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 and 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 (October 2022-January 2023)

	RAIN		TEMP		RADPAR		BIOMSS	
	Current (mm)	Departure (%)	Current (°C)	Departure (°C)	Current (MJ/m²)	Departure (%)	Current (gDM/m²)	Departure (%)
West Africa	163	-22	24.5	-0.6	1220	-1	608	-9
North America	301	-1	5.8	0.6	521	-2	479	5
South America	397	-55	23.7	0.6	1343	2	974	-22
S. and SE Asia	294	0	20.5	-0.1	1037	2	616	1
Western Europe	353	-2	7.1	1.6	318	3	577	8
Central Europe and W. Russia	259	1	1.2	1.2	222	-4	374	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 fifteen-year average (15YA) for the same period (October of the previous year to January) for 2008-2022.*

Table 2.2 Agronomic indicators by Major Production Zone, current season values and departure from 5YA (October 2022-January 2023)

	CALF (Cropped arable land fraction)		Maximum VCI
	Current	5A Departure (%)	Current
West Africa	95	0	0.89
North America	61	-9	0.72
South America	95	-4	0.80
S. and SE Asia	97	1	0.88
Western Europe	93	1	0.90
Central Europe and W Russia	81	8	0.84

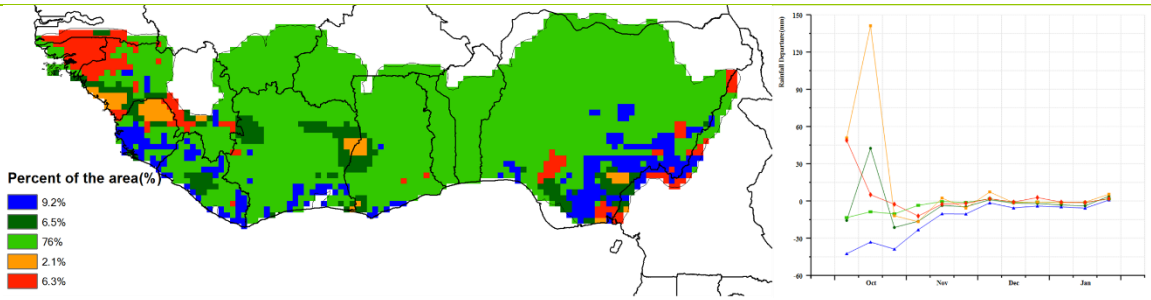
Note: See note for Table 2.1, with reference value R defined as the five-year average (5YA) for the same period (October of the previous year to January) for 2018-2022.

2.2 West Africa

This reporting period covers the harvesting period in this major production zone (MPZ). In the coastal regions, the harvest of the second season tuber crop, cassava, started in January. In the rest of the region, harvesting of rice, millet and sorghum crops was underway and concluded in January 2023. The MPZ relies significantly on imports of cereals, mostly of wheat and rice, to cover its domestic requirements. For Nigeria, cereal imports are forecasted at a near‑average level of 8.1 million tonnes.

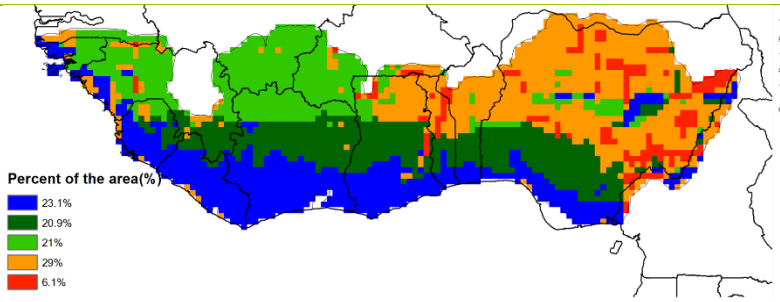
With respect to the climatic indicators for the region, the estimated average rainfall was 163 mm (-22%). At the country level, rainfall deficits were observed for Liberia (416 mm -13%), Sierra Leone (380 mm -7%), Equatorial Guinea (1,434 mm +9%), Togo (57 mm -40%), Burkina Faso (6 mm -77%), Nigeria (125 mm -33%), Ghana (125 mm -35%), Côte d'Ivoire (195 mm -24%) and Guinea (210 mm +6%). Based on the Vegetative Health Index (VHI), localized areas of severe to moderate drought stress were observed, mainly in Nigeria. The average temperature of the MPZ varied from 22.8°C (Equatorial Guinea) to 25.9°C (Guinea Bissau) with an estimated regional average of 24.5°C (-0.6°C) and solar radiation was 1,220 MJ/m2 (-1%) while the regional accumulated biomass production potential decreased by 9%. The cultivated arable cropped area (CALF) for the region was 95% (-0.2%), with Nigeria at 89% (+4%). As an indication of good crop conditions, the regional maximum vegetation condition index (VCIx) attained a favourable value of 0.89. These CropWatch indicators showed stable, but slightly drier-than-usual climatic conditions. In general, conditions were close to normal.

Figure 2.1 West Africa MPZ: Agroclimatic and agronomic indicators, October 2022- January 2023.

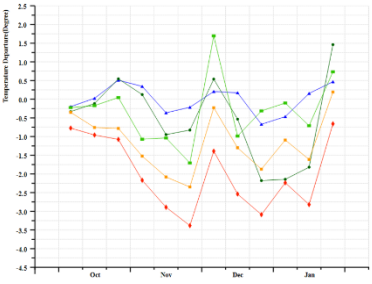


a. Spatial distribution of rainfall profiles

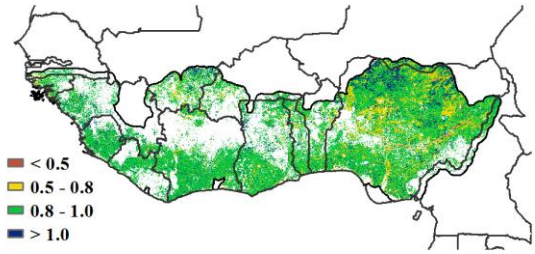
b. Profiles of rainfall departure from average (mm)



