

## Chapter 5. Focus and perspectives

*Building on the CropWatch analyses presented in chapters 1 through 4, this chapter presents first early outlook of crop production for 2019 (section 5.1), as well as sections on recent disaster events (section 5.2), and an update on El Niño (5.3).*

### 5.1 CropWatch food production estimates

#### Methodological introduction

CropWatch production estimates are based on a combination of remote-sensing models combined with CropWatch global agro-climatic and agronomic indicators as well as meteorological data from over 20,000 meteorological weather stations around the world. The major grain crops (maize, rice, wheat) and soybean production of 43 major producers and exporters are estimated and predicted for 2020. The results are as follows.

#### Production estimates

In 2020, global maize production is expected to be 1.070 billion tons, an increase of 1.4% or equivalent to 15.15 million tons; global rice production is expected to be 760 million tons, an increase of 0.9% or an increase of 6.80 million tons; global wheat production is 738 million tons, a 3.1% increase of 21.98 million tons; global soybean production is expected to be 323 million tons, a slight decrease of 0.2%. In 2020, the global production of major cereals and oil crops will be generally stable. COVID-19 has limited impact on global food production. (Table 5.1).

**Table 5.1 2020 cereal and soybean production estimates in thousand tonnes.  $\Delta$  is the percentage of change of 2020 production when compared with corresponding 2019 values.**

	Maize		Rice		Wheat		Soybean	
	2020	$\Delta\%$	2020	$\Delta\%$	2020	$\Delta\%$	2020	$\Delta\%$
Afghanistan					5204	-22		
Angola	2961	7	46	2				
Argentina	54054	2	1938	5	14866	-16	52587	2
Australia					27942	44		
Bangladesh	2386	1	46010	-5				
Belarus					3091	6		
Brazil	87502	2	11578	-1	4204	3	101040	0
Cambodia	982	6	10120	1				
Canada	11938	0			33947	5	7669	0
China	226078	1	201176	0	127053	3	14574	1
Egypt	6121	3	6795	2	12060	2		
Ethiopia	6933	-4			3691	-4		

	Maize		Rice		Wheat		Soybean	
	2020	Δ%	2020	Δ%	2020	Δ%	2020	Δ%
France	14436	-1			34839	-2		
Germany	4830	1			26639	-4		
Hungary	6337	7			5212	7		
India	18602	1	180275	7	95806	6	11653	3
Indonesia	16653	2	64916	1				
Iran			2937	4	16436	2		
Italy	6445	2			7818	1	1616	2
Kazakhstan					12872	1		
Kenya	2889	6			317	4		
Kyrgyzstan	707	6			626	6		
Mexico	23756	7			4311	3	865	13
Mongolia					279	3		
Morocco					6303	-5		
Mozambique	2020	-3	382	0				
Myanmar	1877	1	25591	-7				
Nigeria	10083	-12	4190	-9				
Pakistan	5615	7	11485	6	27502	4		
Philippines	7149	2	20739	1				
Poland					10753	6		
Romania	12802	-4			7406	-4		
Russia	13813	4			55658	4	3757	3
South Africa	11763	1			1483	8		
Sri Lanka			2514	5				
Thailand	4200	-2	40625	3				
Turkey	6534	-5			19337	4		
Ukraine	27934	1			22139	6		
United Kingdom					12726	-5		
United States	374266	2	11687	2	53324	-3	104519	2
Uzbekistan					9114	12		
Vietnam	5403	4	46834	2				
Zambia	1969	5			86	7		
<b>Total</b>	<b>979036</b>	<b>1</b>	<b>689840</b>	<b>2</b>	<b>663043</b>	<b>3</b>	<b>298281</b>	<b>1</b>
<b>Others</b>	<b>91226</b>	<b>3</b>	<b>70638</b>	<b>-6</b>	<b>75075</b>	<b>4</b>	<b>25094</b>	<b>-16</b>
<b>Global</b>	<b>1070263</b>	<b>1</b>	<b>760478</b>	<b>1</b>	<b>738118</b>	<b>3</b>	<b>323375</b>	<b>0</b>

