Chapter 2. Crop and environmental conditions in major production zones

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

2.1 Overview

Tables 2.1 and 2.2 present an overview of the agroclimatic (Table 2.1) and agronomic (Table 2.2) indicators for each of the six MPZs, comparing the indicators to their fifteen and five-year averages, respectively. The text mostly refers simply to "average" with the averaging period implied.

Table2.1 Agroclimatic indicators by Major Production Zone, current value and departure from 15YA (January to April 2020)

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
West Africa	113	-15	27.2	0.0	1334	1	404	-15
North America	418	24	5.5	0.7	706	-8	176	-6
South America	729	-16	22.7	0.0	1194	3	705	-3
S. and SE Asia	133	-5	23.1	-0.4	1175	-2	478	13
Western Europe	315	-2	6.2	1.5	614	5	147	2
C. Europe and W. Russia	253	-1	1.8	2.9	486	-1	95	-2

*Note: Departures are expressed in relative terms (percentage) for all variables, except for temperature, for which absolute departure in degrees Celsius is given. Zero means no change from the average value; relative departures are calculated as (C-R)/R*100, with C=current value and R=reference value, which is the fifteen-year average (15YA) for the same period (January-April) for 2005-2019.*

Table2.2 Agronomic indicators by Major Production Zone, current season values and departure from 5YA (January to April 2020)

	CALF (Cropped arable land fraction)		Maximum VCI
	Current (%)	5A Departure (%)	Current
West Africa	55	3	0.94
North America	44	-3	0.80
South America	99	0	0.92

S. and SE Asia	87	22	1.02
Western Europe	97	2	0.91
Central Europe and W Russia	57	-10	0.83

Note: See note for Table 2.1, with reference value R defined as the five-year average (5YA) for the same period (January-April) for 2015-2019.

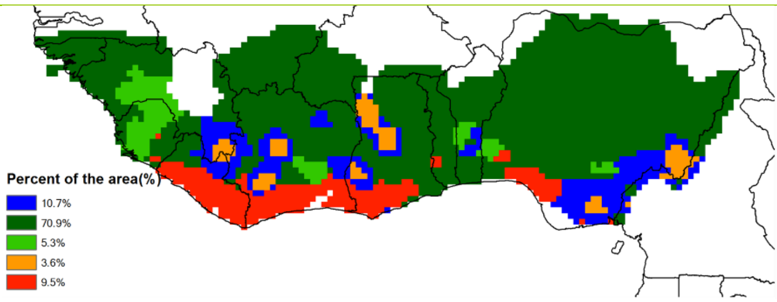
2.2 West Africa

This reporting period covers the onset of the main cropping season for cereals and tuber crops in West Africa. Active cropping activities occurred mainly along the coastal areas of the MPZ while the northern parts are currently uncropped. In the north, farmers are awaiting the onset of the rains which are progressing northwards from the coastal areas. Main farming activities occurred in the south (February/March) and were related to planting of main maize, yams and rainfed rice. For Nigeria, harvesting activities of rainfed and irrigated cereal crops were completed by the end of January. Fall Armyworm infestations on maize crops early in the season had affected the yields.

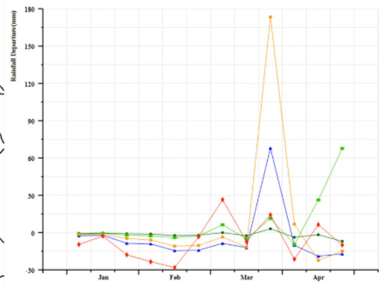
Between January and April, the MPZ received below normal rainfall (113 mm, -15%) covering 70.9% of the region. The highest rainfall amounts were received in Equatorial Guinea (1044 mm, -9%) and Gabon (989 mm, -11%) in the west equatorial rain-forest with a unique tropical warm and humid climate while most of the region received less than 200 mm during this dry season. The VHI map shows the severity of water stress throughout the region. The average temperature for the region was 27.2°C (0.0°C) and an increase in radiation was registered (RADPAR 1334 MJ/m², +1%). Most of the cropland along the coast was planted, while the northern areas remained uncropped in this dry season (CALF 55%, +3%). The observed potential biomass production was 404 gDM m-2 (-15%) and the VCIx of 0.94 is predominantly a result of the coastal areas of the region.

In summary, based on these CropWatch indicators, it is expected that the climatic conditions favor a stable onset of the main long growing season in the MPZ.

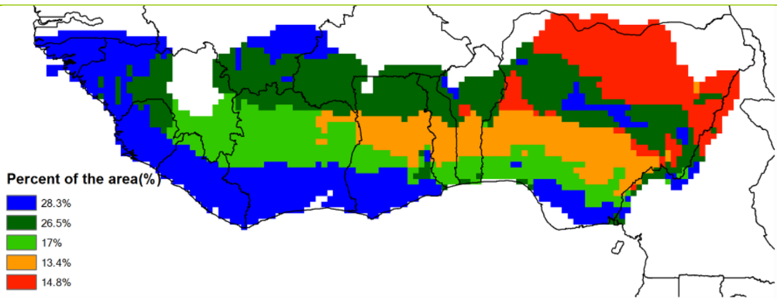
Figure 2.1 West Africa MPZ: Agroclimatic and agronomic indicators, January to April 2020



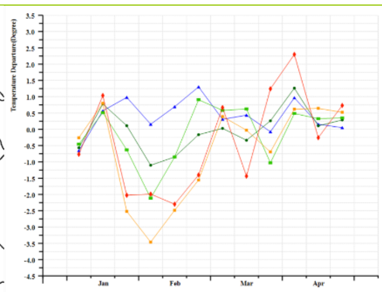
a. Spatial distribution of rainfall profiles



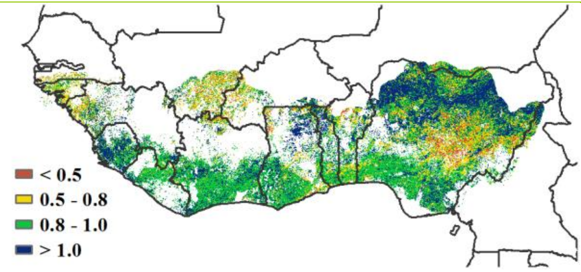
b. Profiles of rainfall departure from average (mm)



