by province), current value and departure from 13YA**

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	13YA Departure (%)	Current (°C)	13YA Departure (°C)	Current (MJ/m <sup>2</sup> )	13YA Departure (%)	Current (gDM/m <sup>2</sup> )	13YA Departure (%)
Akmolinskaya	158	-2	14.5	-0.1	1215	-1	697	-4
Karagandinskaya	185	11	14.3	-0.1	1255	0.5	813	7
Kustanayskaya	135	-12	15.3	0.0	1217	-0.5	573	-18
Pavlodarskaya	133	-18	15.2	0.3	1240	2	589	-20
Severo kazachstanskaya	213	10	13.9	-0.4	1147	-3	844	-2
Vostochno kazachstanskaya	263	41	13.8	0.2	1313	0.4	987	24
Zapadno kazachstanskaya	60	-48	18.0	0.2	1310	5	311	-44

See note table A.1.

**Table A.9. Russia, April to July 2014 agroclimatic indicators and biomass (by oblast), current value and departure from 13YA**

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	13YA Departure (%)	Current (°C)	13YA Departure (°C)	Current (MJ/m <sup>2</sup> )	13YA Departure (%)	Current (gDM/m <sup>2</sup> )	13YA Departure (%)
Bashkortostan Rep.	162	-27	13.2	-0.7	1199	3	736	-24
Chelyabinskaya Oblast	222	2	13.1	-0.6	1165	1	930	-2
Gorodovikovsk	-1	0	-1.0	0.0	-1	0	-1	0
Krasnodarskiy Krai	299	11	15.5	0.5	1184	-1	1153	5
Kurganskaya Oblast	254	26	13.1	-0.9	1134	-2	1017	14
Kirovskaya Oblast	167	-31	12.7	-0.5	1129	3	848	-19
Kurskaya Oblast	163	-31	16.4	0.5	1189	5	800	-22
Lipetskaya Oblast	152	-30	16.4	0.8	1216	6	707	-27
Mordoviya Rep.	163	-28	14.9	0.1	1205	6	707	-29
Novosibirskaya Oblast	159	-27	12.8	-0.2	1192	2	751	-20
Nizhegorodskaya Oblast	178	-25	14.4	0.1	1184	6	723	-29
Orenburgskaya Oblast	81	-52	15.2	-0.4	1267	4	410	-45
Omskaya Oblast	229	6	12.6	-0.4	1119	-3	873	-8
Permskaya Oblast	241	-7	11.4	-1.3	1096	-0.7	1067	-3
Penzenskaya Oblast	137	-36	15.4	0.2	1217	5	664	-30
Rostovskaya Oblast	245	24	19.1	0.7	1245	2	1041	21
Ryazanskaya Oblast	167	-28	15.3	0.3	1213	7	713	-30
Stavropolskiy Krai	321	25	19.8	1.0	1244	2	1189	13
Sverdlovskaya Oblast	279	14	11.5	-1.4	1093	-1	1116	7
Samarskaya Oblast	146	-20	15.2	-0.5	1237	4	510	-37
Saratovskaya Oblast	115	-27	16.9	0.0	1254	5	501	-31
Tambovskaya Oblast	143	-30	16.3	0.6	1227	6	700	-25
Tyumenskaya Oblast	246	10	12.1	-1.2	1113	-2	1036	7
Tatarstan Rep.	144	-31	14.4	-0.2	1203	4	685	-25
Ulyanovskaya Oblast	169	-19	14.9	-0.2	1218	4	522	-43
Udmurtiya Rep.	180	-24	12.7	-0.7	1127	0.8	904	-11
Volgogradskaya Oblast	130	-12	18.5	0.5	1257	4	638	-8
Voronezhskaya Oblast	165	-13	17.3	0.7	1219	5	817	-5

See note table A.1.