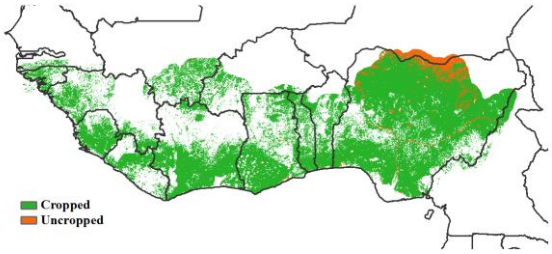
c. Spatial distribution of temperature profiles



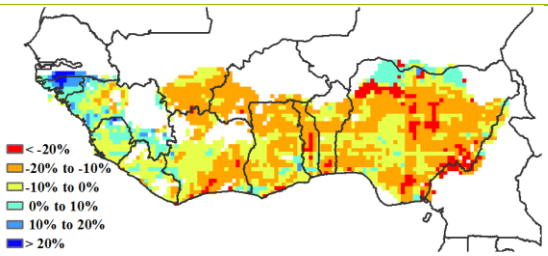
d. Profiles of temperature departure from average (mm)



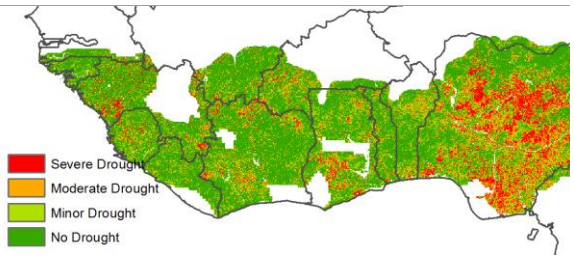
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. VHI minimum

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

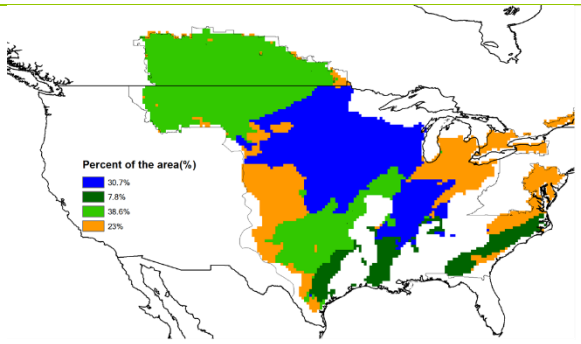
2.3 North America

During the October 2022 to January 2023 reporting period, the harvests of maize and soybean were completed, and winter wheat was sown. Overall, crop conditions for winter wheat were below average.

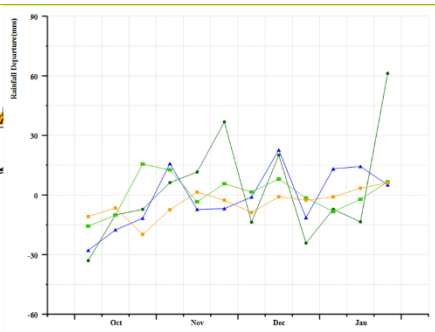
North America has experienced close to average conditions, with below average rainfall (-1%) and RADPAR (-2%), and above average temperature (+0.6°C), while potential biomass was 5% above average. During the previous monitoring period, severe drought conditions affected the region from the Canadian Prairies to the Southern Plains. Although drought conditions have improved in these areas during the current observation period, the minimum Vegetation Health Index (VHIm) indicates that drought conditions still exist, particularly in North Texas and Kansas. The negative deviation in potential biomass (<-20%) also confirms the negative impact of drought on crops in these areas. Poor crop conditions are reflected in Kansas with a VCIx below 0.5. Conditions in other regions were close to average. The maximum Vegetation Condition Index (VCIx) reached 0.72, but the Cropped Arable Land Fraction (CALF) for the whole region was significantly below average (-9%). It is still too early to predict the variation of winter crop yields.

In summary, crop conditions for winter wheat in North America were below average due to persistent drought conditions in North Texas and Kansas.

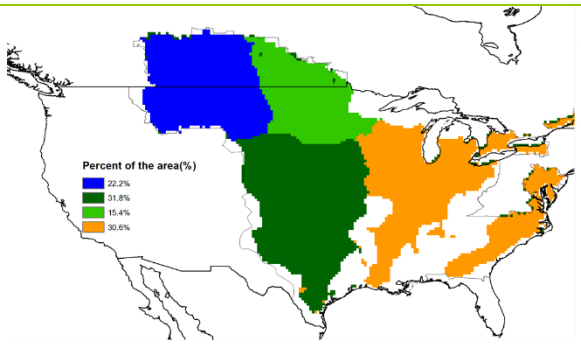
Figure 2.2 North America MPZ: Agroclimatic and agronomic indicators, October 2022-January 2023.



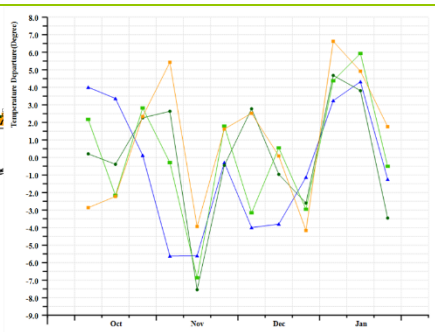
a. Spatial distribution of rainfall profiles



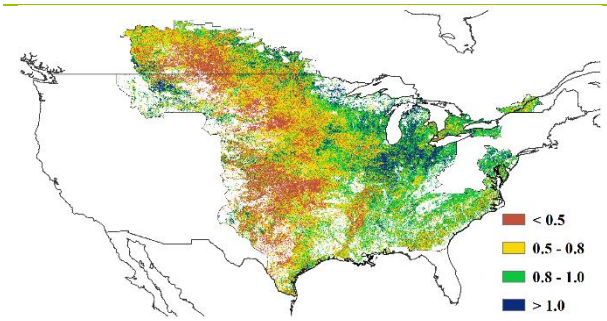
b. Profiles of rainfall departure from average (mm)



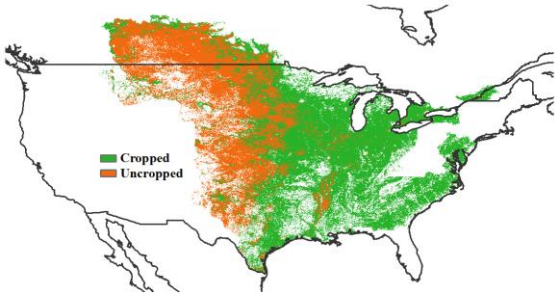
c. Spatial distribution of temperature profiles