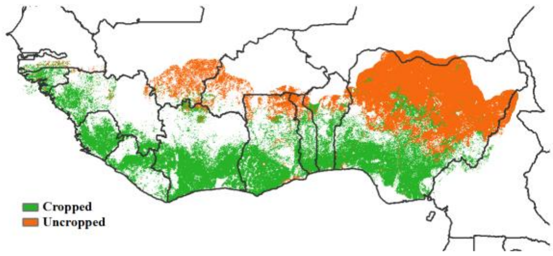
c. Spatial distribution of temperature profiles



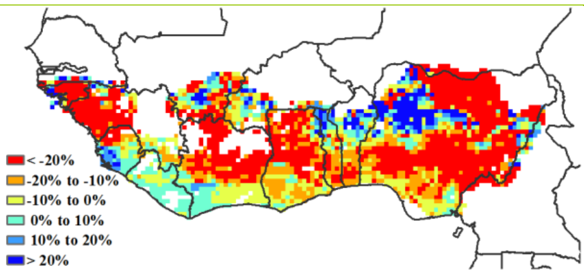
d. Profiles of temperature departure from average (mm)



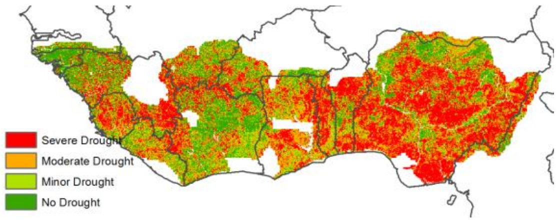
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

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

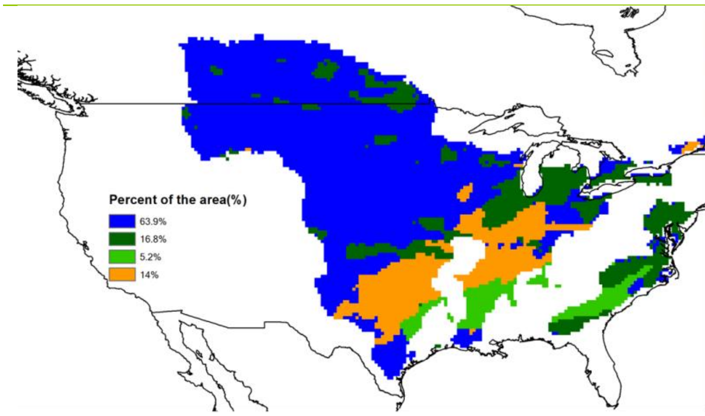
2.3 North America

The monitoring period from January to April 2020 covers the winter dormancy, green-up and flowering stages of winter wheat, depending on latitude. Abundant precipitation has produced generally favorable conditions. In April, a cold snap may have caused some local freeze damage to wheat in some parts. While temperatures were generally warmer than average from January to March, they were below average in April, which in turn may have slowed down growth and development of wheat. However, this has no negative impact on yield. Slow development prolongs the growth period and allows the crop to intercept more light for photosynthesis.

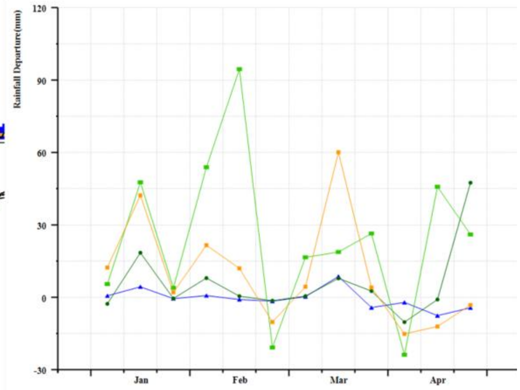
As a whole region, North America received abundant precipitation (+ 24%) and warm temperatures (+ 0.7 ° C), but photosynthetically active radiation was significantly lower than the average (-8%) for the same period over the past 15 years. Winter wheat reached heading and flowering stages in the south. In terms of the southern Great Plains, the most important growing area of winter wheat, precipitation in Oklahoma, Texas and Kansas was significantly above average, the peak of precipitation occurred in the middle of March and then gradually declined to below-average levels in April (Figure 1). During this monitoring period, the temperature fluctuated greatly in the southern Great Plains. It was above average in March, but dropped to a below-average level by 5 ℃ in April (Figure 2). This delayed crop development. Colorado and Western Kansas were affected by below-average rainfall. The effects are shown in Figure 5, where VCIx is below 0.5 for that region.

In general, conditions were close to average for winter wheat.

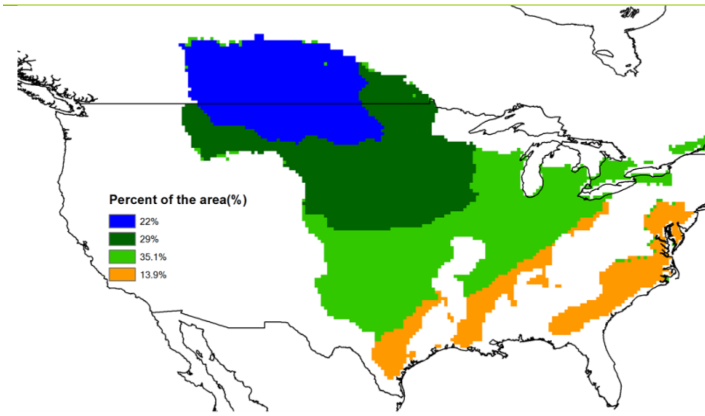
Figure 2.2 North America MPZ: Agroclimatic and agronomic indicators, January to April 2020.