### **Maize**

The global maize production supply situation is generally favorable. Maize production of the world's top five maize producers increased by 0.8% to 2.5%, and the total maize production of the top five maize producing countries increased by 10.72 million tons. The United States, as the world's largest maize producer, maize production increased by 1.6% to 374.266 million tons. More than 5.0% year-on-year production increase were observed in 8 countries (Pakistan, Mexico, Angola, Hungary, Cambodia, Kenya, Kyrgyzstan, and Zambia). Nigeria, Turkey, Romania, and Mozambique experienced drought impact during the critical maize growth period and maize production decreased by 12.1%, 5.1%, 3.5% and 3.1%, respectively. Ethiopia was affected by the desert locust and other unfavorable factors, and its maize production decreased by 3.8%. The overall maize production of other countries is close to last year.

### **Rice**

Compared with the other three major crops, rice is mostly grown in areas with abundant rainfall or well-developed irrigation facilities. Therefore, the inter-annual variation of rice production is generally smaller than the other three crops. However, some countries still experienced large inter-annual changes due to the extreme weather. Affected by the drought in 2020, Bangladesh, Myanmar, and Nigeria have the largest reduction in rice production by 4.6%, 7.3%, and 8.6% respectively; Brazil, Mozambique, and China also saw a slight decrease in rice production, with a decrease of 0.6%, 0.3% and 0.2% respectively. The rest of the main rice-producing countries all achieved increased production compared to 2019. India as the world's second largest rice producer, rice production increased by 7.2%, or 12.13 million tons, reaching 182.75 million tons. The increase in production was mainly due to favorable agro-meteorological conditions. Pakistan, Argentina, Sri Lanka and Iran's rice production increased by more than 4%. In general, the global rice production and supply situation is in overall stable.

### **Wheat**

The wheat in most major producing countries in the northern hemisphere was harvested in June to July 2020. The agro-meteorological conditions in late growing stage of spring wheat are generally conducive to the formation of crop yields. CropWatch revised spring wheat production in many countries up from 2020 August prediction. The wheat production in United States, France, Germany and Romania decreased 2.5%, 2.1%, 4.1% and 4.4% respectively, with smaller inter-annual changes compared with August 2020. Among the southern hemisphere countries, wheat in Argentina was affected by severe drought and the wheat production fell sharply by 15.7% at 14.866 million tons. In contrast, Australia received abundant rainfall in the wheat-producing area, which provides sufficient water for rain-fed wheat. Wheat output increased by 8.57 million, an increase of 44.3% from 2019, the largest production increase among the 43 countries. At the same time, the total wheat output of the world's top ten wheat producing countries increased by 20.63 million tons, an increase of 4.3%, ensuring the stability of the global wheat supply situation.

### **Soybean**

In 2020, the production of the world's top 9 soybean producing countries increase at different degrees: the top 3 producing countries, the United States, Brazil, and Argentina, have production

of 104.519 million tons, 101.04 million tons and 52.587 million tons, respectively, achieving a slight increase in production. China, India, Canada and Russia ranked 4-7 in soybean production also achieved minor increased production, mainly attributed to both increases in soybean planted area and yield. However, the soybean cultivation in other minor soybean producing countries decreased and the total soybean production of all other none major producing countries is only 25.095 million tons, a sharp decrease of 16.1%. This might be a trade-off due to the restriction of agriculture practices caused by the Covid-19 Pandemic. In general, the global soybean market is stable.

## 5.2 Disaster events

### *Introduction*

The achievement of Sustainable Development Goal 2 (Zero Hunger) became harder in 2020, particularly after the global spread of the new coronavirus (COVID-19). The new pandemic overlapped with other disasters and put more pressure on the local and national organizations in their fight against hunger. As a result, the UN expects an increase of the number of hungry people by at least 83 to 132 million people by the end of 2020, instead of a decrease. Hence, the 2020 setback in the fight against hunger may hamper the achievement of the Zero Hunger target of the Sustainable Development Goals by 2030. More efforts by the global community will be needed in the upcoming years. The current report highlights the major disasters that threaten global health and food security.

