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), minimum vegetation health index (VHIn) and cropping intensity (CI)— 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.

Table 2.1 Agroclimatic indicators by Major Production Zone, current value and departure from 15YA (July-October 2020)

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m^2)	Departure (%)	Current (gDM/m^2)	Departure (%)
West Africa	743	-22	24.9	0.1	1071	-1	684	-4
North America	332	-3	20.2	-0.4	1129	-1	606	-1
South America	270	-21	19.2	-0.6	1022	0	398	-9
S. and SE Asia	1374	3	25.8	0.3	1064	-1	664	0
Western Europe	336	11	15.9	0.1	925	-4	416	-2
Central Europe and W. Russia	249	-3	15.8	0.6	885	1	404	0

*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 (July-October) for 2005-2019.*

Table 2.2 Agronomic indicators by Major Production Zone, current season values and departure from 5YA (July-October 2020)

	CALF (Cropped arable land fraction)		Maximum VCI	Cropping Intensity	
	Current	5A Departure (%)	Current	Current	5A Departure (%)
West Africa	97	0	0.94	134	3
North America	94	-1	0.90	101	0
South America	86	-5	0.75	124	0
S. and SE Asia	97	1	0.96	133	1
Western Europe	89	-1	0.90	107	-2
Central Europe and W Russia	95	-1	0.88	102	0

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

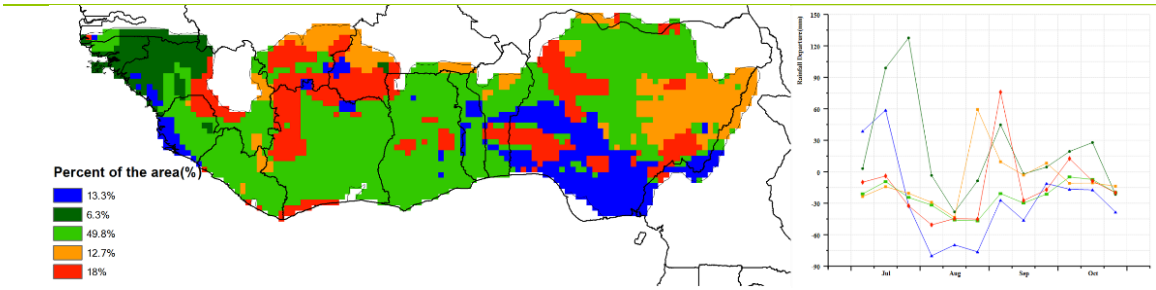
2.2 West Africa

The reporting period covers the onset of the main rainy season throughout the south of the MPZ and the end of the rainy season in the northern Sahelian areas. The harvesting of the main maize crop was completed in August in the south, while ongoing in the rest of the MPZ for other cereal crops (rice, millet and sorghum). The cumulative rainfall in the MPZ was above average in most areas leading to improved vegetation conditions. For Nigeria the abundant rainfall in July and August boosted natural pasture conditions and helped replenish surface water and improving livestock production.

The main activities during this period included the sowing of main cereals (maize, sorghum, millet, and rice) under both rainfed and irrigated conditions. In addition, tuber crops (yam and cassava) were also being harvested. Rice harvest will extend into December/January period. In the southern parts of the region experiencing bimodal rainfall, the first maize crop was harvested in October while cassava was still growing.

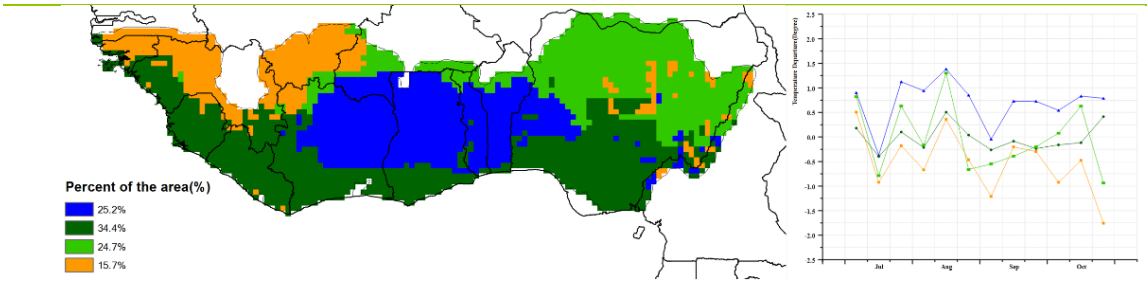
Climatic indicators for the MPZ indicate a below-average rainfall of 743 mm (-22%). Highest rainfall was recorded in Sierra Leone (1393 mm, -20%), Guinea Bissau (1275 mm, +12%), Equatorial Guinea (1291mm, -1%), and Guinea (1195 mm, 0%). The average temperature for the MPZ was 24.9°C (+0.1°C) and solar radiation was 1071 MJ/m^2 (+1%). The biomass production potential was slightly below average. The northern parts of the MPZ experienced more negative departures (0 to -20%) than the coastal areas. The cropped arable land fraction (CALF) reached 97% for the region. Cropping intensity was up 3% compared with the five-year-average across the MPZ. The maximum VCI (VCIx) map shows an average value of 0.94 covering most of the region indicating favorable conditions for crop growth. These CropWatch indicators show stable climatic conditions for the MPZ and present favorable prospects for the 2020/2021 season.

Figure 2.1 West Africa MPZ: Agroclimatic and agronomic indicators, July to October 2020.