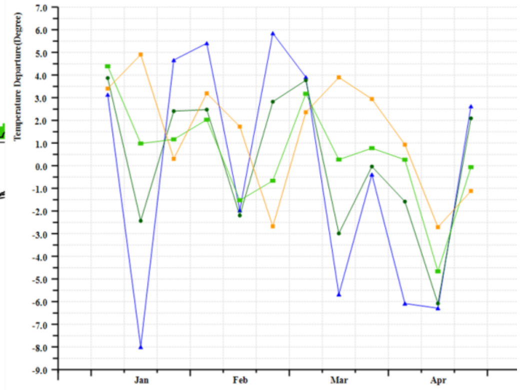
a. Spatial distribution of rainfall profiles



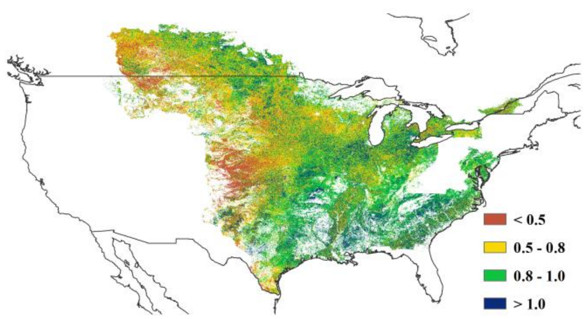
b. Profiles of rainfall departure from average (mm)



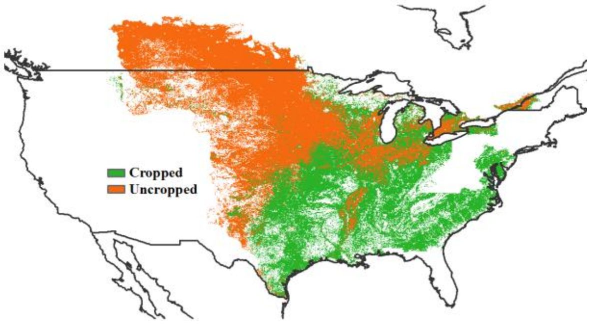
c. Spatial distribution of temperature profiles



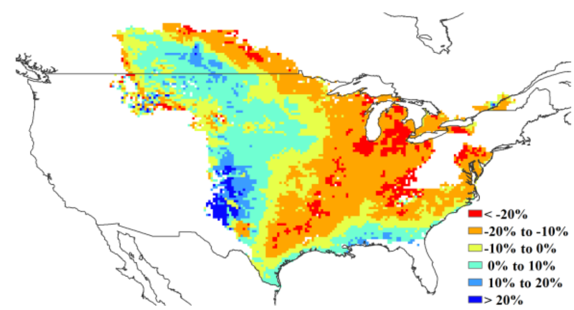
d. Profiles of temperature departure from average (mm)



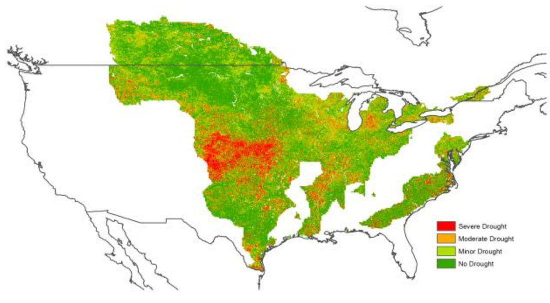
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

Note: For more information about the indicators, see Annex B

2.4 South America

The reporting period covers the main growing period of summer crops, as well as the harvest of earlier planted crops. Overall, the situation for South America is near average.

RAIN showed four homogeneous patterns distributed along a South-North direction. Argentina and Uruguay were dominated by a nearly stable rainfall profile with slight positive anomalies in March and April (light green area). Southern Brazil and Paraguay showed a slightly negative anomaly pattern that decreased over time. The northern area of Brazil was mixed with two profile patterns. Both had high positive anomalies in February. The blue area shows a relevant negative anomaly in March and the dark green area shows a positive spike in precipitation departure from the mean in April.

Despite the fact that several homogeneous regions were defined for TEMP, it is difficult to find clear differences among the temperature profiles. Most of the profiles showed a high positive deviation, i.e., warmer conditions than usual, during March and a negative anomaly followed by a positive anomaly during April. For the North of the Brazilian agricultural region (red area), a more stable pattern with a slight variation in anomaly values around zero was observed.

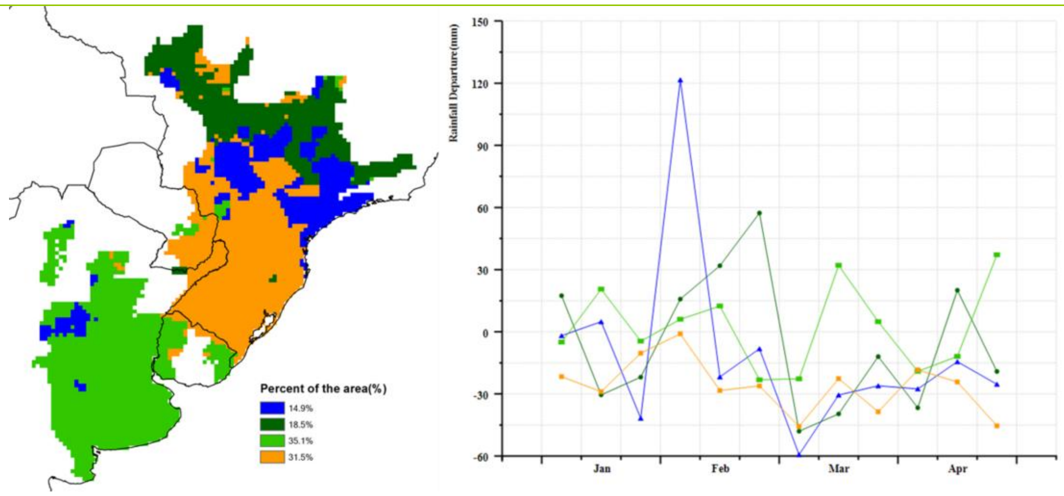
Most BIOMSS anomalies were in the range of -10% to =10%. Positive deviations were observed in the Southern Pampas and South and North West of Brazilian agricultural regions. Negative anomalies were mostly observed in the North East. Almost all cropland was farmed (CALF = 1), except for small areas in the South West Pampas.

Maximum VCI showed good conditions (values higher than 0.8) in most of the zones. Values higher than one were mostly observed in the North of Brazil. Lower values were observed in areas of uncropped farmlands in the South West Pampas and in South Brazil.

The statistical analysis of the proportions of different categories of drought showed drought conditions were getting more severe starting in early March, when the maximum proportion of cropland suffering from drought reached 30%. This coincided with the below-average rainfall in that month. The drought might also be a result of positive anomaly in temperature and sunshine.