### *Extreme conditions by type*

#### *COVID-19*

As of October 31, up to 50 million people were infected, and more than one million people lost their lives in the fight with the new virus around the globe. Despite the high rate of recovering people, there is growing concern about the second wave of COVID-19, which already started in Europe and the USA. Many countries had started to ease the restrictions on people and goods movements after July, but with the current rise of infection rate, several countries are back to the initial emergency level of restrictions on movement and social distancing, such as in Germany.

The new pandemic has a profound impact on the food supply chain at its all stages, including agricultural production, postharvest handling, processing, and consumption. A large number of farmers and food packaging workers were identified as COVID-19 positive in several countries such as USA, Brazil, England, Ghana and Germany. Besides, the production capacity of pork facilities decreased by approximately 25% in Europe in late April. However, new hygiene standards have been put in place by now and the slaughter houses are working at full capacity again. As a result of illness, physical distancing requirements and travel restrictions, there was a considerable shortage of farm workers which forced some countries, such as France and the United Kingdom, to call unemployed people to work in the agriculture fields.

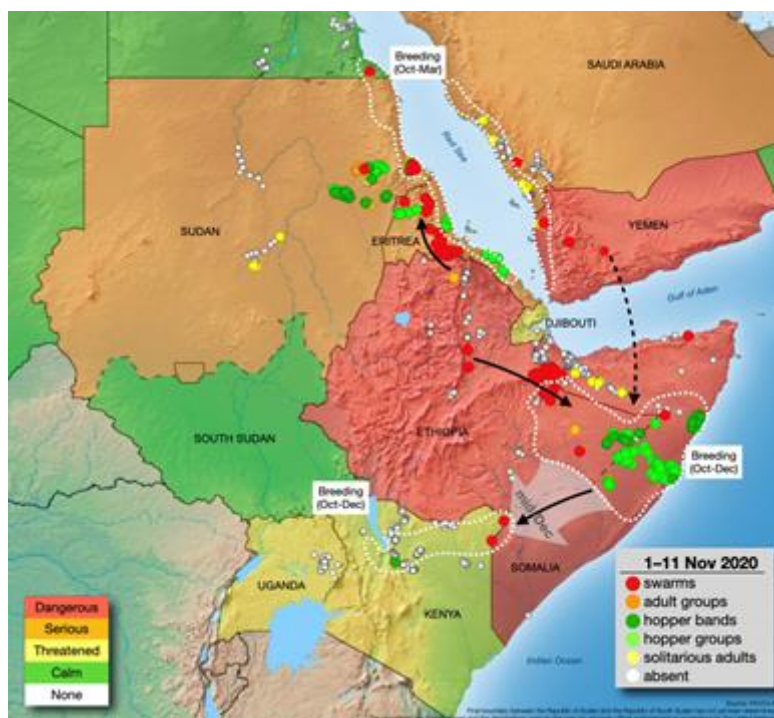
Furthermore, dairy farmers in the USA and England were forced to dump a million liters of milk due to interrupted supply chain. The restrictions on people's movement impacted consumer's demand: They cannot go to restaurants and they prepare their meals at home.

The impacts of COVID-19 on food supply chain may continue due to the second winter wave of COVID-19 that already started in Europe. Fortunately, several countries already announced that vaccines have been successfully tested in people and the companies are now ramping up production. With the availability of Covid-19 vaccines, the restrictions could be alleviated gradually until COVID-19 is under full control.