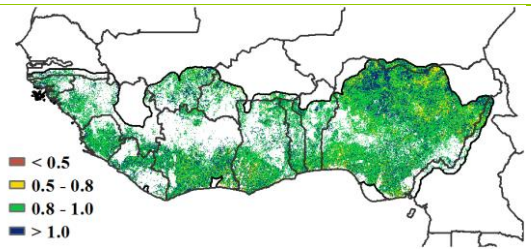
a. Spatial distribution of rainfall profiles

b. Profiles of rainfall departure from average (mm)

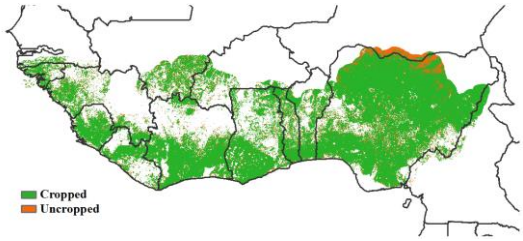


c. Spatial distribution of temperature profiles

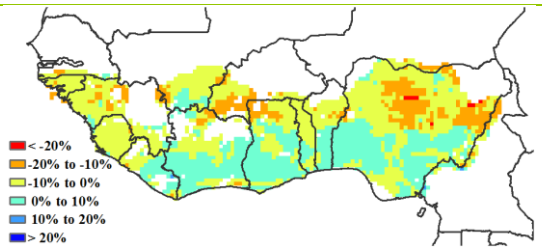
d. Profiles of temperature departure from average (mm)



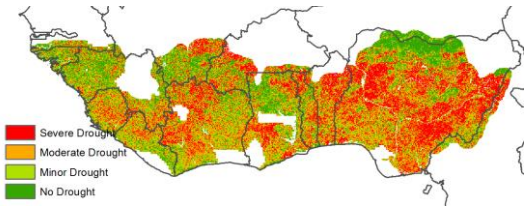
e. Maximum VCI



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

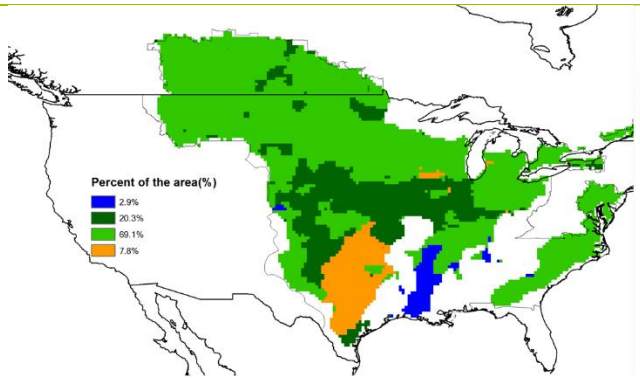
This monitoring period from July to October 2020 covers the main growing and harvesting seasons of soybean, maize, rice, and spring wheat. Sowing of winter wheat started in September. In general, the crop conditions were favorable.

During the monitoring period, the overall agro-climatic conditions in North American production areas were close to the 15-year average. Compared with the 15-year average, rainfall, temperature, and radiation were 3%, 0.4°C, and 1% below average, respectively. The rainfall in most areas varied greatly during the monitoring period. The rainfall in July was close to or above the average, but the rainfall fell below the average level from August to September except for Lower Mississippi region in late August, and late September to early October as well as the Southern Plain areas in early September, when hurricanes and tropical depressions brought

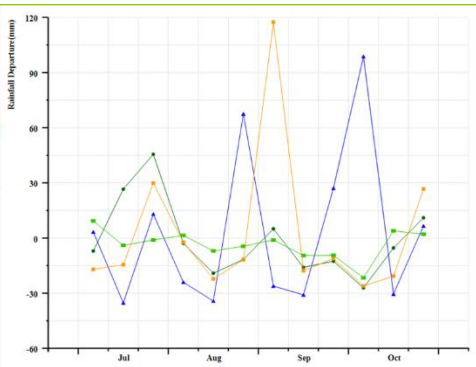
abundant rainfall to those areas. The temperature anomaly graph shows that the temperatures in the northern plains and Canadian prairie in August and mid-September were 1-2°C higher than the average.

July and August are the crucial growth periods for the summer crops, and lack of rainfall can cause yield losses. Most areas experienced above-average rainfall until July and subsequently, rainfall trended slightly below average. Hence, only western Texas and Colorado were affected by droughts, apart from California (not shown). The minimum vegetation health index indicates that severe drought occurred during the monitoring period in the western part, and the maximum vegetation index also indicates the unfavorable crop condition in the region. According to the histogram of drought classification statistics, the proportion of drought in the main producing areas was gradually increasing from 10% at the beginning of July to 25% at the end of October. Compared with the 15-year average, the potential biomass is 1% lower than the average, and the cropped arable land fraction also decreased by 1%. In short, moisture supply was adequate in most major crop production regions of the USA. Slightly drier weather in September and October helped provide favorable conditions for harvest. Overall, crop conditions were favorable

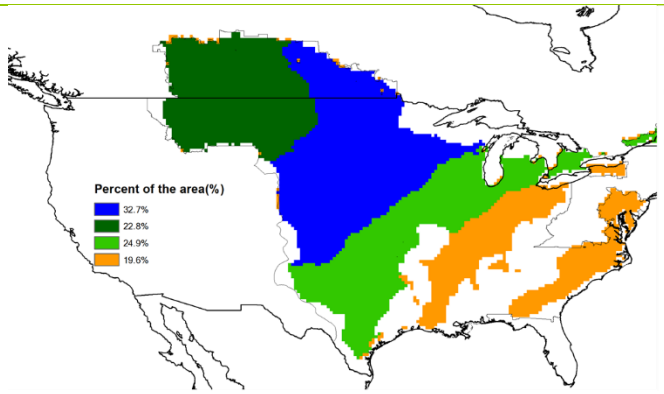
Figure 2.2 North America MPZ: Agroclimatic and agronomic indicators, July to October 2020.