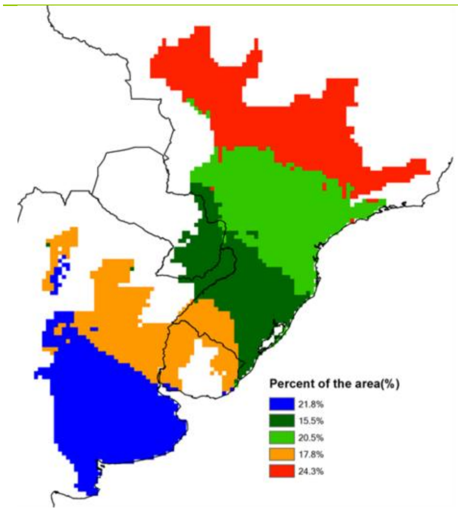
In general, South America show good conditions for crop production with near-average rainfall, although some positive and negative anomalies in rainfall and temperatures were observed. BIOMSS trends tended to be positive and near optimum values of VCIx were observed.

Figure 2.3 South America MPZ: Agroclimatic and agronomic indicators, January to April 2020.



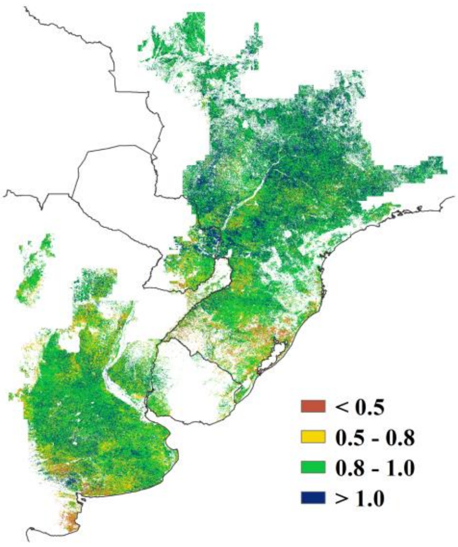
a. Spatial distribution of rainfall profiles

b. Profiles of rainfall departure from average (mm)

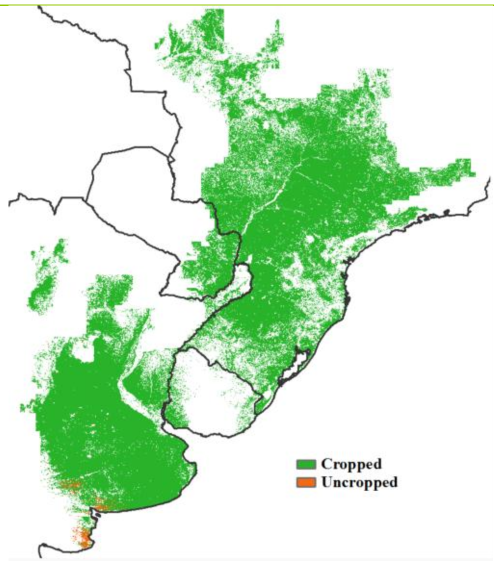


c. Spatial distribution of temperature profiles

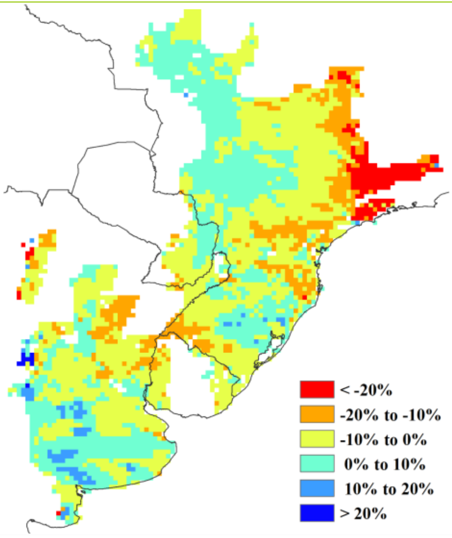
d. Profiles of temperature departure from average (mm)



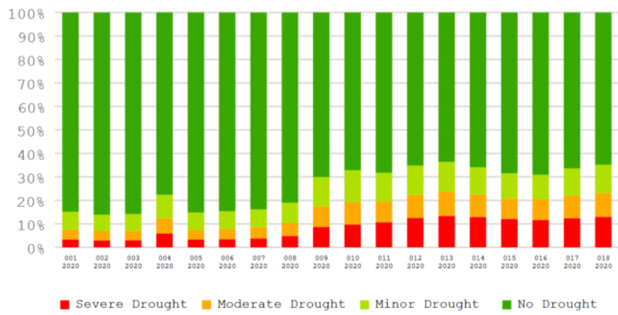
e. Maximum VCI



f. Cropped arable land



g. Biomass departure



h. Proportion of different drought categories from January to April 2020

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

2.5 South and Southeast Asia

The South and Southeast Asia MPZ spans a large geographic area, including India, Bangladesh, Cambodia, Myanmar, Nepal, Thailand, Laos and Vietnam. Rice is the main crop in most countries, but wheat, maize, soybean and other crops are also grown. During this monitoring period, this MPZ experienced close to average agroclimatic conditions: Rainfall was slightly lower than the average by 5%, temperature remained at the average level and RADPAR was slightly reduced by 2%. Meanwhile, the MPZ had a high value for VCIx (1.02). However, the situation was quite different within this MPZ: South-Asia experienced favorable conditions, whereas most of Southeast Asia suffered from much drier than normal weather, which caused unfavorable conditions.

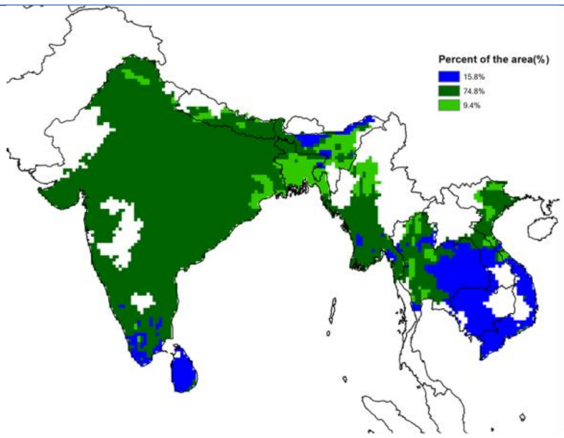
This monitoring period falls into the dry months. Nevertheless, rainfall is an important agroclimatic parameter. In this period, 74.8% of cultivated areas experienced average rainfall, they are located mainly in India, southern Myanmar, and northern Vietnam. Cambodia, southern Vietnam, Laos and eastern Thailand experienced below average rainfall. The severe drought conditions for Thailand, Cambodia, Laos and southern Vietnam were shown according to the VHI minimum map. The remaining 9.4% of crop land, mainly in Bangladesh, experienced heavy rainfall in late April.