### *Desert locust*

Ethiopia remains the epicenter of the locust movement in Africa. Despite of intensive control operations conducted in October, numerous swarms moved from central parts in Ethiopia to the northern highlands and reached Eritrea, Sudan, and southeastern Egypt. The swarms' movement towards Somalia, in the south of Ethiopia, during October was even more extensive. This could form another epicenter of locust shifting towards the South African countries in the coming months. Red locust hoppers already reached Angola, Botswana, Namibia, Zambia, and Zimbabwe by the end of October, and could potentially disrupt the 2020/2021 agricultural season that is due to start in October/November and thereby affect household and national food security.

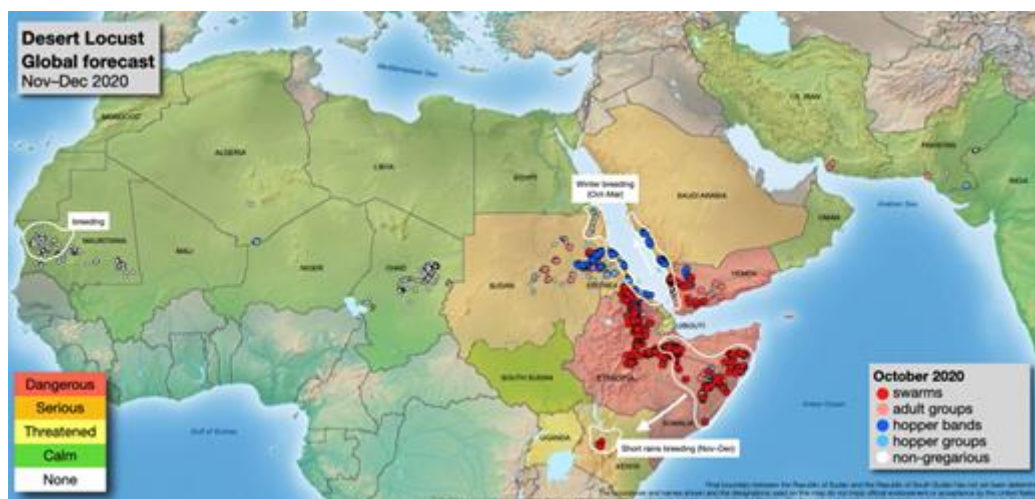
Winter breeding areas in Africa are mainly clustered in Sudan, Chad, and Mauritania. Along both sides of the red sea, the breeding continued particularly in Yemen and Saudi Arabia while the situation was calm in the other Asian countries.



**Figure 5.1** FAO desert locust bulletin, the current situation during November 2020.

Source: <http://www.fao.org/ag/locusts/common/ecg/75/en/201112DLupdate.jpg>





**Figure 5.2** FAO desert locust bulletin, forecast until mid-December 2020.

Source: <http://www.fao.org/ag/locusts/common/ecg/75/en/201101forecast.jpg>

### Wind storms

In Iowa, USA, an extreme Derecho occurred on August 10. The intense, widespread, and fast-moving windstorms caused extensive damage to homes, power lines and businesses. It damaged about one third of its maize crop. According to an USDA report, about 10% of the corn fields could not be harvested. USDA reduced its estimate of harvested acres from 13.6 to 12.7 million acres for Iowa.