**Table A.10. United States, April to July 2014 agroclimatic indicators and biomass (by state), current value and departure from 13YA**

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	13YA Departure (%)	Current (°C)	13YA Departure (°C)	Current (MJ/m <sup>2</sup> )	13YA Departure (%)	Current (gDM/m <sup>2</sup> )	13YA Departure (%)
Arkansas	605	33	22.0	-0.8	1275	-4	1697	20
California	52	-33	17.8	2.5	1604	0.1	211	-28
Idaho	118	-21	12.7	0.8	1493	0.2	532	-17
Indiana	500	5	18.6	-0.5	1270	-2	1557	4
Illinois	544	20	19.0	-0.4	1282	-2	1621	14
Iowa	760	58	17.4	-0.7	1231	-6	1805	23
Kansas	464	14	20.3	-0.3	1376	-2	1370	7
Michigan	361	-2	13.8	-1.0	1212	-5	1264	-2
Minnesota	502	33	14.3	-0.7	1175	-7	1399	8
Missouri	569	16	20.3	-0.4	1290	-3	1591	4
Montana	217	-3	12.9	0.1	1387	-0.4	920	-0.7
Nebraska	516	44	17.5	-0.2	1366	-2	1406	14
North Dakota	296	2	13.3	-0.9	1239	-5	1113	1
Ohio	469	6	18.0	-0.2	1233	-2	1551	6
Oklahoma	471	13	22.3	-0.4	1361	-2	1491	18
Oregon	91	-41	14.4	1.5	1422	0.7	448	-27
South Dakota	417	37	15.6	-0.7	1312	-3	1252	10
Texas	325	8	24.7	0.1	1389	-0.5	1054	13
Washington	111	-28	14.6	1.5	1346	-0.3	502	-16
Wisconsin	496	14	14.6	-0.7	1174	-6	1443	1

See note table A.1.

**Table A.11. China, April to July 2014 agroclimatic indicators and biomass (by province), current value and departure from 13YA**

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	13YA Departure (%)	Current (°C)	13YA Departure (°C)	Current (MJ/m <sup>2</sup> )	13YA Departure (%)	Current (gDM/m <sup>2</sup> )	13YA Departure (%)
Anhui	687	6	23.4	0.2	1145	-2	1742	7
Chongqing	593	-9	20.6	0.0	895	-11	1675	-7
Fujian	1204	32	23.2	0.9	1021	-2	2199	11
Gansu	264	3	15.7	0.3	1232	-3	952	8
Guangdong	1235	18	25.8	1.0	996	0.2	2235	8
Guangxi	1162	23	25.3	0.9	927	-5	2205	9
Guizhou	798	20	20.9	0.3	863	-11	1777	0.9
Hebei	308	0.1	20.6	1.1	1285	0.9	1126	5
Heilongjiang	335	4	16.5	1.3	1166	-0.9	1056	-7
Henan	317	-25	23.0	0.6	1263	2	1135	-11
Hubei	546	-16	22.1	0.0	1061	-6	1582	-9
Hunan	940	23	23.1	-0.1	950	-9	2014	6
Jiangsu	484	-11	22.8	0.3	1167	-2	1448	-0.8
Jiangxi	1219	35	24.5	0.7	1028	-4	2316	15
Jilin	306	-19	17.1	1.0	1209	2	1101	-10
Liaoning	322	-21	18.8	1.2	1239	2	1120	-12
Inner Mongolia	316	26	16.1	0.9	1248	-1	1109	19
Ningxia	157	-4	17.4	0.6	1314	-3	681	4
Shaanxi	277	-22	19.2	0.3	1198	-1	1048	-10
Shandong	275	-31	22.6	1.2	1278	0.5	998	-15
Shanxi	274	2	17.9	0.5	1297	-0.7	1059	4
Sichuan	564	2	19.4	0.6	993	-5	1417	-8
Yunnan	565	-7	20.7	1.5	1134	5	1420	-12
Zhejiang	970	29	22.3	0.4	1019	-7	2015	8

See note table A.1.

## Annex B. 2014 production estimates

Tables B.1 through B.5 present 2014 CropWatch production estimates for Argentina, Australia, Brazil, Canada, and the United States.

**Table B.1. Argentina, 2014 maize, wheat, and soybean production, by province (thousand tons)**

	Maize		Wheat		Soybean	
	2014	Δ%	2014	Δ%	2014	Δ%
Buenos Aires	7106	-2.0	6861	22.1	16244	-2.2
Chaco					567	13.5
Córdoba	6549	1.1	1117	8.6	11963	4.7
Corrientes						
Entre Rios	1142	-2.9	875	5.5	3195	0.6
La Pampa	307	-8.4			654	-4.9
Salta					236	-2.1
San Luis	1001	-1.6			578	-5.2
Santa Fe	3744	-3.4	1510	13.2	9703	3.9
Santiago Del Estero	1203	0.1			1631	2.4
Tucuman	170	2.9			232	-5.4
<b>Sub total</b>	<b>21222</b>	<b>-1.3</b>	<b>10363</b>	<b>17.7</b>	<b>45003</b>	<b>1.3</b>
Other provinces	3090	-4.8	3008	77.8	5427	-5.8
<b>Argentina</b>	<b>24312</b>	<b>-1.8</b>	<b>13371</b>	<b>27.3</b>	<b>50430</b>	<b>0.5</b>

Δ% indicates percentage difference with 2013.