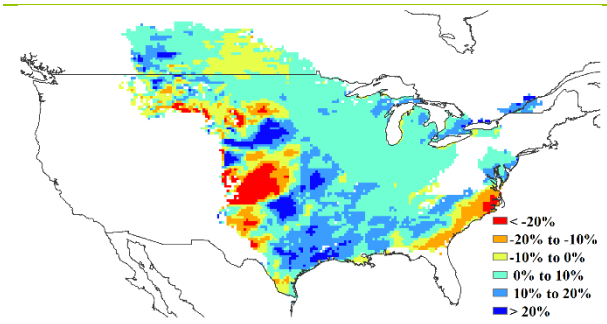
d. Profiles of temperature departure from average (mm)



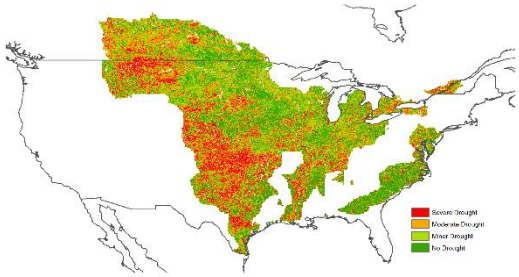
e. Maximum VCI



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 stages for early maize, early soybean and rice, planting of late maize and late soybean and the harvesting of wheat. The situation in South America is variable. Only TEMP showed in general near average values. Agronomic and drought

indicators showed poor conditions, in particular in North-East Pampas in Argentina and in the north of the Brazilian agricultural area.

Spatial distribution of rainfall profiles showed five different patterns. The blue profile showed the most negative anomalies and was located in the North of Brazilian agricultural area in the states of Mato Grosso, Goiás and Minas Gerais. The observed negative anomalies throughout the monitoring period ranged from -30 to -100 mm. The orange profile, located in the west of Mato Grosso, Mato Grosso do Sul, San Pablo and part of Rio Grande do Sul state, showed negative anomalies of near -60 mm during most of the period, except at the beginning of October and mid-December when it showed only slight negative anomalies. The red profile was observed in the west of Mato Grosso do Sul, Parana and Santa Catarina states in Brazil, East Paraguay and North Mesopotamia in Argentina and showed high variability, with positive anomalies in mid-October, mid-December and end-January, and negative anomalies during November and end-December. A dark green profile was observed in most of Chaco, Pampas and South Mesopotamia in Argentina, Uruguay and South of Rio Grande do Sul state in Brazil. It showed a quite stable pattern with near no anomalies along the reporting period. Finally, a light green profile was identified in small areas like in Subtropical Highlands and North-West Pampas in Argentina and East Santa Catarina state in Brazil. It showed high positive anomalies during November, December and January, with high peaks (more than 90 mm) at beginning of December and at the end of January.

Temperature profiles showed five homogeneous patterns. These profiles had some similarities among them, with reductions at the beginning of November (except for the blue profile), increases at the beginning of December, reductions at the end of December and increases again during January. Variation among profiles was mostly observed in the magnitude of the anomalies. The orange profile showed in general the most negative values and was observed in West Paraguay, North Mesopotamia in Argentina and Paraná and Santa Catarina states in Brazil. The light green profile, located in Chaco and North Pampas in Argentina, North and East Uruguay and Rio Grande do Sul, Mato Grosso do Sul and San Pablo sates in Brazil, showed less negative anomalies and higher positive anomalies. The blue profile showed also less negative anomalies and high positive anomalies and was observed in East Pampas, South-West Uruguay and West of Mato Grosso in Brazil. The dark green profile, located in South and West Pampas showed values in between the light green and blue profiles. Finally, the red profile showed in general the highest positive anomalies and almost no negative anomalies and was located in Mato Groso do Sul, Goiás and Minas Gerais states in Brazil.

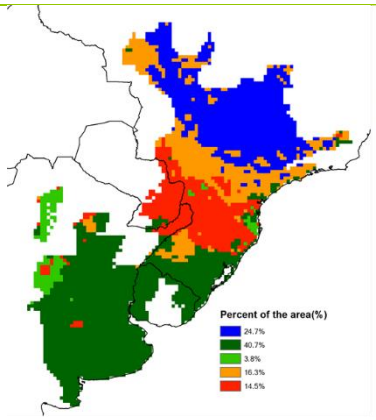
The CALF map showed uncropped areas in Argentina, in Center-East and South-West Pampas, Chaco and Subtropical Highlands. BIOMSS showed the poorest conditions with strong negative anomalies in Mato Grosso, Mato Grosso do Sul, Goiás, San Pablo and South of Rio Grande do Sul in Brazil, as well as in Chaco, South Mesopotamia and Center East Pampas in Argentina and in East Uruguay. Good conditions with positive anomalies were observed in East Paraguay, Paraná and Santa Catarina states in Brazil, and West Pampas and Subtropical Highlands in Argentina.

Surface soil moisture showed low values (less than 30%) in most of agricultural areas of Brazil and Argentina. Intermediate soil moisture values were observed in Paraguay and Mato Gross and Mato Grosso do Sul in Brazil. SPI showed severe to extreme conditions in Goiás and Minas Gerais states in Brazil. Moderate to severe drought conditions were observed in Center-East Pampas and South Mesopotamia in Argentina, Uruguay and Rio Grande do Sul in Brazil. The poor conditions in the drought stricken areas may have affected wheat production and corn and soybean development, and may also have affected or delayed the planting of summer crops in Argentina, where the CALF showed some uncropped areas. Wet conditions were observed in North-West Pampas and

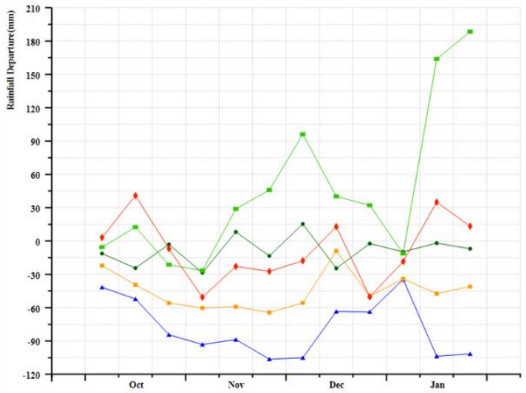
Subtropical Highlands in Argentina. The rest of Brazil and Argentina and Paraguay showed normal conditions.