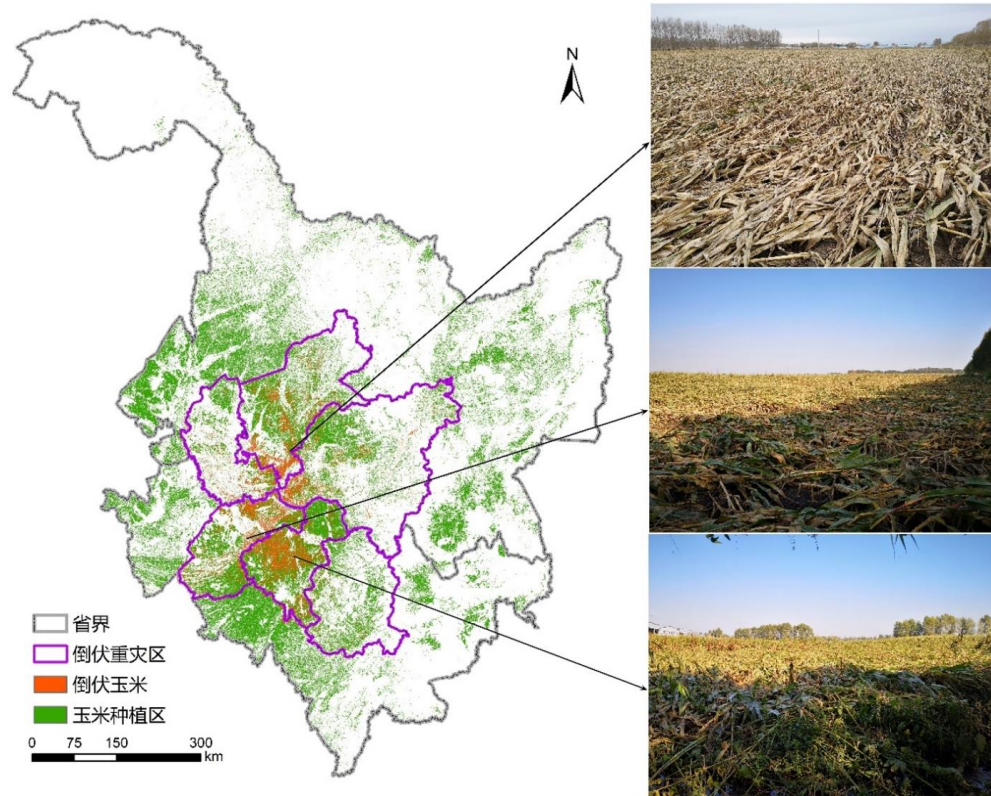


**Figure 5.3** The massive damage of the maize fields in Iowa, USA, after the Derecho on August 10, 2020.

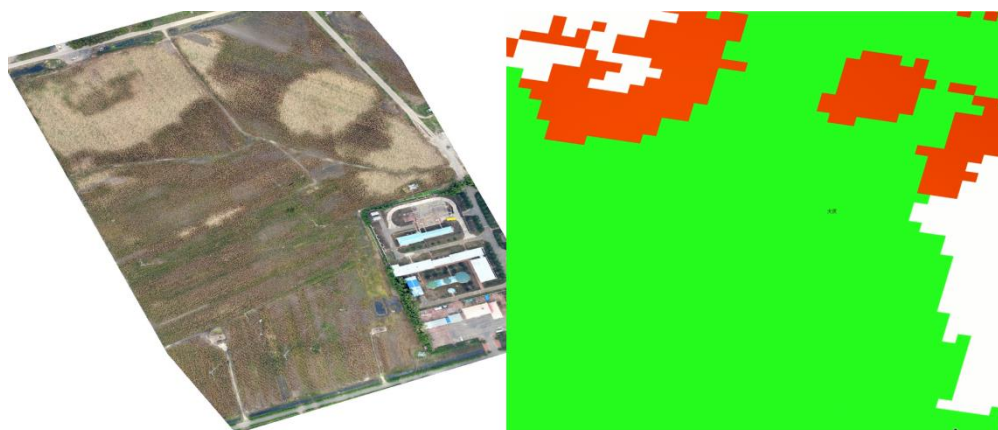
(Source: <https://agfax.com/2020/08/12/iowa-field-reports-derecho-devastates-state-infrastructure-crops/>)

From the end of August to mid-September in 2020, three typhoons Pravit, Maysak and Poseidon continuously invaded northeast China, which caused large areas of maize lodging in Daqing, Suihua, Harbin in Heilongjiang province and Changchun, Songyuan and Jilin in Jilin Province

(Figure 4-8). The total area of lodging maize is 1,103 thousand hectares. Lodging area accounts for 23.8% of the total maize area of the six aforementioned cities and 10.4% of the total corn area of the two aforementioned provinces. Maize in other regions was hardly affected by the typhoon. UAV images were also used in maize lodging monitoring. The high-resolution aerial imageries and satellite remote sensing monitoring results were overlaid for comparison, reflecting the high accuracy of lodging monitoring results (Figure 4-9).