**Table B.2. Australia, 2014 wheat production, by state (thousand tons)**

	Wheat	
	2014	Δ%
New South Wales	8861	-6.8
South Australia	5004	-4.5
Victoria	3832	-7.9
Western Australia	9304	16.0
<b>Sub total</b>	<b>27002</b>	<b>0.3</b>
Other states	2267	12.0
<b>Australia</b>	<b>29269</b>	<b>1.1</b>

Δ% indicates percentage difference with 2013.

**Table B.3. Brazil, 2014 maize, rice, wheat, and soybean production, by state (thousand tons)**

	Maize		Rice(paddy)		Wheat		Soybean	
	2014	Δ%	2014	Δ%	2014	Δ%	2014	Δ%
Ceara	162	43.5	52	6.0				
Goias	8445	9.8	137	-8.1			9954	11.8
Mato Grosso	19613	-2.8	584	17.4			25933	10.7
MG Do Sul	7520	-0.7	96	-0.2	11	19.9	6242	8.0
Minas Gerais	7202	-3.1	38	-10.1	171	43.1	3617	7.2
Parana	15027	-14.1	161	-8.4	2538	35.3	17028	7.0
Rio Gr. Do Sul	4870	-9.0	8497	4.9	3578	6.7	13461	5.5
Santa Catarina	3057	-8.1	1033	1.1	287	17.4	1717	8.2
Sao Paulo	3769	-21.0	75	-19.1	100	7.4	2143	10.8
<b>Sub total</b>	<b>69665</b>	<b>-5.8</b>	<b>10673</b>	<b>4.4</b>	<b>6685</b>	<b>17.4</b>	<b>80096</b>	<b>8.7</b>
Other states	8633	30.8	1104	-28.2	325	1231.0	8940	11.4
<b>Brazil</b>	<b>78298</b>	<b>-2.8</b>	<b>11777</b>	<b>0.2</b>	<b>7010</b>	<b>22.6</b>	<b>89036</b>	<b>9.0</b>

Δ% indicates percentage difference with 2013.

**Table B.4. Canada, 2014 maize and wheat production, by state (thousand tons)**

	Maize		Wheat	
	2014	Δ%	2014	Δ%
Alberta			10382	-6.0
British Columbia			146	-3.8
Manitoba			4108	-6.1
Ontario	7845	-12.9	2341	-2.1
Quebec	3146	-16.7		
Saskatchewan			15708	-14.3
<b>Sub total</b>	<b>10990</b>	<b>-14.0</b>	<b>32685</b>	<b>-9.9</b>
Other states	666	-52.8	2048	65.1
<b>Canada</b>	<b>11656</b>	<b>-17.9</b>	<b>34733</b>	<b>-7.5</b>

Δ% indicates percentage difference with 2013.