VCIx showed good conditions in Paraguay and most of Brazil (with values higher than 0.8), except for Río Grande do Sul state where poor conditions were observed. The worst conditions were observed in Argentina, with values of VCIx less than 0.5 in North and Center-East Pampas, Chaco, East Subtropical Highlands and South Mesopotamia. Good conditions in Argentina were only observed in part of West and South Pampas and South-West Subtropical Highlands.

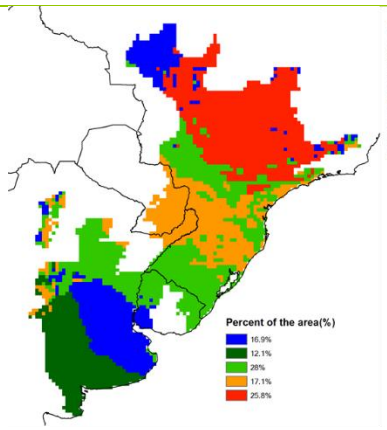
Figure 2.3 South America MPZ: Agroclimatic and agronomic indicators, October 2022 to January 2023.



a. Spatial distribution of rainfall profiles

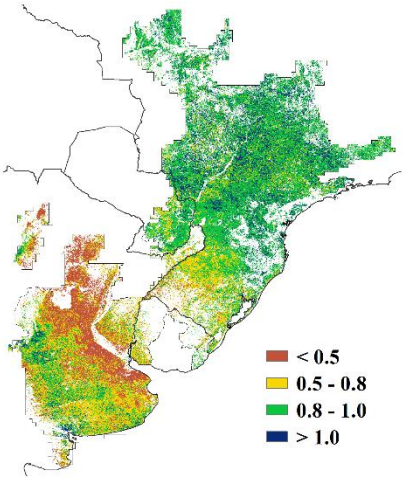


b. Profiles of rainfall departure from average (mm)

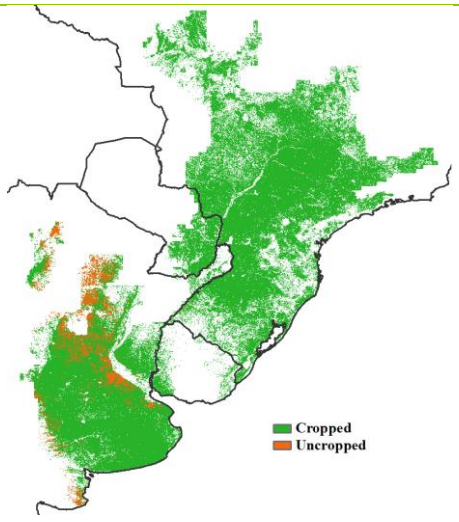


c. Spatial distribution of temperature profiles

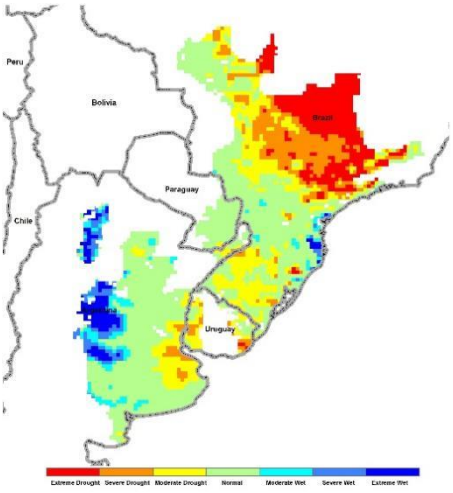
d. Profiles of temperature departure from average (mm)



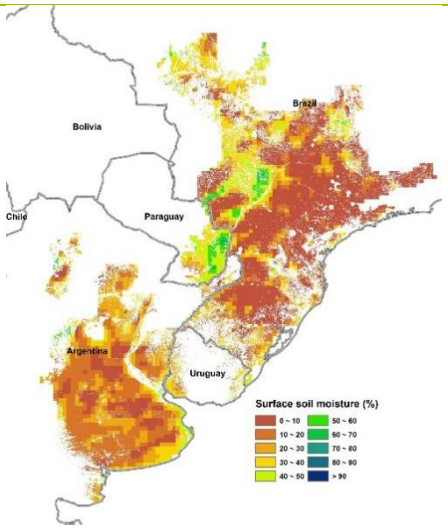
e. Maximum VCI



f. Cropped arable land



g. Biomass accumulation potential departure



h. Soil Mositure (0-10cm)

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

2.5 South and Southeast Asia

The South and Southeast Asia MPZ includes India, Bangladesh, Cambodia, Myanmar, Nepal, Thailand, Laos, and Vietnam. This monitoring period covers the harvesting period of autumn crops (rice, corn, and sugarcane) and the sowing as well as the growing period of winter crops (wheat) in the region.

The accumulated precipitation was unchanged compared with the 15YA, while the temperature was slightly below the 15YA (TEMP -0.1℃) and the RADPAR (+2%) was above the 15YA, resulting in an estimated biomass increase (BIOMSS +1%). Compared with the 5YA, the CALF increased by 1% to 97%. The VCIx of the MPZ was 0.88, indicating that the crops were growing well.