Temperature was near average for 30.3% of the crop land, mainly in southern India and Myanmar. The temperatures in most Indochina countries were higher than the 15YA. Meanwhile, the temperatures in 31.3% of cultivated areas were below average and fluctuated significantly, including northeastern India and Bangladesh.

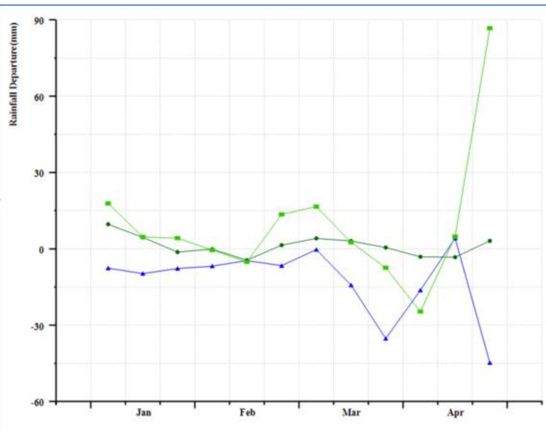
CALF reached 87% in this MPZ, 21% above the average of this stage. Uncultivated areas are scattered in various countries. The VCIx map shows that favorable crop conditions with the values greater than 0.8 could be observed in India, Bangladesh and Vietnam. Poor crop growth (<0.5) was located in Thailand, Laos and Cambodia, which was mainly due to drier than normal conditions. The BIOMASS map shows that the areas with above average biomass were mainly distributed in the Indian Peninsula, and below-average BIOMASS occurred in Southeast Asian countries, including southern Myanmar, western Thailand, Cambodia and northern Vietnam.

In summary, crop conditions in South Asia were favorable, whereas South-East Asian countries suffered from drought.

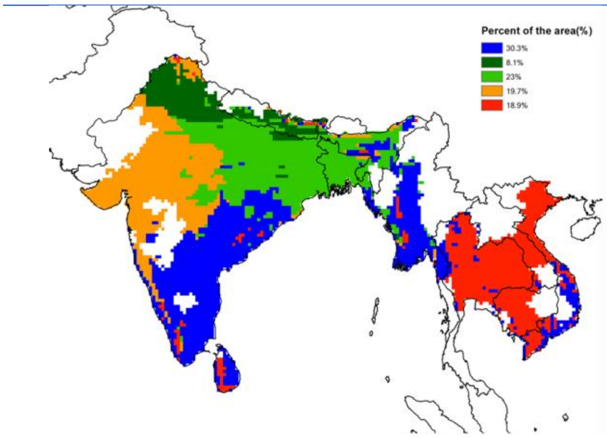
Figure 2.4 South and Southeast Asia MPZ: Agroclimatic and agronomic indicators, January to April 2020.



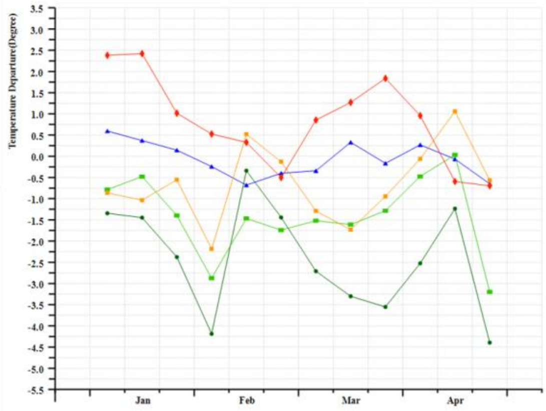
a. Spatial distribution of rainfall profiles



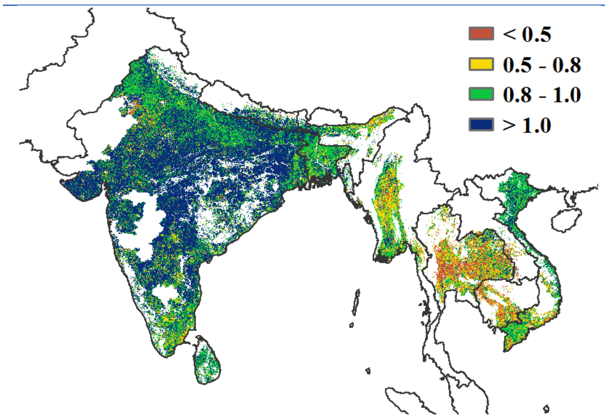
b. Profiles of rainfall departure from average (mm)



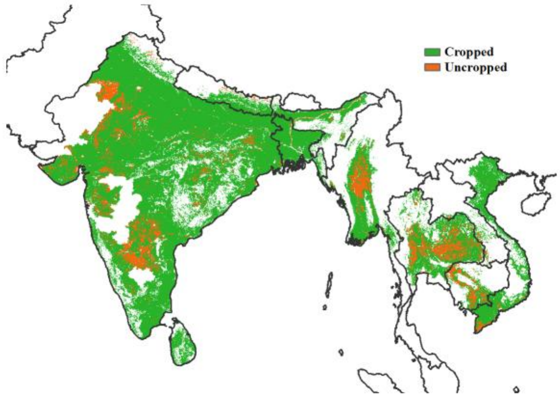
c. Spatial distribution of temperature profiles