**Table B.5. United States, 2014 maize, rice, wheat, and soybean production, by state (thousand tons)**

	Maize		Rice (paddy)		Wheat		Soybean	
	2014	Δ%	2014	Δ%	2014	Δ%	2014	Δ%
Alabama	1035	-1.9					599	20.4
Arkansas	3315	-15.7	4365	19.0	862	-17.0	4213	10.2
California	758	-10.6	2015	-6.6	890	-3.6		
Colorado	3235	3.3			2105	74.7		
Delaware	650	-6.9					173	-2.3
Georgia	1254	-36.2			607	6.2	246	0.6
Idaho					1623	-41.0		
Illinois	49372	-2.7			1300	-14.1	13981	11.3
Indiana	25395	1.5			662	-24.3	7198	-0.1
Iowa	52722	1.0					11464	12.5
Kansas	9615	-21.6			8456	-2.7	3775	8.9
Kentucky	5589	-4.8			1009	-18.9	2130	-3.6
Louisiana	2191	-21.8	1528	11.8			1764	21.6
Maryland	1611	0.5			495	4.4	524	3.9
Michigan	7490	-11.1			954	-22.1	2383	5.3
Minnesota	31706	0.7			1774	-1.4	8233	11.5
Mississippi	2559	-27.5	558	33.9	434	-28.6	2429	-0.4
Missouri	12518	19.1	749	50.6	1386	-9.1	6417	19.7
Montana					5506	-0.4		
Nebraska	37318	-4.8			1413	31.3	6839	-0.4
New Jersey	233	-13.1					96	4.1
New York	2392	4.0			203	-4.5	302	-16.8
North Carolina	2804	-6.0			1272	-10.9	1301	2.0
North Dakota	7598	-20.6			8809	18.2	4670	23.8
Ohio	15416	-3.6			1100	-13.1	6507	10.1
Oklahoma	1083	-0.3			2353	-18.0	252	-7.9
Oregon					1348	-8.1		
Pennsylvania	3834	-0.9			279	-5.8	870	21.9
South Carolina	1064	1.1			379	1.2	230	-2.4
South Dakota	17997	-7.9			3094	46.9	5078	1.9
Tennessee	3203	3.7			928	-11.1	1912	0.5
Texas	6769	1.5	514	1.8	1805	1.7	74	13.8
Virginia	1315	-1.8			533	14.8	617	1.1
Washington	572	4.9			3578	-8.9		
Wisconsin	11558	7.4			417	-0.4	1686	5.2
<b>Sub total</b>	<b>324171</b>	<b>-7.8</b>	<b>9728</b>	<b>12.9</b>	<b>55577</b>	<b>-1.0</b>	<b>95964</b>	<b>8.5</b>
Other states	2410	15.2	262	147.0	1151	-40.8	3248	213.7
<b>United States</b>	<b>326581</b>	<b>-7.7</b>	<b>9990</b>	<b>14.6</b>	<b>56728</b>	<b>-2.3</b>	<b>99213</b>	<b>10.9</b>

Note: Δ% indicates percentage difference with 2013. The wheat production of "other states" was calculated by total wheat production minus "subtotal" winter wheat production. Δ% indicates percentage difference with 2013.

## 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 production estimation methodology. For more information about CropWatch methodologies, visit CropWatch online at [www.cropwatch.com.cn](http://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 (despite their names)—RAIN (for rainfall), TEMP (for temperature), and RADPAR (for photosynthetically active radiation, PAR)—are therefore not identical to the corresponding weather variables. Instead, they are value-added indicators computed only over crop growing areas (thus excluding deserts and rangelands, for instance) 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."


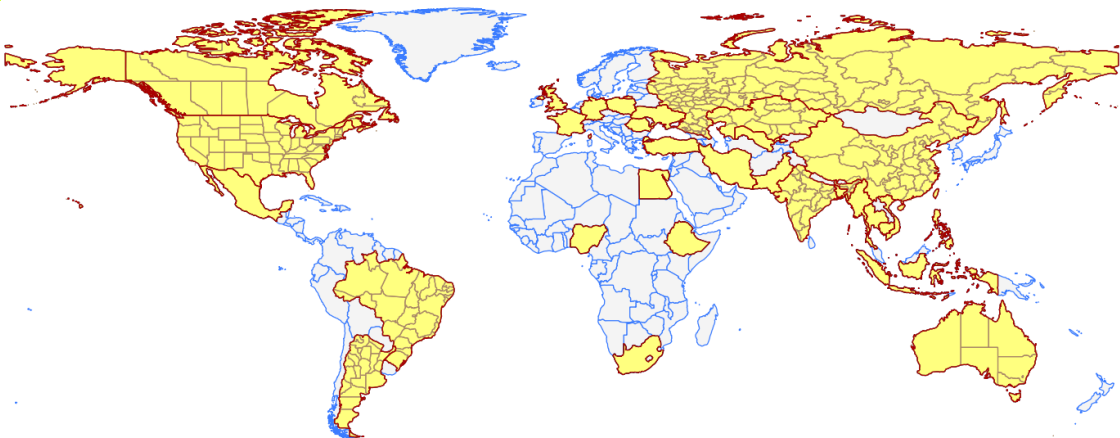
INDICATOR			
Type/ source	Unit, spatial scale	Description	Presentation and legend
<b>BIOMSS</b>			
<b>Biomass accumulation potential</b>			
Crop/ Ground and satellite	grams dry matter/m <sup>2</sup> , pixel or CWSU	An estimate of biomass that could potentially be accumulated over the reference period 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 (2009-13), with departures expressed in percentage.
<b>CALF</b>			
<b>Cropped arable land and cropped arable land fraction</b>			
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 (2009-13), with departures expressed in percentage.
<b>NDVI</b>			
<b>Normalized Difference Vegetation Index</b>			
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 (2009-2013), and as spatial patterns compared to the average showing the time profiles, where they occur, and the percentage of pixels concerned by each profile.