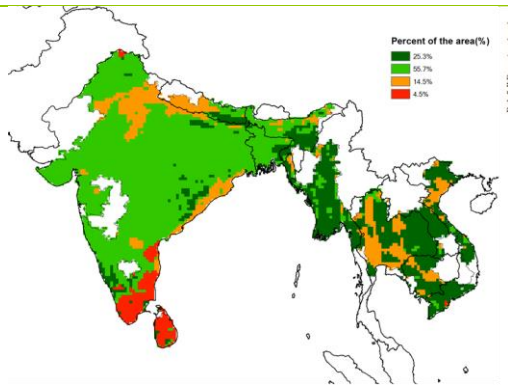
Based on the spatial distribution of rainfall profiles, 14.5% of the MPZ (northern and southeastern India, Nepal, Thailand, Cambodia, and northern Vietnam) experienced higher precipitation levels in early October compared to the 15YA. They dropped sharply to the average level in the middle of October. Between October and early November, the precipitation for 25.3% of the MPZ was lower than the average, which occurred in eastern India, Myanmar, Laos, Cambodia, and Vietnam. However, heavy precipitation occurred in late November, leading to flooding disasters in central Vietnam. The precipitation for 4.5% of the MPZ (southern India, Sri Lanka) fluctuated around the 15YA. After the middle of December, precipitation levels for all cultivated land in the MPZ returned to levels close to the 15YA. According to the spatial distribution of temperature profiles, during the whole monitoring period, 1% of the MPZ (northern India and central Nepal) recorded significantly higher temperature departures than the 15YA, and 12% of the areas (northern and eastern India, Nepal and Myanmar) had slightly higher temperature departures than the 15YA. 67.4% of the MPZ (India and Bangladesh) had negative temperature departures t from October to late November. 19.6% of the MPZ (Thailand, Laos, Cambodia, and Vietnam) had strong temperature fluctuations, with temperatures higher than the average from the middle of November to early December, and lower than the average most of the time.

The BIOMASS departure map shows that the potential biomass of northwest and southern India was 20% greater than the historical average for the same period, while the potential biomass in northern India, eastern India, Myanmar, and northern Vietnam was below the average. The Maximum VCI shows that the index in northern India and various isolated locations were above

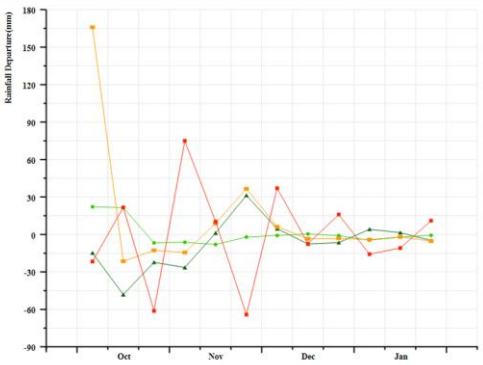
1.0. The VHI Minimum map shows that north and central India, regions in Myanmar, Thailand, and Cambodia experienced periods of severe drought conditions. The CALF map indicates that a significant portion of the region was planted, except for northwest India.

In general, the growth conditions for winter crops in the main production area were close to normal.

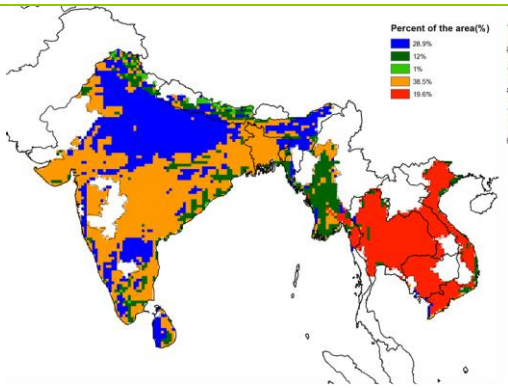
Figure 2.4 South and Southeast Asia MPZ: Agroclimatic and agronomic indicators, October 2022 to January 2023.



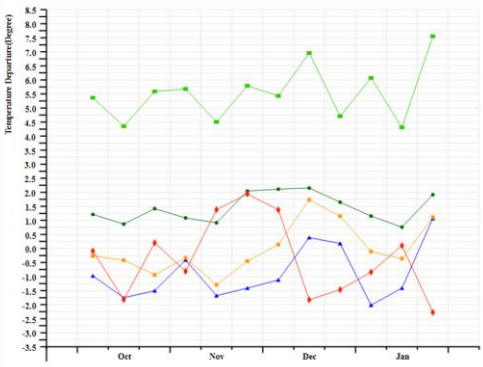
a. Spatial distribution of rainfall profiles



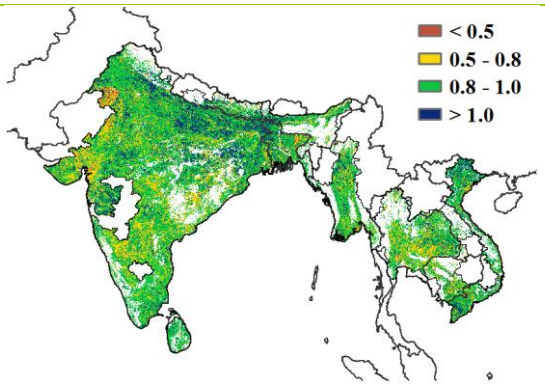
b. Profiles of rainfall departure from average (mm)



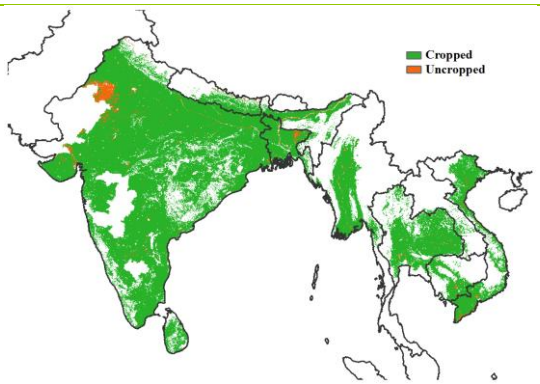
c. Spatial distribution of temperature profiles



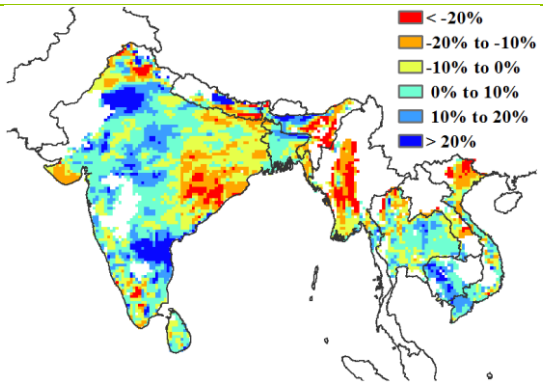
d. Profiles of temperature departure from average (mm)



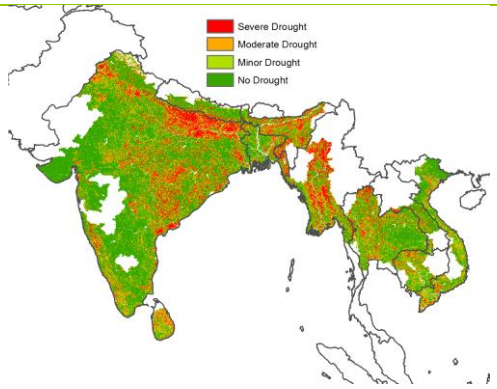
e. Maximum VCI



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 report covers the sowing period of winter crops in the major production zone (MPZ) of Western Europe. In general, crop conditions were above average or close to average in most parts of this region due to favourable sunshine conditions and warmer-than-usual temperatures (Figure 2.5).