**Figure 5.4 Remote sensing monitoring results of maize lodging in Heilongjiang and Jilin provinces of China in 2020**



**Figure 5.5 Comparison between UAV aerial imagery and remote sensing monitoring of maize lodging area in Zhaodong, Heilongjiang province**

(Note: The bright yellow area in the left image represents the lodging maize, while the green area in the right image represents normal maize fields and the red area presents lodging maize identified by satellite)

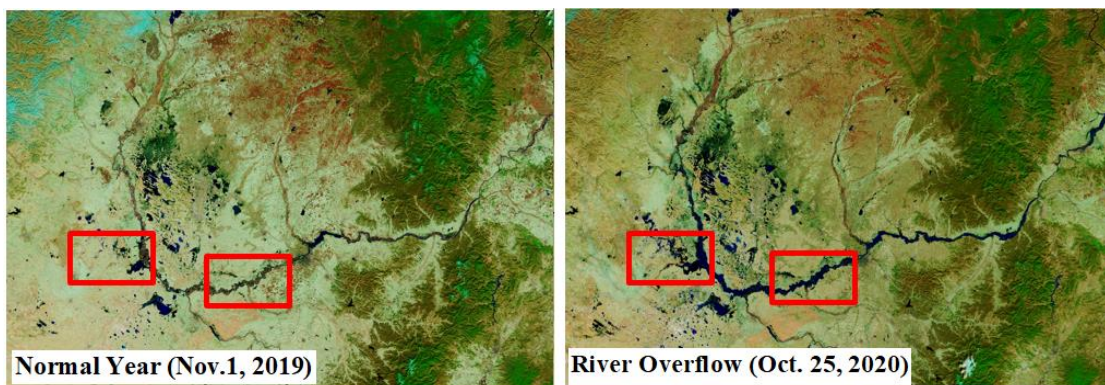


### *Floods & Typhoons*

In Africa, a record rainfall has been marked in August over central and southern provinces of Chad. In the provinces the Lac and N'Djaména 388,000 people were affected. These heavy rains were followed by massive floods that destroyed 150,000 hectares of cultivated land and washed away 10,000 cattle. Also, the heavy rainfall affected central and eastern states in South Sudan and caused the overflow of the White Nile and Akobo Rivers. This impacted the lives and livelihoods of over 600,000 people. In September, severe floods following the heavy rains affected thousands of people and inundated large farmland areas in Senegal, Genua, Burkina Faso and Mauritania. In October, flash floods triggered by Deyr seasonal rains (October-December) in Somalia affected nearly 20,000 people, especially in the Banadir region and the capital of Mogadishu, Galmudug, and South West and Jubaland states. These floods have inundated swathes of farmland, damaged property and disrupted livelihoods. Also in October, floods have affected North Kivu Province (the eastern Democratic Republic of the Congo) following heavy rain on October 2. According to media reports, at least 15 people died in Sake Town after the overflow of the Mutahyo River. Dozens of people have been displaced, several houses flooded and schools and health centres were damaged.

In Asia, the flash floods that occurred in August over Afghanistan were responsible for the death of 145 people and injured 167 people. Also, agricultural land and public infrastructure were impacted. Over Pakistan, severe monsoon rains caused urban flooding on August 25. It resulted in 409 deaths, 402 injured and 305,151 fully or partially destroyed homes. In October, many regions in Laos and Cambodia were hit by severe floods which affected thousands of people.