<b>RADPAR</b>			
<b>CropWatch indicator for Photosynthetically Active Radiation (PAR), based on pixel based PAR</b>			
Weather/ Satellite	W/m <sup>2</sup> , 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 thirteen-year average (2001-13), 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.
<b>RAIN</b>			
<b>CropWatch indicator for rainfall, based on pixel-based rainfall</b>			
Weather/ Ground and satellite	Liters/m <sup>2</sup> , 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 thirteen-year average (2001-13), 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.
<b>TEMP</b>			
<b>CropWatch indicator for air temperature, based on pixel-based temperature</b>			
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 13 years (2001-13), 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.
<b>VCIx</b>			
<b>Maximum vegetation condition index</b>			
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.
<b>VHI</b>			
<b>Vegetation health index</b>			
Crop/ Satellite	Number, pixel to CWSU	The average of VCI and the temperature condition index (TCI), with TCI defined like VCI but for temperature. VHI is based on the assumption that "high temperature is bad" (due to moisture stress), but ignores the fact that low temperature may be equally "bad" (crops develop and grow slowly, or even suffer from frost).	Low VHI values indicate unusually poor crop condition, but high values, when due to low temperature, may be difficult to interpret. VHI is shown as typical time profiles over Major Production Zones (MPZ), where they occur, and the percentage of pixels concerned by each profile.
<b>VHIn</b>			
<b>Minimum Vegetation health index</b>			
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.

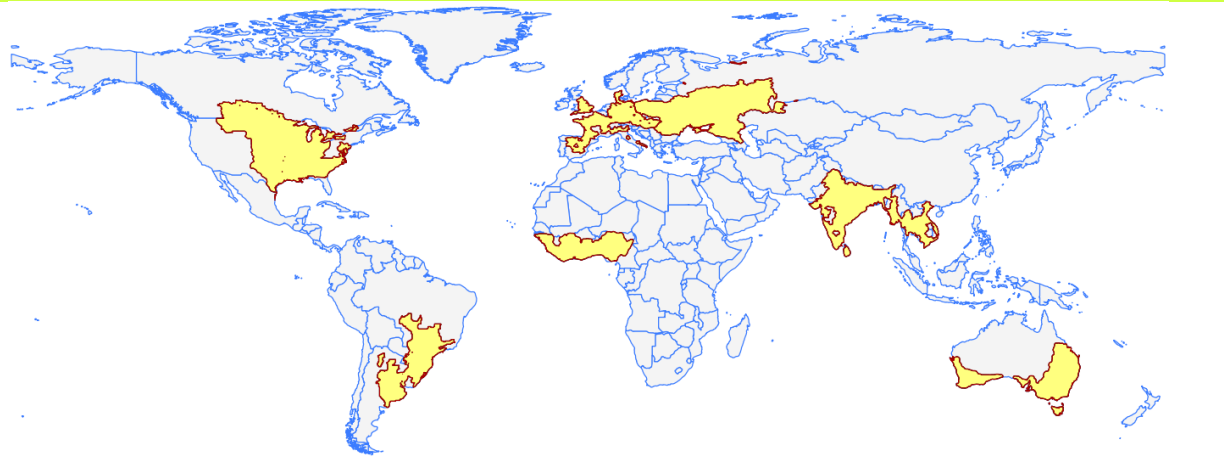
## CropWatch spatial units (CWSU)

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 UNITS	
<b>CHINA</b>	
<i>Overview</i>	<i>Description</i>
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.
	
<b>Countries (and first-level administrative districts, e.g., states and provinces)</b>	
<i>Overview</i>	<i>Description</i>
“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—Canada, 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, <a href="http://www.cropwatch.com.cn">www.cropwatch.com.cn</a> .
	