The CropWatch agro-climatic indicators show that the overall rainfall deficit across the MPZ has continued from the last two reports, but the magnitude of the deficit has been significantly reduced, with a deficit of only 2% below average for the whole MPZ for this reporting period. The spatial and temporal distribution of rainfall varies considerably between countries, and rainfall patterns can be characterized as follows: (1) Precipitation was about average in 50.5% of the MPZ (green and dark green areas in Fig. 2.6a), with the exception of late November/early December and late January, when precipitation was well below average, and late December and mid-January, when precipitation was well above average. This includes most of Germany, most of France and central and northern UK; (2) Precipitation was below average in 25.4% of the MPZ (yellow areas in Fig. 2.6a), with the exception of slightly above average precipitation in early and mid-December and mid-January. It mainly affected eastern and northeastern Spain, southeastern France (Auvergne Rhone-Alpes), northern and southeastern Italy and eastern and northeastern Germany (Saxony, Brandenburg, Saxony-Anhalt, Mecklenburg-Western Pomerania); (3) With the exception of mid-November, late December and late January, 10.8% of the MPZ (the blue area in Fig. 2.6a) received above-average precipitation during the observation period, with particular peaks of significantly above-average precipitation in early December. It mainly affected parts of central Italy, west-central Spain, south-western France (south of Aquitaine Limousin Poitou-Charentes, south-west of Languedoc-Roussillon Midi-Pyrenees); (4) above-average precipitation occurred in western France (Bretagne) and eastern France (eastern Auvergne Rhone-Alpes, eastern Bourgogne Franche-Comte, central Alsace Champagne-Ardenne Lorraine), southern, eastern and western UK (red areas in Fig. 2.6a), with the exception of early October, early December and late January. The countries with the most severe precipitation deficits were Germany (RAIN -12%), Italy (RAIN -9%), and France (RAIN -7%). The rainfall deficits in October have favoured the harvesting of autumn crops, but may also have delayed the germination of winter crops in northern Italy, northern Germany, and south-eastern Spain.

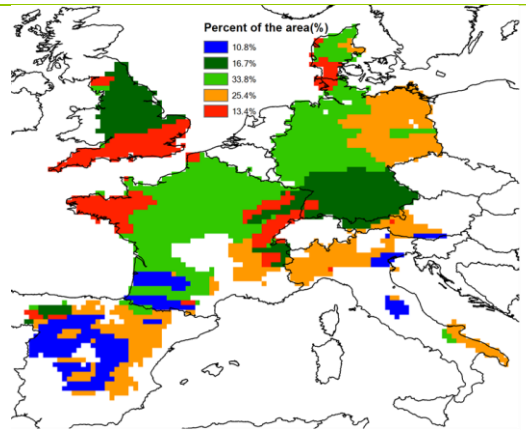
CropWatch agroclimatic indicators show that the MPZ experienced relatively mild weather (TEMP +1.6°C) with good light conditions (RADPAR +3%). As shown in the spatial distribution of temperature profiles, except for early and mid-December and late January, temperatures were

above average in almost all the MPZ during the monitoring period, particularly in mid and late October and in late December and early January, when temperatures were significantly above average. The relatively mild weather in the MPZ has resulted in very limited winter frost damage to winter crops, but at the same time, the lack of frost conditions may increase pest and disease pressure later in the season.

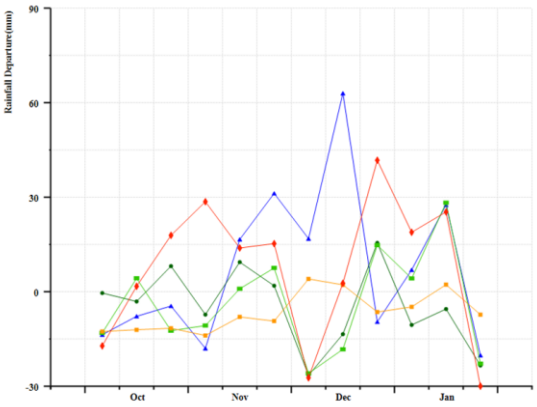
Due to favourable solar radiation and warmer-than-usual temperatures, the potential BIOMSS was 8% above average. Significant BIOMSS departures (-20% and less) occurred in the Northwest and Southeast of Italy, northeast Germany, east and northeast Spain, which was consistent with the above description of areas where precipitation deficits occurred. The average maximum VCI for the MPZ was only 0.90. The lowest VCI values also occurred in areas for which negative BIOMSS departures (-20% and less) were observed. More than 93% of arable land was cropped, which was 1% above the recent five-year average. Most uncropped arable land was concentrated in Spain and northwestern Italy, with patchy distribution in south-eastern and south-western France, and other countries. The VHI minimum map shows that north-west Italy, south-western France, east and northeast Spain were most affected by drought conditions, which is consistent with continuous rainfall deficits in these countries during the monitoring period.

Generally, crop conditions were above average or close to average in most parts of this MPZ.

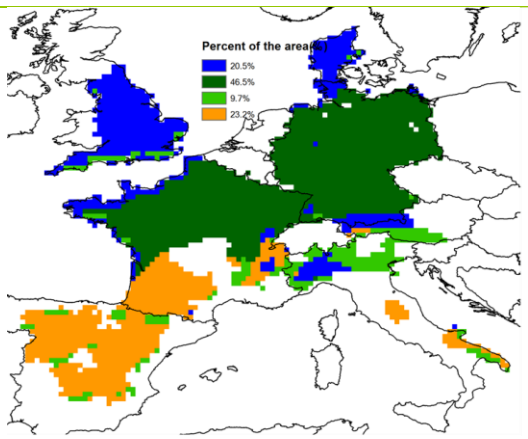
Figure 2.5 Western Europe MPZ: Agroclimatic and agronomic indicators, October 2022-January 2023.