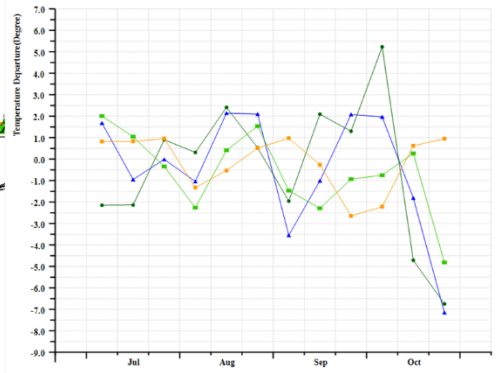
a. Spatial distribution of rainfall profiles



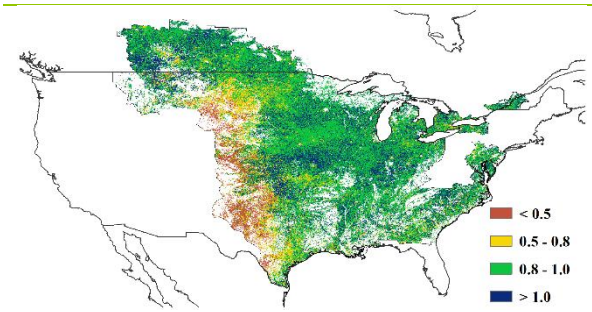
b. Profiles of rainfall departure from average (mm)



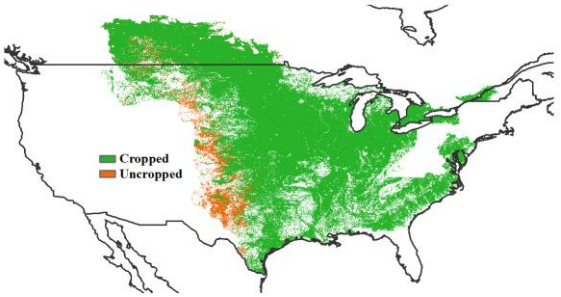
c. Spatial distribution of temperature profiles



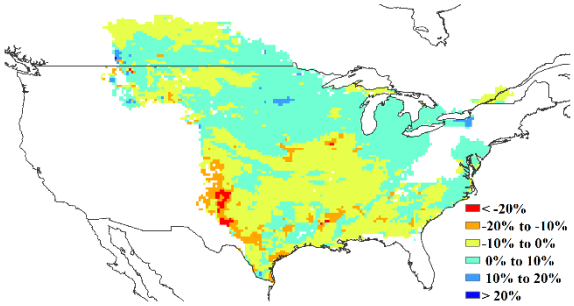
d. Profiles of temperature departure from average (mm)



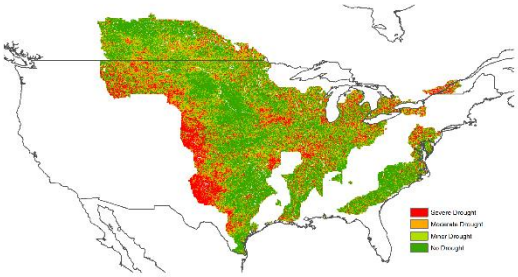
e. Maximum VCI



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

This reporting period covers the main growing period for wheat and the beginning of planting of maize, soybean and rice. Dry conditions observed in some regions may have reduced or delayed the planting of summer crops.

For the whole region, rainfall showed strong negative anomalies with 21% below average during the monitoring period. Spatial distribution of rainfall profiles showed two homogeneous patterns over the southern Brazilian agricultural area and Paraguay. These patterns (blue and green areas) showed a high positive anomaly during August and a negative anomaly at the end of this reporting period. The green profile showed also a positive anomaly in July. The rest of the MPZ (Argentina and Uruguay and North of Brazilian agricultural area) was dominated by mixed patterns. Their profiles showed below average values over this monitoring period in other regions.

Temperature profiles were clearly grouped along a North-South gradient. Nevertheless, the four profiles generated showed high variability in temperature along the period and are not clearly distinguishable. Both positive and negative anomalies were observed in all profiles, but in general positive anomalies were stronger.

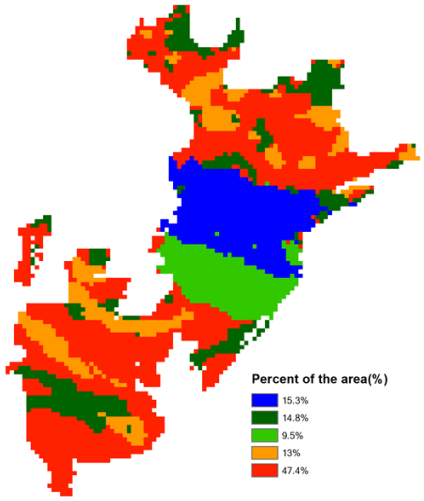
BIOMSS showed strong negative anomalies in the north of the MPZ in Brazil. Moderate negative anomalies (about 10% below average) were observed in most of the Argentine Pampas. Positive anomalies were mostly observed in North of Argentina and South and Center of Brazil and Paraguay, where above average rainfall was observed as indicated in the rainfall departure clusters.

Maximum VCI showed quite generalized and low values in Center West Pampas, Chaco and Subtropical highlands in Argentina. The south and center of the Brazilian agricultural area showed good conditions for this index.

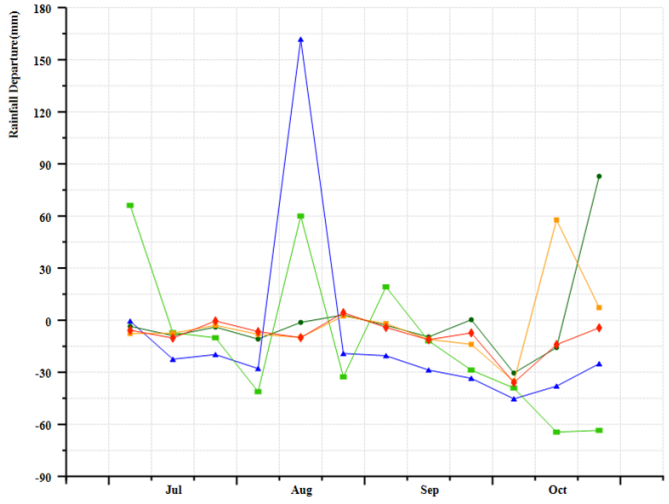
The weekly proportions of different drought categories showed that drought conditions were getting worse starting in mid-September, mainly due to the overall below average rainfall at the later stages of this monitoring period. CALF showed a strong reduction in Center West Pampas and Chaco in Argentina, suggesting a delay in planting of summer crops. The uncropped areas coincided with the regions of low VCIx.

In summary, the MPZ showed critical conditions in several indices. In particular, some regions like Pampa (poor values in Maximum VCI, BIOMSS and CALF), Chaco (Maximum VCI and CALF) and the north of MPZ in Brazil (BIOMSS and rainfall).