Both the Philippines and Vietnam faced several strong typhoons in October and November. They caused the displacement of several hundred thousands of people. In the Philippines, the authorities confirmed 67 deaths, 21 injured and 15 missing persons. In Vietnam, five people have been injured, and more than 325,000 people have been evacuated. In China, the historic amounts of rains received by the 2020 summer monsoon season were the main reason behind at least 21 large scale floods reported over the country. The massive floods started in September where Typhoon Maysak brought persistent rainfall to the Heilongjiang Province and flooded nearby areas. The rains submerged buildings in Harbin, the provincial capital, and caused rivers to overflow (e.g. Songhua River). Flood waves from the Mudan River also broke a dam located on the outskirts of Harbin.

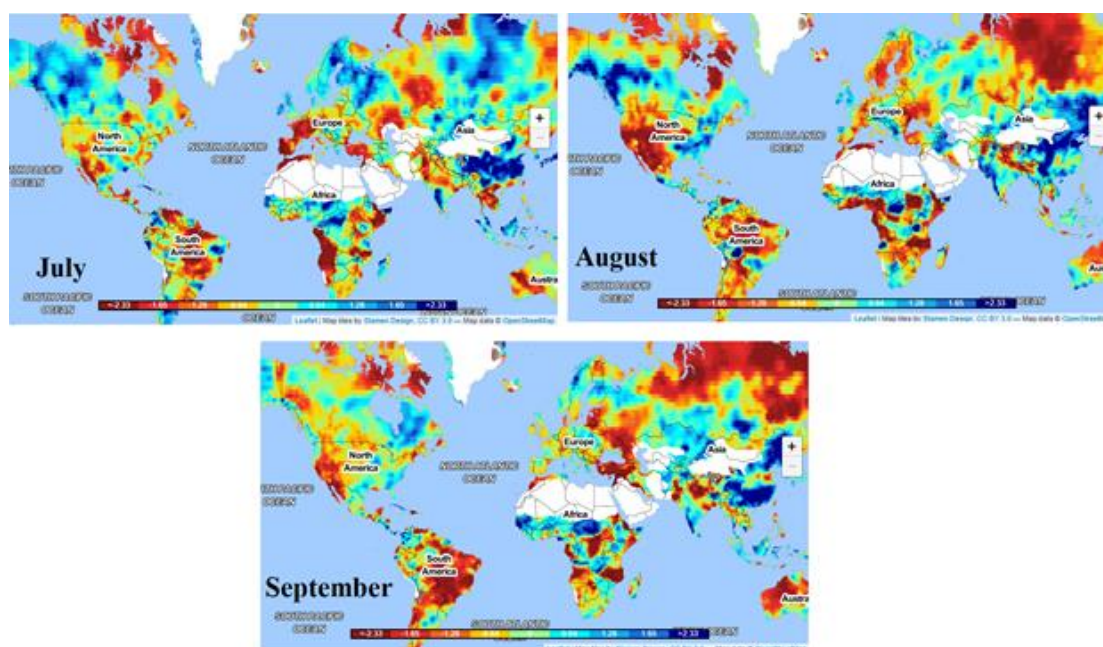


**Figure 5.6** The overflow in Songhua River located in the Heilongjiang Province of northeast China on October 25, 2020 (right) compared to normal year (November 1, 2019, on the left). The river overflow was captured by two MODIS Terra satellite images displayed in false-color using infrared and visible light (bands 7-2-1) to better distinguish water from land. Vegetation appears green, water appears dark blue, and bare land appears brown (<https://earthobservatory.nasa.gov/images/147471/chinas-unrelenting-season-of-flooding#>).