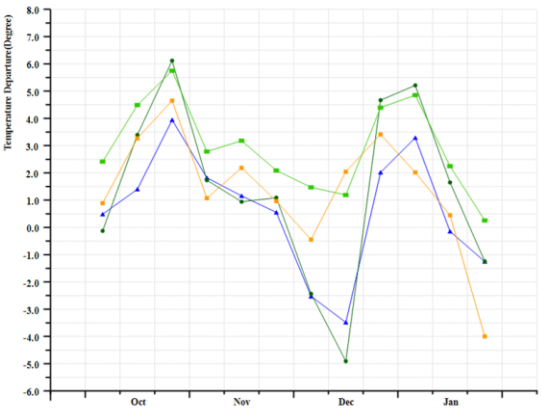
a. Spatial distribution of rainfall profiles



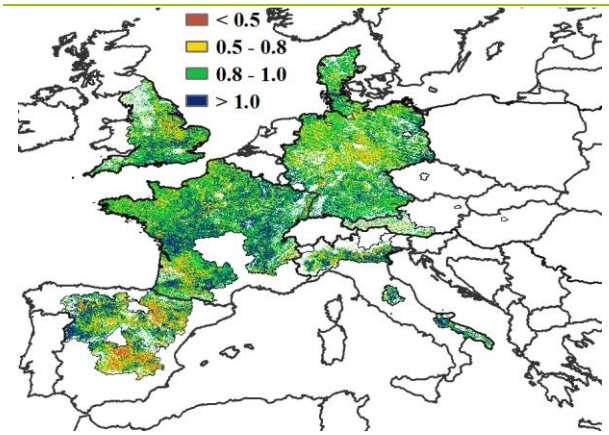
b. Profiles of rainfall departure from average (mm)



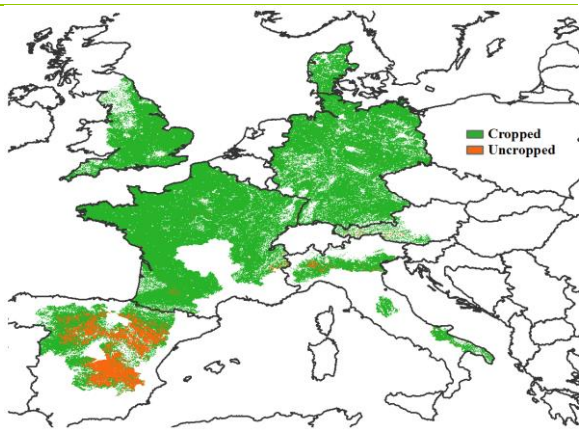
c. Spatial distribution of temperature profiles



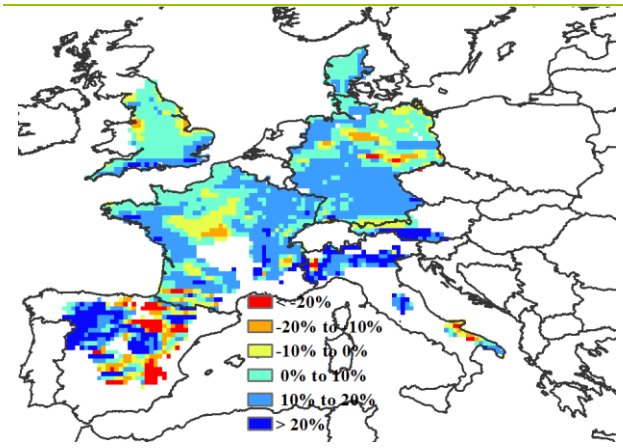
d. Profiles of temperature departure from average (mm)



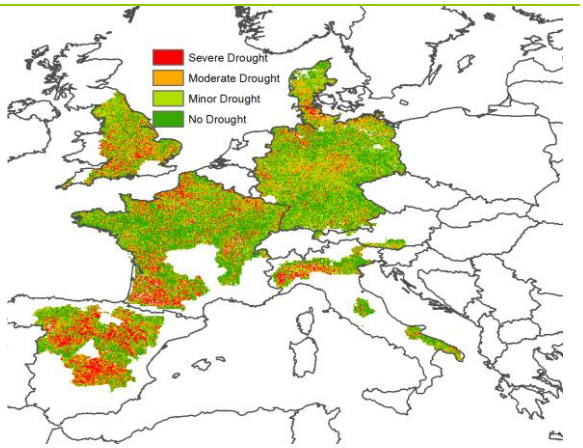
e. Maximum VCI



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 and the growing period of winter crops. In general, the agroclimatic indicators in this MPZ were close to average, with higher precipitation (+1%), higher temperature (+1.2°C), and lower RADPAR (-4%), as compared to the 15YA.

According to the spatial distribution map of rainfall departure, precipitation was close to the 15 year average value and the range of fluctuation was relatively small. The specific spatial and temporal distribution characteristics were as follows: (1) In October, 43.4% of the region (the west, south and northeast of the MPZ) received below-average precipitation. The reduction of precipitation provided favorable conditions for the harvest of autumn crops and the sowing of winter crops, but may also have delayed the germination and early development of winter crops; (2) In the middle of November, 68% of the regions (the southwest, central and eastern parts of the MPZ) received above-average precipitation, and the precipitation in other areas was close to the average, which helped alleviate the negative impact of insufficient precipitation in some areas in October; (3) In the middle of December, the precipitation in all areas of the MPZ exceeded the average value; (4) From late December to the end of the monitoring period, the precipitation in 88.4% of the MPZ (the northwest, central and eastern parts of the MPZ) showed a small downward trend and remained below average until the end of January.