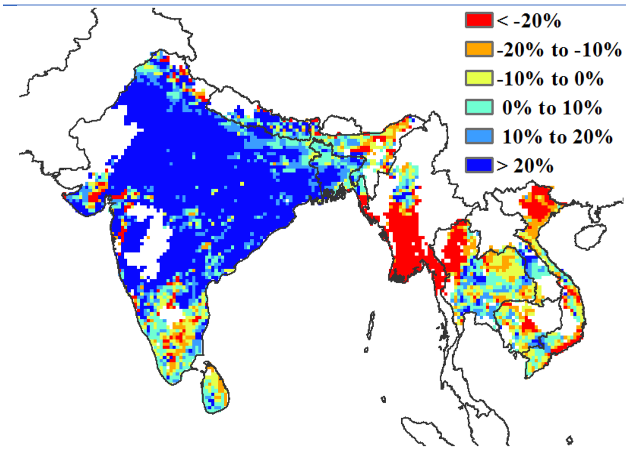
d. Profiles of temperature departure from average (mm)



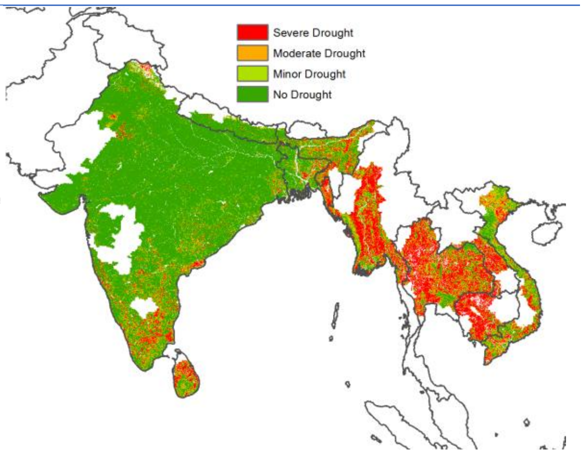
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

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

2.6 Western Europe

This monitoring period covers the vegetative growth period of winter wheat in the Western European Major Production Zone (MPZ). Sowing of the summer crops started in March. Overall, crop conditions were generally favorable in most parts of MPZ based on the integration of agroclimatic and agronomic indicators (figure 2.5).

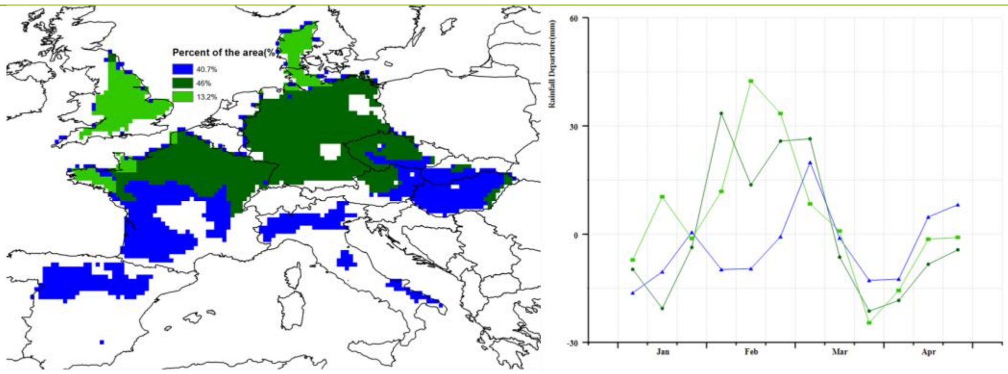
The whole MPZ showed a slight drop in RAIN (-2% below average) and small disparities among the major agricultural production areas. However, there were spatio-temporal differences. They can be characterized as follows (1) Precipitation was below average in most areas in January, with the exception of the United Kingdom, the western part of Bretagne and Normandie in France, and the northwestern part of Schleswig-Holstein in Germany in mid-January; (2) 59.3 percent of MPZ areas experienced above-average precipitation from February to early-March in addition to Spain, Italy, Hungary, south-central France, southern Czech Republic, eastern Austria and south-western Slovakia; (3) Precipitation was below average in most parts of MPZ areas (mainly in the United Kingdom, Denmark, most parts of France, most parts of Germany, most parts of the Czech Republic, western Austria), while areas with above-average precipitation accounted for only about 40.7% of the main producing areas in late April. Countries with the most severe precipitation deficit included Italy (RAIN -43%), Hungary (RAIN -34%), Slovakia (RAIN -24%), Czech Republic (RAIN -13%), while two countries had above normal precipitation: Denmark (RAIN +31%) and UK (RAIN +13%). More rain is needed in the coming months to raise soil moisture levels, and create favorable conditions for the growth of winter and summer crops.

Temperature (TEMP) for the MPZ as a whole was significantly above average (TEMP +1.5°C), and radiation also was above average with RADPAR at +5%. During the entire monitoring period, most areas experienced warmer-than-usual conditions, and related reports suggest that the monitoring period was the warmest since 1979 in parts of this MPZ, while below-average temperature mostly occurred in (1) United Kingdom, Italy, Hungary, Slovakia, most parts of Spain in early and mid-January; (2) The entire MPZ in late March. Due to suitable temperature and high sunshine conditions for the MPZ, the biomass accumulation potential BIOMSS was 2% above average. The lowest BIOMSS values (-20% and below) occurred in Austria, Italy, and Spain. In contrast, BIOMSS was above average (sometimes exceeding a 10% departure) for France, UK, Germany, Denmark and Hungary. The average maximum VCI for the MPZ reached 0.91.

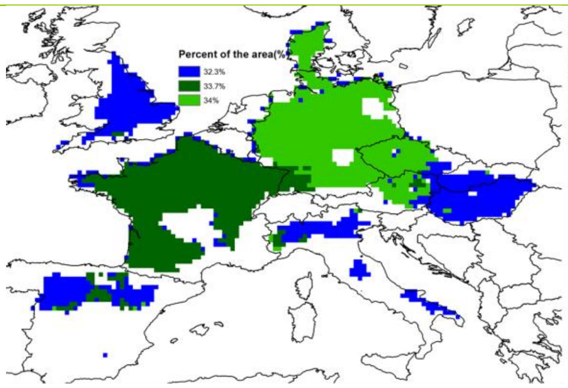
A total of 97% of arable land was cropped (i.e. 2% above average) in the whole MPZ. The area of uncultivated arable land was mainly located in Spain, south-eastern France, northern Italy and central Austria, where it might be affected by the COVID-19.

Generally, the conditions of winter crops in the MPZ were above average. However, more rain will be needed in several important crop production areas to ensure an adequate soil moisture supply for the crops..