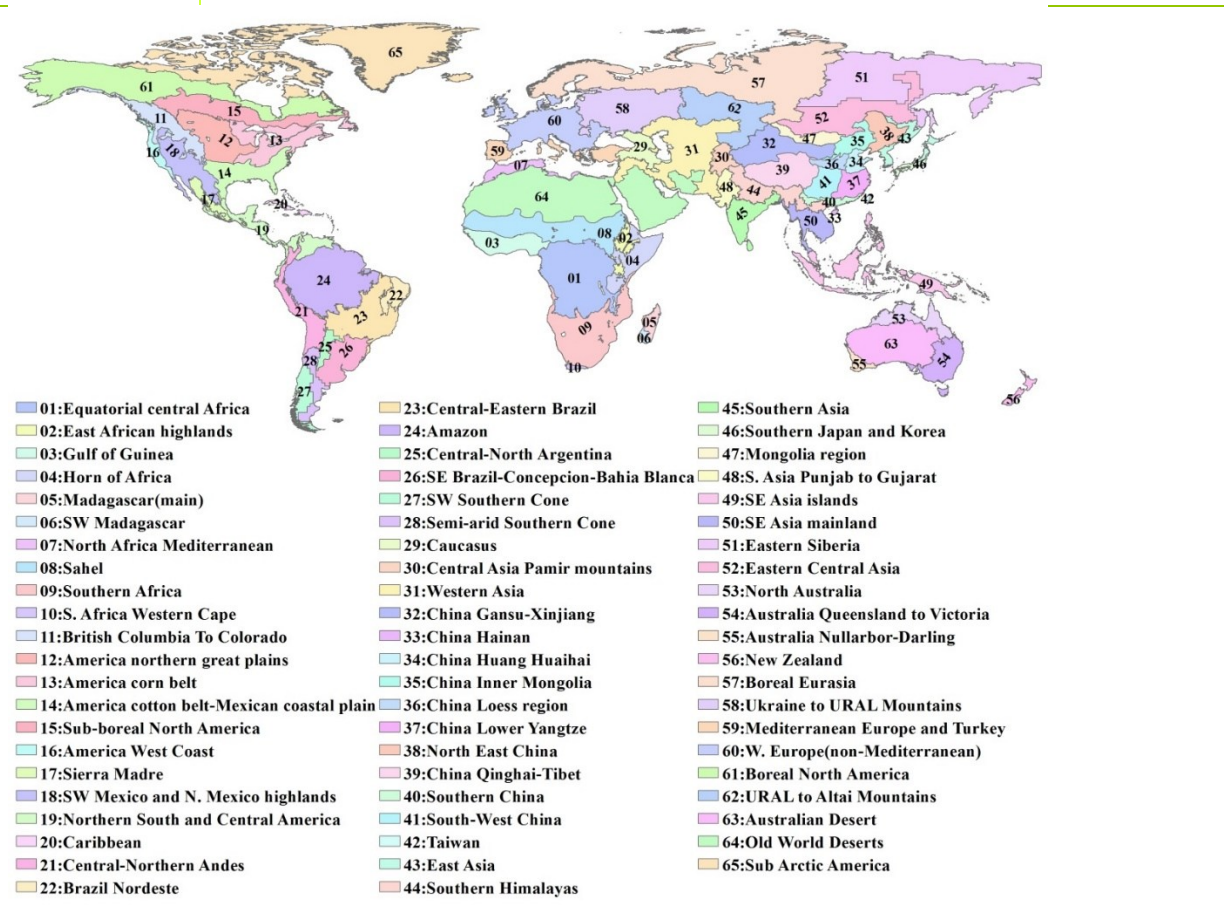
**Major Production Zones (MPZ)**

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



**Global Monitoring and Reporting Unit (MRU)**

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



### Production estimation methodology

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

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

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

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

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

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

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

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

$$Area_i = a + b * CALF_i$$

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

The production for "other countries" (outside the 31 CropWatch monitored countries) was estimated as the linear trend projection for 2014 of aggregated FAOSTAT data (using aggregated world production minus the sum of production by the 31 CropWatch monitored countries).

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## Online resources

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This bulletin is only part of the CropWatch resources available. Visit [www.cropwatch.com.cn](http://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](mailto:cropwatch@radi.ac.cn).

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### Online Resources posted on [www.cropwatch.com.cn](http://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 environmental 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).

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The latest 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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