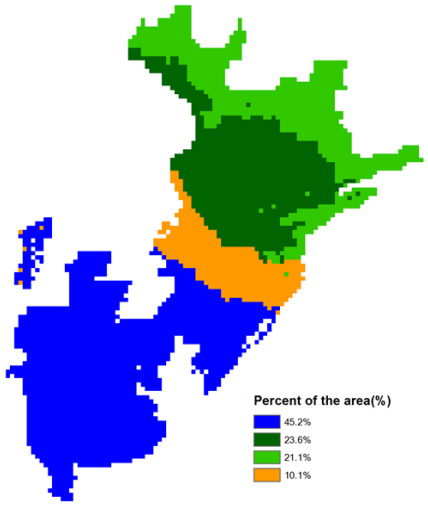
Figure 2.3 South America MPZ: Agroclimatic and agronomic indicators, July to October 2020.



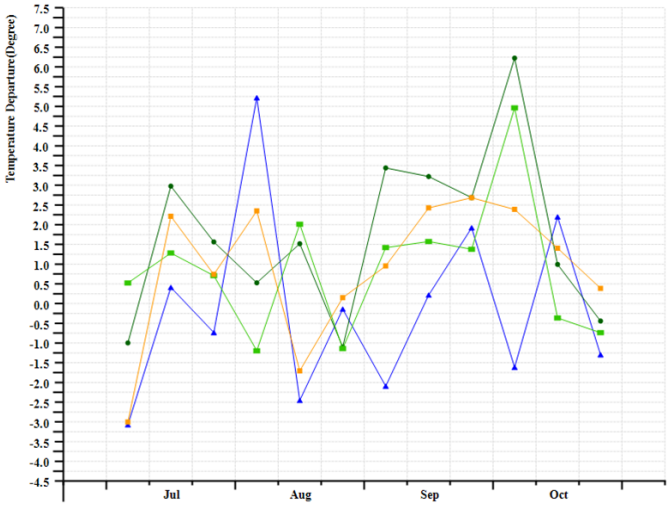
a. Spatial distribution of rainfall profiles



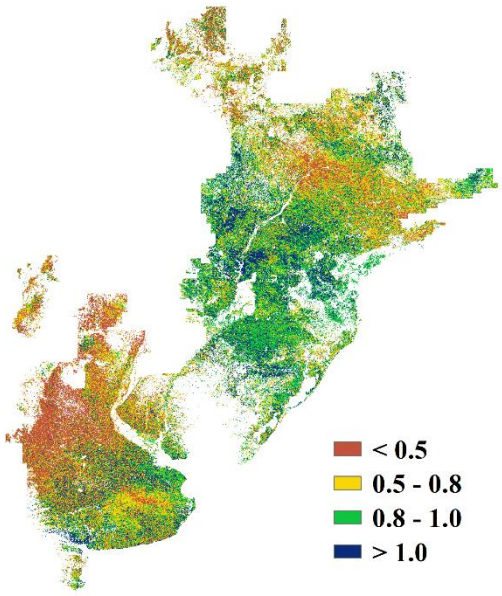
b. Profiles of rainfall departure from average (mm)



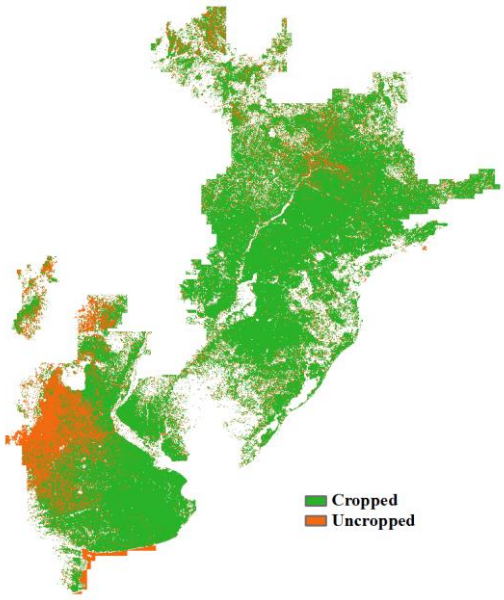
c. Spatial distribution of temperature profiles



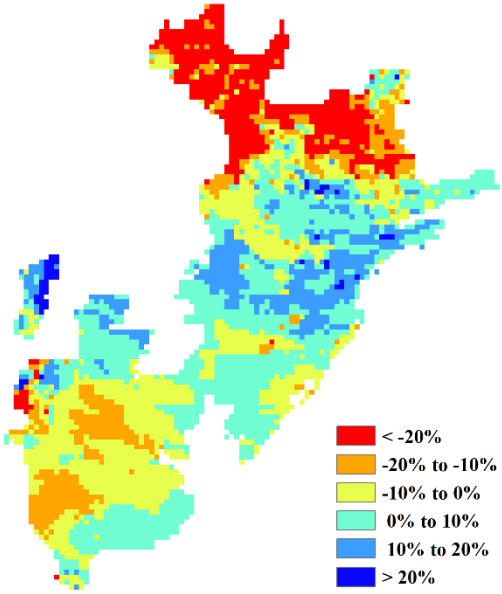
d. Profiles of temperature departure from average (mm)



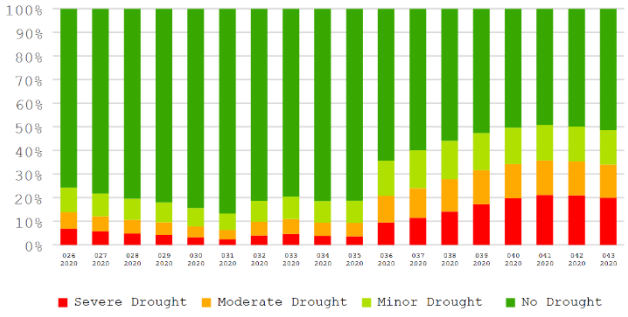
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. The proportions of different drought categories