The spatial distribution of the temperature profiles shows that temperature fluctuated greatly in most areas of the MPZ. The specific spatial and temporal distribution characteristics were as

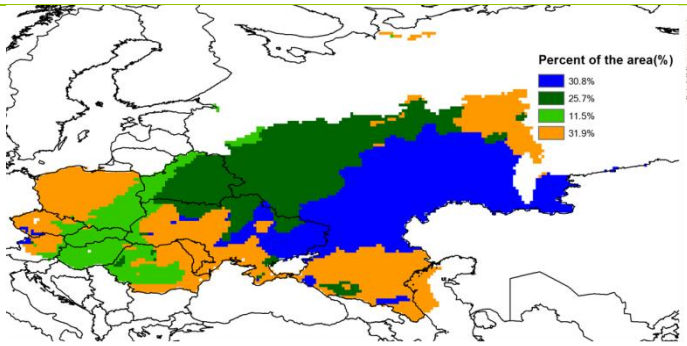
follows: (1) In October, the average temperature in the MPZ trended higher than the average value. Only in the middle of October, the temperature in 38.2% of the MPZ (southwest Russia and eastern Ukraine) was slightly below-average; (2) In early December, the temperature in 63.4% of the MPZ was significantly below-average, mainly distributed in western Russia and eastern Ukraine; (3) In early and middle January, the average temperature of 36.5% of the western region in the MPZ was significantly higher than the average value of the same period in the past; (4) In late January, the average temperature of all regions in the MPZ was higher than the average.

On average, the potential biomass in the MPZ was higher than the 5YA (3%). The areas with a 20% lower potential biomass were mainly located in southern Romania and southern Russia; the areas with a 10% higher potential biomass were mainly located in the south-western part of the MPZ, including eastern Poland, southwestern Belarus, western and southeastern Ukraine, Slovakia, southwestern Czechia, eastern Austria, western Hungary, and western Romania.

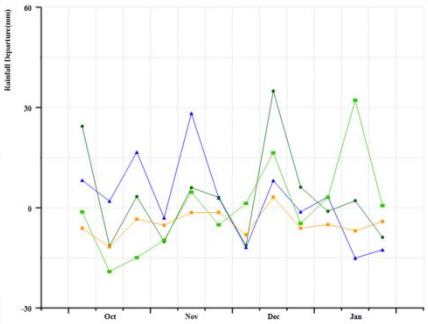
During this monitoring period, most of the arable land in MPZ was cultivated, with a CALF value of 81% (+8%). The VCIx showed a significant spatial variation, with an average value of 0.84. The regions below 0.5 were mainly in southern Ukraine, southeastern Romania, and southwestern Russia, which was consistent with the uncropped arable land map.

Overall, CropWatch agroclimatic and agronomic indicators indicate that crop growth was expected to be slightly above average during this monitoring period.

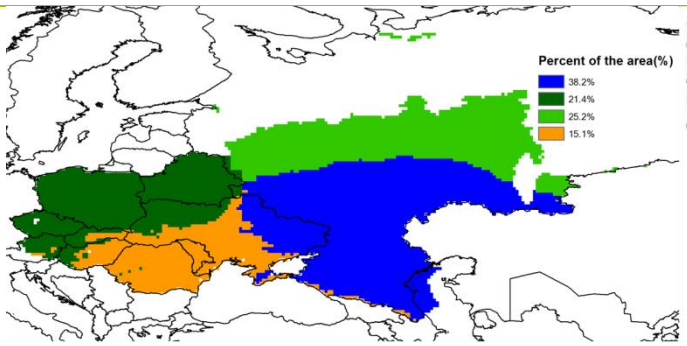
Figure 2.6 Central Europe to Western Russia MPZ: Agroclimatic and agronomic indicators, October 2022 to January 2023.



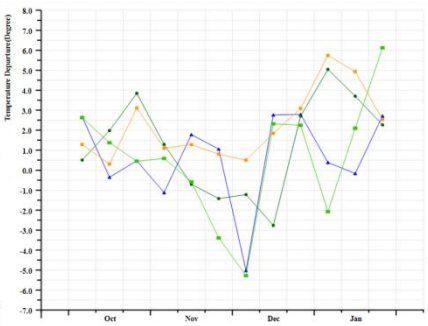
a. Spatial distribution of rainfall profiles



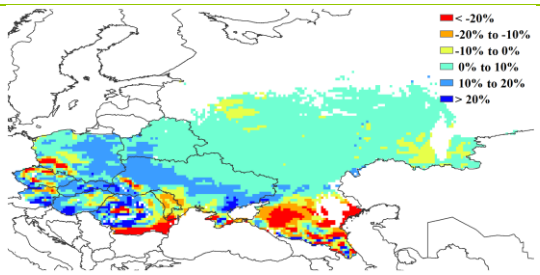
b. Profiles of rainfall departure from average (mm)



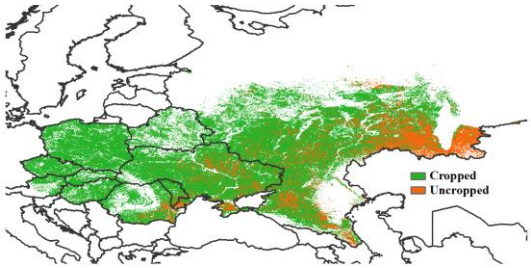
c. Spatial distribution of temperature profiles



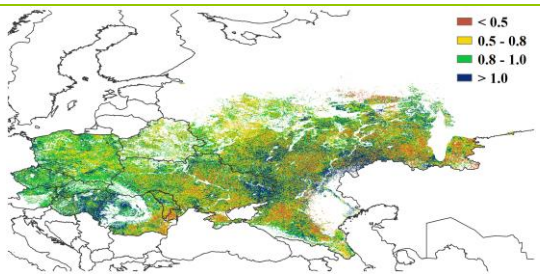
d. Profiles of temperature departure from average (℃)



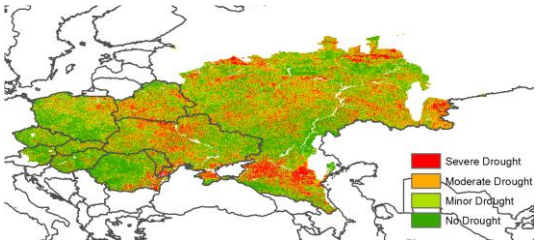
e. Biomass accumulation potential departure



f. Cropped arable land



g. Maximum VCI



h. VHI minimum

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