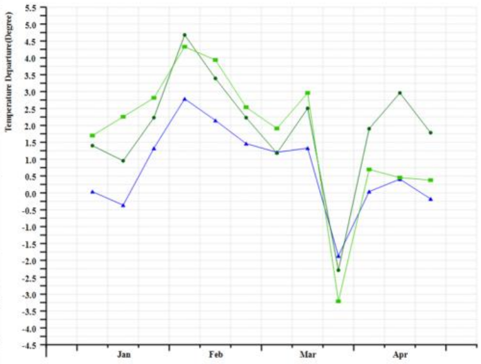
Figure 2.5 Western Europe MPZ: Agroclimatic and agronomic indicators, January to April 2020.



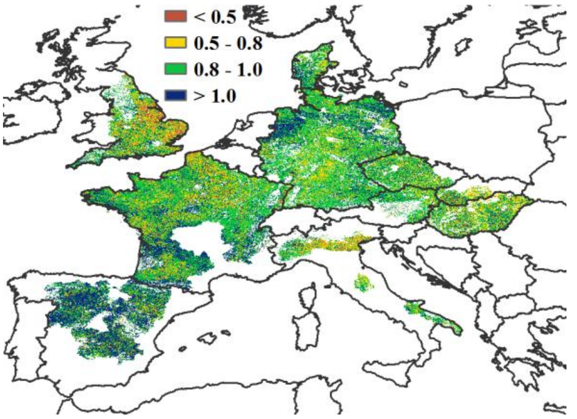
a. Spatial distribution of rainfall profiles | b. Profiles of rainfall departure from average (mm)



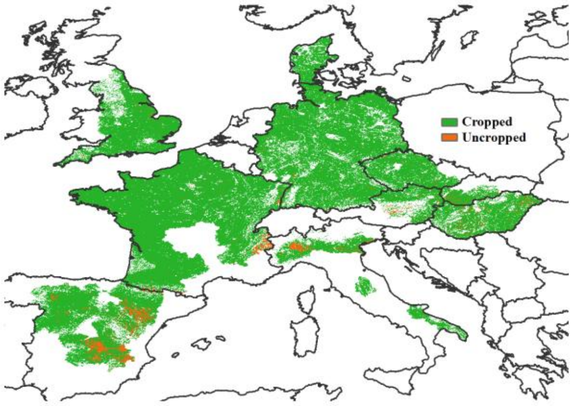
c. Spatial distribution of temperature profiles



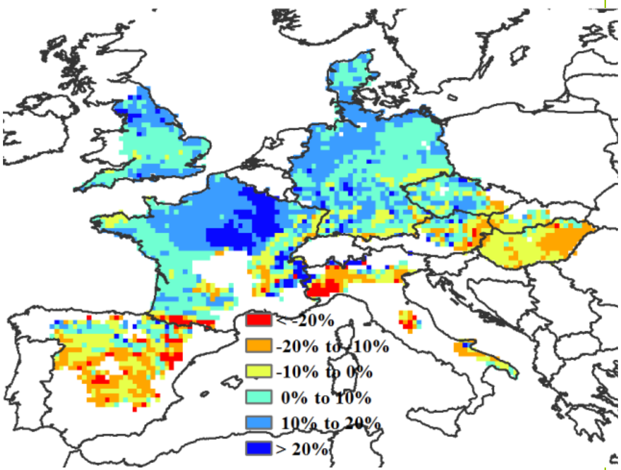
d. Profiles of temperature departure from average (mm)



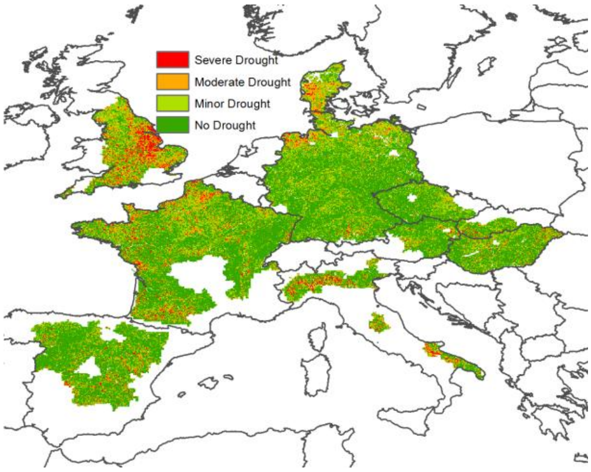
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

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

2.7 Central Europe to Western Russia

This monitoring period covers the dormant winter season and spring green-up of winter cereals in Central Europe and the western Russia MPZ. Sowing of the summer crops started in April. Generally, agroclimatic variables demonstrated average conditions for rainfall (-1%), temperature (+2.9ºC), and RADPAR (-0.7%). Crop conditions were generally normal, but good rainfalls are needed during the remainder of the wheat growing season to ensure yields.

Based on the spatial distribution map of rainfall departure, the precipitation in most areas of the MPZ fluctuated around the mean, however, the period from mid March to mid April was below average in all regions. From February to early April 2020, the precipitation in southern Poland, southern Ukraine, Moldova, and Romania (37.5% of the MPZ) continued to decline. In the northwest of the MPZ (25.4% of the total area) precipitation was below average from mid-March to early April. This includes the northwest of Poland, the north of Ukraine, the south of Belarus and parts of the west of Russia. From mid-January to early March (25.5% of the MPZ), the regions with higher than average precipitation were located in western Russia.