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

2.5 South and Southeast Asia

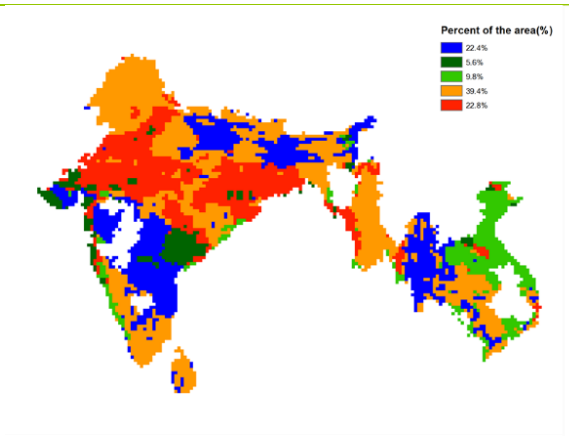
The South and Southeast Asia MPZ spans a large geographic area, including India, Bangladesh, Cambodia, Myanmar, Nepal, Thailand, Laos and Vietnam. This reporting period covers the growth period of maize, and the growth and harvest period of summer rice and soybean. This MPZ experienced close-to-average agroclimatic conditions: Compared to the average of the past 15 years, rainfall was slightly higher by 3%, temperature rose 0.3°C and RADPAR was slightly reduced by 1%. Meanwhile, BIOMSS was close to average and CALF increased by 1%, reaching 97%. A high value for VCIx (0.96) was observed. Almost all agroclimatic conditions and agronomic indicators stayed close to the average over this monitoring period and the crop growth conditions are generally normal.

The spatial distribution of rainfall profiles shows that RAIN was below average with small fluctuations in 39.4% of the MPZ, including parts of India, Myanmar, Thailand and Cambodia. Rainfall in 55% of the MPZ was fluctuating during the monitoring period. Large fluctuations were observed, especially for the Malwa Plateau in India, where the rainfall in August was about 100 mm higher than the average, and the rainfall in Vietnam was about 150 mm higher than the average in mid-October. Heavy rainfall in August, exceeding the average by 350 mm, was observed for 5.6% of the MPZ, mainly for the Indian state of Telangana. As this is the growing season of maize, rice and other crops in India, excess rainfall may affect their production. Temperature profiles indicate that temperatures in 6% of main production areas (located in Myanmar) were slightly above the average, and 9% of the MPZ (located in India) was slightly below the average. In the other areas, temperatures slightly fluctuated around the average.

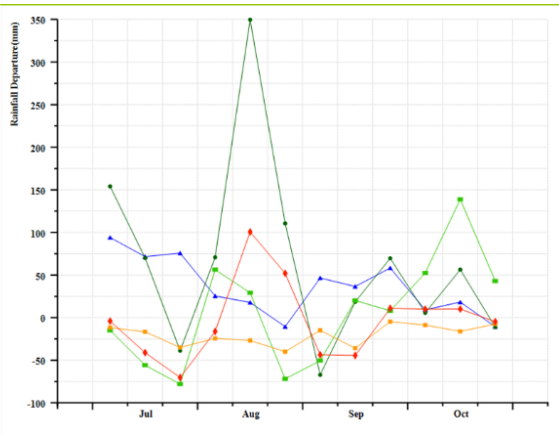
CALF in this MPZ reached 97%, and uncultivated areas were mainly located in a small part of south Tamil Nadu, north Rajasthan and Bangladesh. VCIx was 0.96. Areas with lower VCIx values coincided with the uncropped fields. Potential biomass was mostly near average (BIOMSS, 664 gDM/m^2) but low values occurred in north and south India and Nepal. The VHI minimum map shows that east and north India, regions in Myanmar, Thailand and Cambodia were most affected by periods of severe drought conditions.

In summary, despite the large local rainfall, crops conditions of the MPZ were generally favorable.

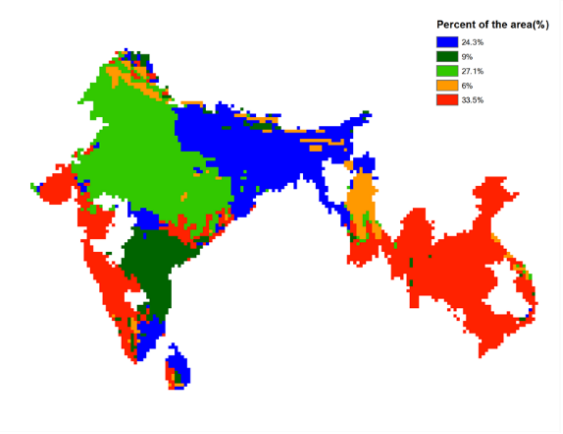
Figure 2.4 South and Southeast Asia MPZ: Agroclimatic and agronomic indicators, July to October 2020



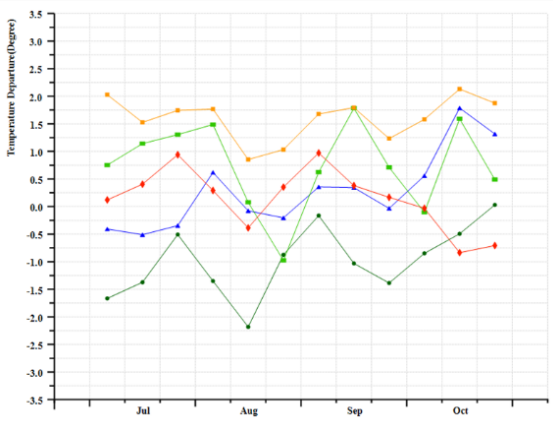
a. Spatial distribution of rainfall profiles



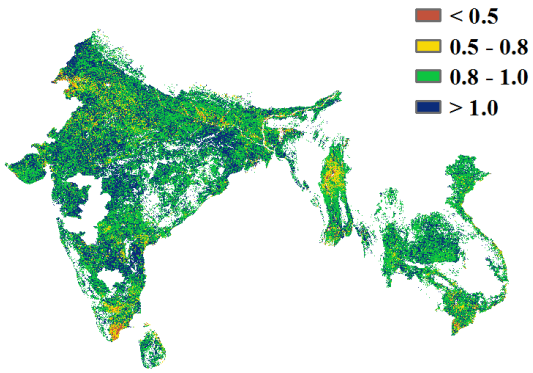
b. Profiles of rainfall departure from average (mm)



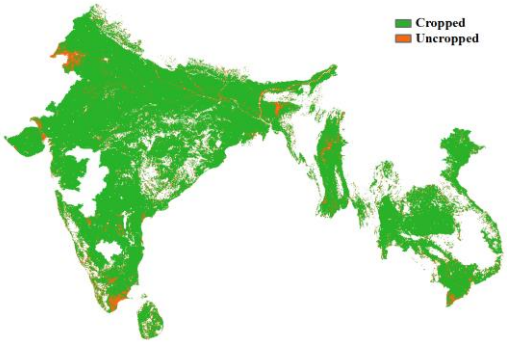
c. Spatial distribution of temperature profiles



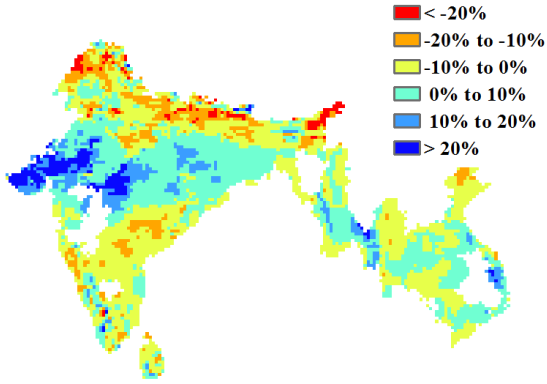
d. Profiles of temperature departure from average (mm)



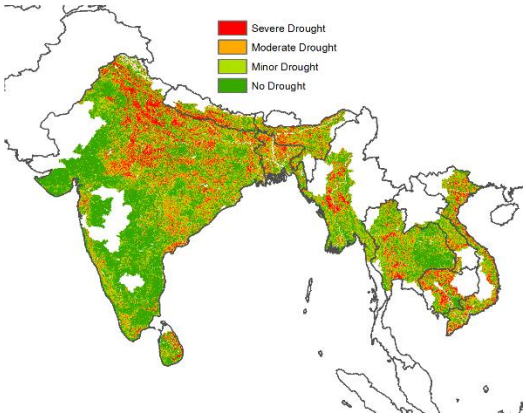
e. Maximum VCI



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 and reproductive periods of the summer crops and sowing of winter crops in the major production zone (MPZ) of Western Europe. Overall, crop conditions were below average in most parts of this MPZ. The agroclimatic and agronomic indicators show warmer-than-usual conditions and a rainfall deficit in the early part of summer and colder-than-usual conditions and above-normal precipitation in the late growing season (Figure 2.6).

Significant spatio-temporal differences in precipitation were observed between different countries but the MPZ as a whole recorded above-average RAIN (+11%). The detailed characteristics of the temporal and spatial changes of precipitation in different countries were as follows: (1) During the whole monitoring period, 33 percent of MPZ areas experienced a situation where the precipitation fluctuated around the average. This was the case for northern Spain, northern and southeastern Italy, eastern Germany, Czech Republic, Slovakia, Austria and Hungary. (2) Before mid-August, in early to mid-September and in mid-October, poor precipitation was observed in more than 70% of the areas (northern Italy, most of France, United Kingdom and Denmark, northern, western and southern Germany) with the most severe shortfalls in Denmark (RAIN -11%). However, frequent and excessive rainfall was observed during the period of mid-August, late September and early October in the southern United Kingdom, western, southwestern and eastern France, and northern Italy. Countries that experienced significant above-average precipitation included the Czech Republic (+39%), Hungary (+39%),

Slovakia (+39%), Austria (+328%), Italy (+15%) and the United Kingdom (+12%). Due to the rainfall deficit, flowering and grain filling for the summer crops were negatively impacted, while the harvest season of summer crops coincided with frequent rainfall. Therefore, the crop yields in the Western European Major Production Zone (MPZ) need to be paid attention to.

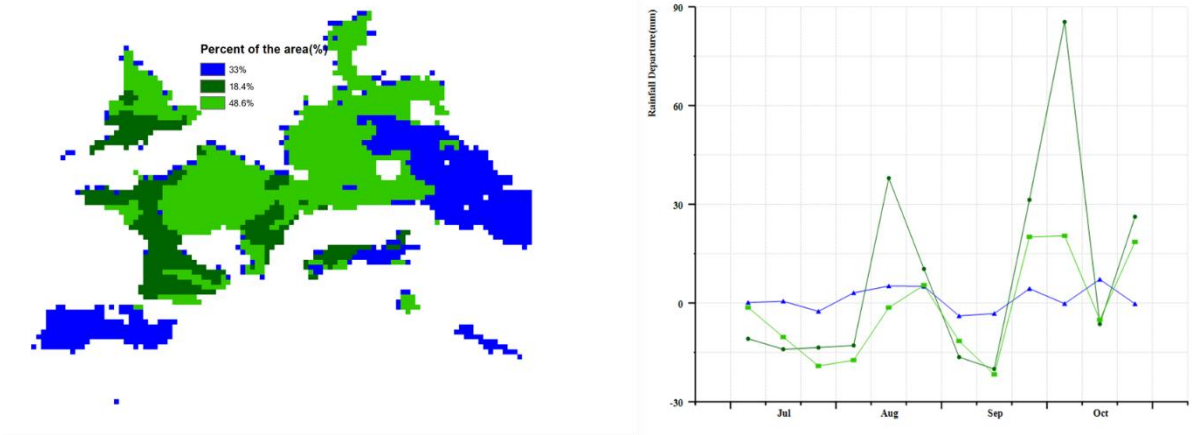
Temperature for the MPZ as a whole was slightly above average (TEMP +0.1°C), and sunshine was below average with RADPAR down 4%. Most areas experienced warmer-than-usual conditions, while below average temperatures occurred mostly in early to mid-July, late August and early September, and late September to mid-October. The spatial distribution of temperature profiles indicates that two warm spells swept across Europe in early to mid-August and in mid-September.