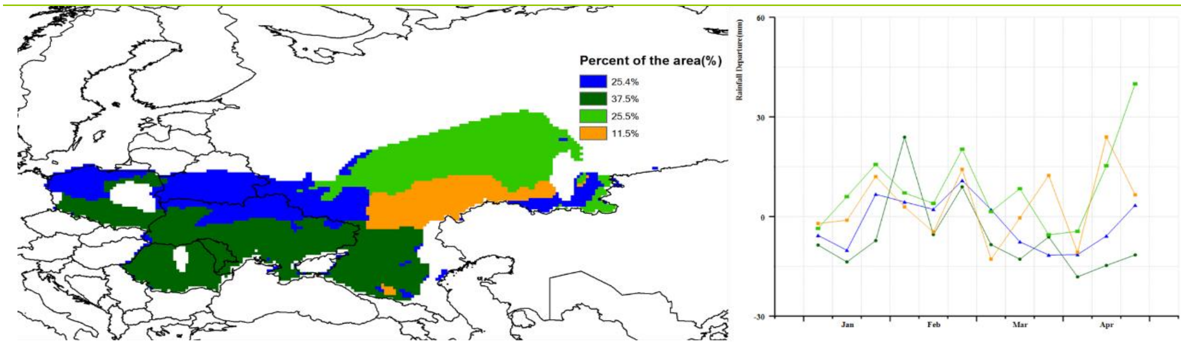
Temperatures were above average until mid March, when they started to drop to below average levels. This slowed growth in April. On average, temperatures in the main production area were higher (+ 2.9℃) than the 15YA. According to the temperature departure map, in early January, except for western Romania and western Russia (12.4% of the MPZ), temperatures were above average. From late January to the mid-April, the temperatures of the MPZ began to decline, and the lowest temperature departure value was nearly 3.8℃. The areas of lower temperature are located in the southeast of Belarus and parts of western Russia (20.1%).

CropWatch calculated that BIOMSS was 2% below the 15YA. The spatial distribution of BIOMSS showed that in the MPZ, the lowest BIOMSS (-20% and below) occurred in western Russia, Belarus and Northern Romania. In contrast, the highest BIOMSS (10% and above) was concentrated in Poland and Ukraine. From January 1 to April 30, the cropped arable lands proportion was 57% (-10% below average). The uncropped areas are mainly distributed in the southwest of Russia, some in the central and eastern Ukraine. They are consistent with the spatial distribution of BIOMSS.

The average value of maximum VCI was 0.83, and values higher than 0.8 were observed in western MPZ (Poland), and northeastern MPZ. Although the potential biomass was above average, the VCIx in Ukraine was lower. This is also proved by the distribution map of Minimum VHI, which demonstrated that some severe drought areas are located in the central and western MPZ (western Russia, central Ukraine and to some extent western Romania). Mostly drought-free conditions were observed for Poland and Belarus.

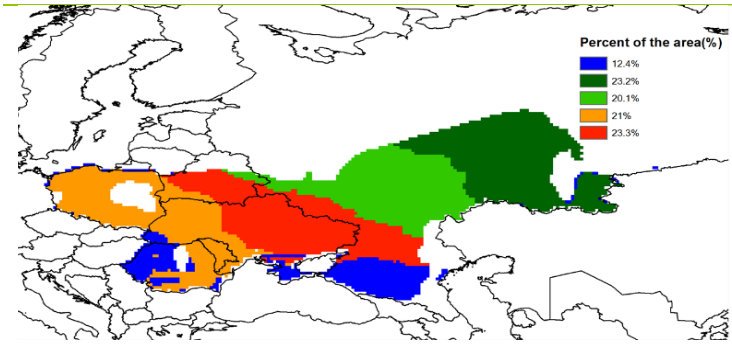
In brief, based on the results of CropWatch agroclimatic and agronomic indicators during the monitoring period, the condition of winter crops in the Central Europe and western Russia MPZ are normal, except for Ukraine, and the crop yields are expected to be normal.

Figure 2.6 Central Europe-Western Russia MPZ: Agroclimatic and agronomic indicators, January - April 2020.

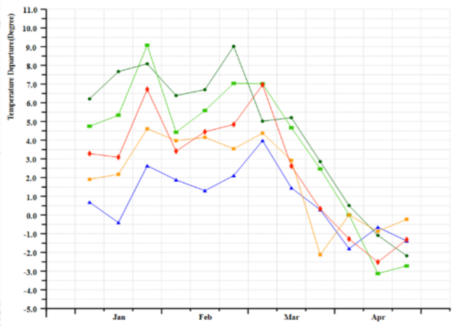


a. Spatial distribution of rainfall profiles

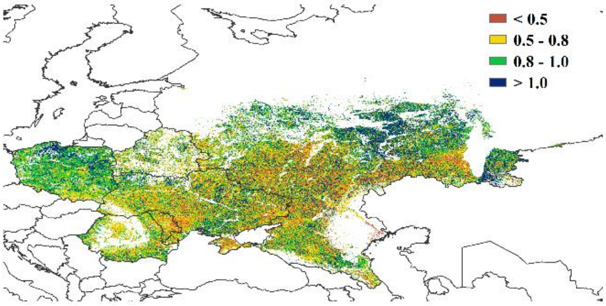
b. Profiles of rainfall departure from average (mm)



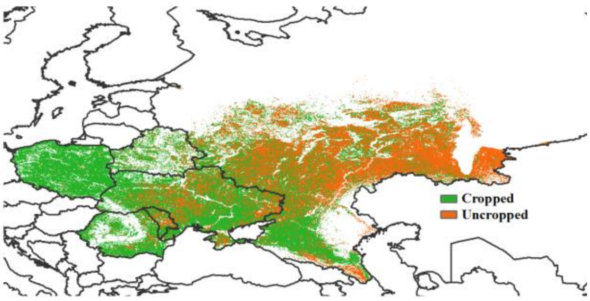
c. Spatial distribution of temperature profiles



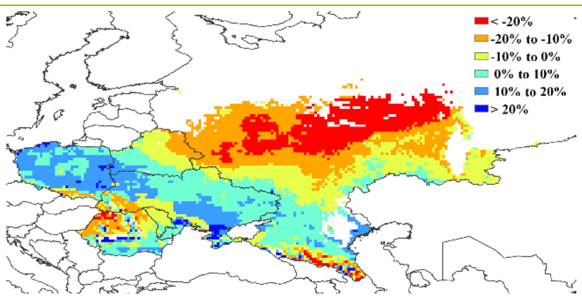
d. Profiles of temperature departure from average (mm)



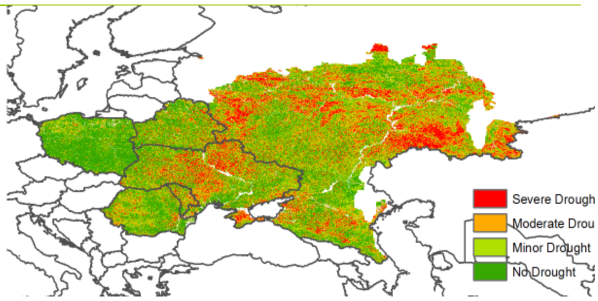
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

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