Due to excessive precipitation in mid-August and early October, and unfavorable sunshine, the biomass accumulation potential was 2% below average. Significant BIOMSS departures (-20% and less) occurred in UK, Denmark and north of Germany, and scattered over other countries. In contrast, BIOMSS was above average (sometimes exceeding a 20% departure) over the east of France, south-eastern Italy, and south of Spain. The average maximum VCI for the MPZ reached 0.90.

More than 89% of arable land was cropped, which is 1% below the recent five-year average. Most uncropped arable land was concentrated in Spain and southeastern Italy, with patchy distribution in other countries. The VHI minimum map shows that France, Germany and Spain were most affected by severe drought conditions. Cropping intensity (135%) was up 3% compared with the five-year-average across the MPZ.

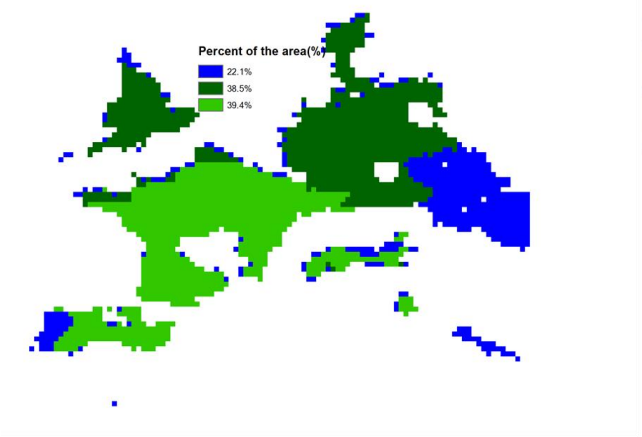
Generally, crop conditions were below average in most parts of this MPZ and the crop yields need to be paid attention to.

Figure 2.5 Western Europe MPZ: Agroclimatic and agronomic indicators, July to October 2020.



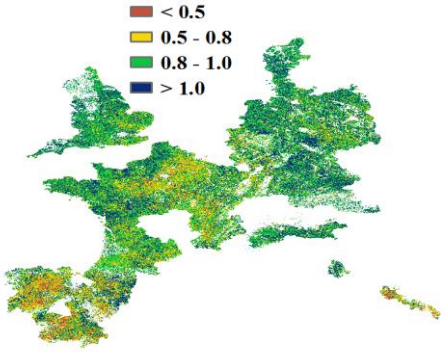
a. Spatial distribution of rainfall profiles

b. Profiles of rainfall departure from average (mm)

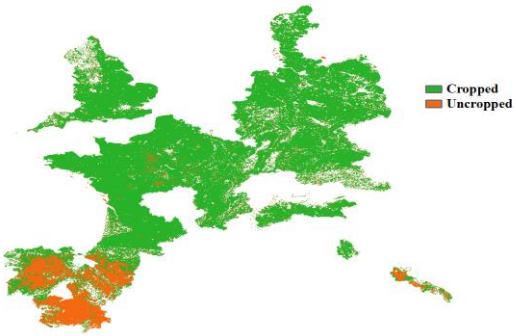


c. Spatial distribution of temperature profiles

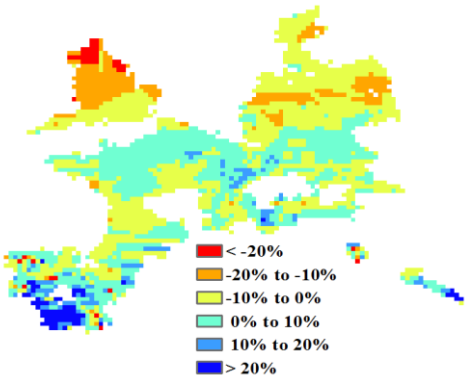
d. Profiles of temperature departure from average (mm)



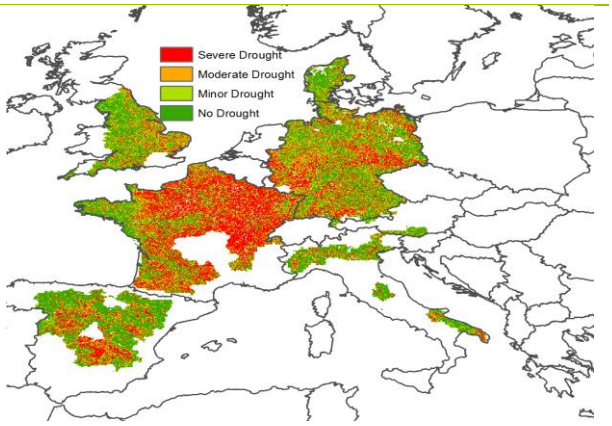
e. Maximum VCI



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 sowing season and the harvest stage of summer cereals in this MPZ. In general, agroclimatic variables demonstrated average conditions for rainfall (-3%), temperature (+0.6°C), and RADPAR (+1%). Crop conditions were mostly normal, except for eastern Ukraine and southern Russia, which suffered from a rainfall deficit.

According to the spatial distribution map of rainfall departure, rainfall fluctuated significantly, but it was below average from July to October for most of the MPZ. The spatial and temporal distribution characteristics were as follows: (1) From July to mid-August, and from late

September to mid-October, the rainfall for 39.4% of this MPZ was above average, with a highest departure of 58 mm. These regions were mainly distributed in the eastern, central and southwestern MPZ, including eastern and southwestern Russia, southern Ukraine and southwest Poland. (2) From July to early October, the rainfall in 60.7% of MPZ was below average, distributed in the northwest, south and east of the MPZ, covering southwest of Poland, southwest of Belarus and southwest of Russia. (3) Rainfall was rather stable in 22.4% of MPZ, which was mainly in the southwest of Poland.

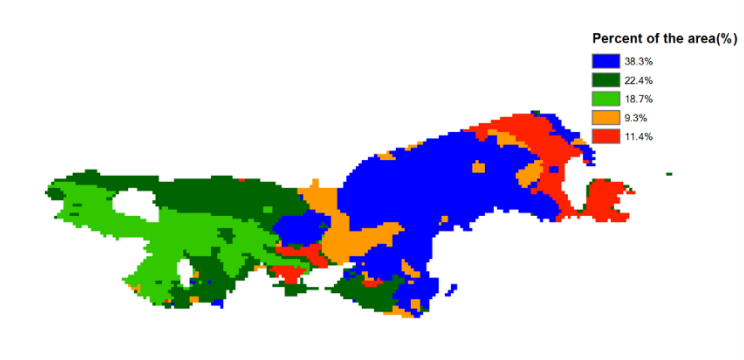
The temperature departure distribution map shows that the temperature fluctuated strongly in the eastern region from July to October, but temperature in this MPZ was generally above average. The spatial and temporal distribution changes were as follows: (1) In the first ten days of July, the temperature in the central and eastern MPZ was higher than average. This was the case for southwest Russia, central and eastern Ukraine and Eastern Belarus. (2) From late July to mid-August, the temperature of 71.4% of MPZ was below average, with lowest drops in August. These regions included southwest Russia, central and eastern Ukraine and Eastern Belarus. (3) From late August to October, the temperature of 72.1% of MPZ was above average, concentrated in the central and western regions, including Ukraine, Belarus, Poland, Czechoslovakia.

CropWatch estimates that the BIOMASS of this MPZ was below the 5YA. BIOMASS in the west and north of the MPZ were lower (-10%), mainly in northwest Russia, Poland, Czech Republic, Slovakia, Moldova and northern Romania. In addition, northern Poland, south-western Ukraine and southern Russia had the largest negative potential biomass (-20% and below) departures. The highest BIOMASS departure was found in the eastern and south-western regions of the MPZ (about +10%), including Belarus, southern Russia, Hungary, Ukraine and parts of southern Romania.

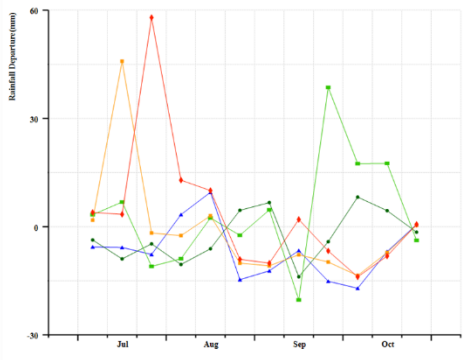
During the monitoring period, most of the arable land in MPZ was cultivated, with a CALF value of 95%. Uncultivated land occurred in the southwestern MPZ, including southern Russia, southern Ukraine and eastern Romania. The VCIx showed significant spatial difference in MPZ, with an average value of 0.88. The regions below 0.8 were mainly distributed in the south of the MPZ, including southern Russia, southeastern Romania, Moldova, southeastern Ukraine and other regions. The VHI is similar to the VCIx in its distribution, with areas of severe drought occurring in the central and southern MPZ.

In general, CropWatch agroclimatic and agronomic indicators show that crop growth was generally near average during the monitoring period.

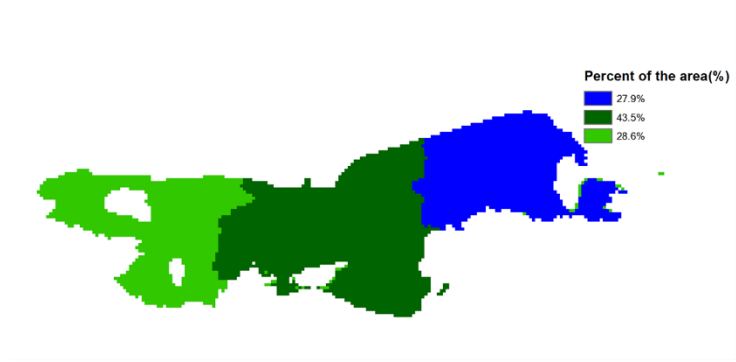
Figure 2.6 Central Europe-Western Russia MPZ: Agroclimatic and agronomic indicators, July to October 2020.



a. Spatial distribution of rainfall profiles

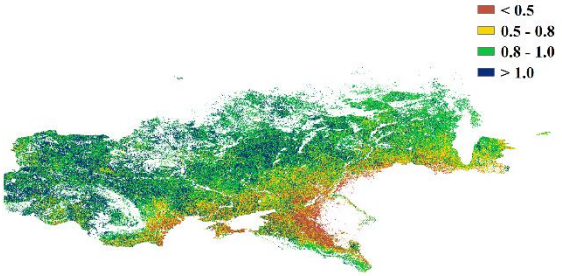


b. Profiles of rainfall departure from average (mm)

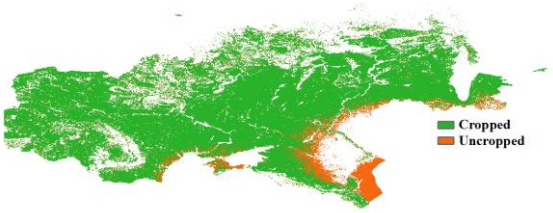


c. Spatial distribution of temperature profiles

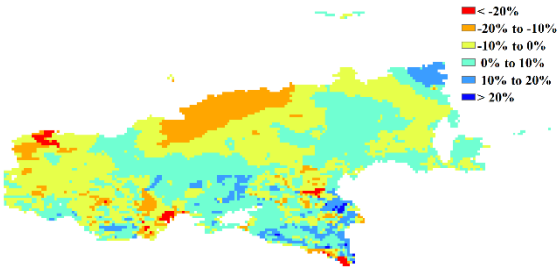
d. Profiles of temperature departure from average (mm)



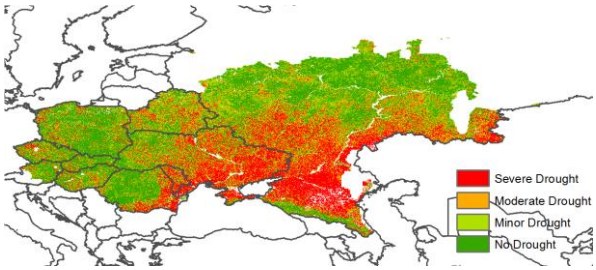
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

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