## Drought

Severe drought conditions were observed in eastern Romania, eastern Bulgaria, and southern Ukraine, with further negative impacts mainly on maize and sunflowers. The drought conditions were also observed in north-eastern Greece, which is the main region of sunflower production. In central Ukraine, a prolonged precipitation deficit started to impact maize in September. The continuing deficit in precipitation in Western Europe (large parts of France, Belgium, Luxembourg, western Germany and the southern Netherlands) negatively affected the production of summer crops, mainly maize, sugar beet and potatoes in this region. In Ireland and parts of the United Kingdom, frequent and abundant precipitation since mid-August negatively affected the ripening and harvesting of spring and winter cereals. In Russia, the dry and hot conditions throughout July and August over the main growing region of sunflowers impacted the crop's yield despite its tolerance to drought. Furthermore, moderate to extreme drought impacted the western United States. Record setting wild fires destroyed houses and 3.3 million hectare of forests. In Argentina, South America, drought conditions in August-September impacted the seeding of sunflower and maize.



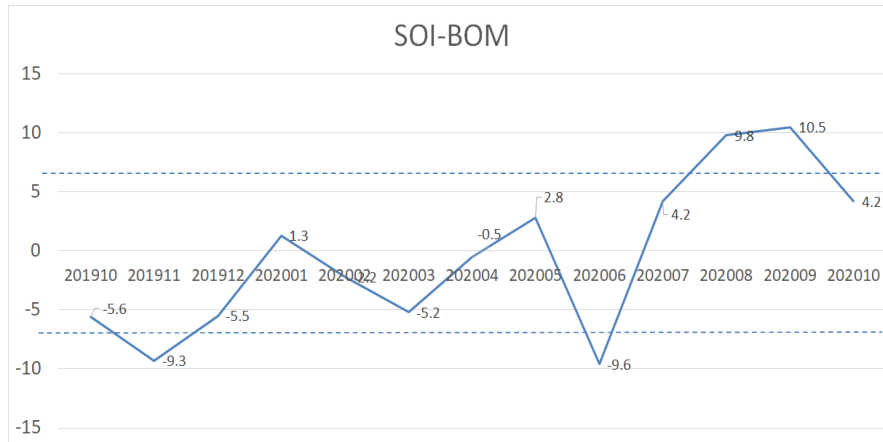
**Figure 5.7** The Standardized Precipitation-Evapotranspiration Index (SPEI) estimated globally for the months; July to September of 2020, <https://spei.csic.es/map/maps.html#months=1#month=8#year=2020>.

## 5.3 Update on El Niño

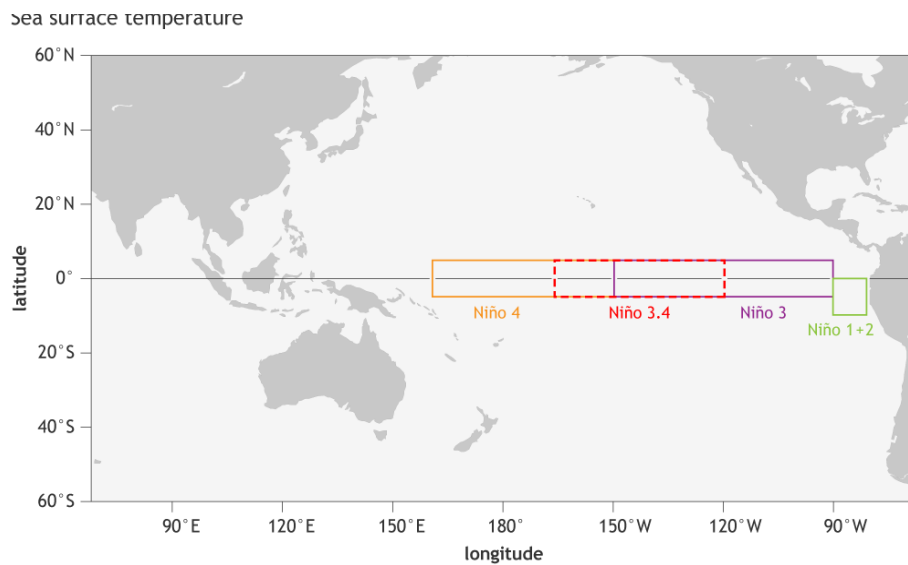
La Niña condition prevailed across the Pacific Ocean. Figure 5.8 illustrates the behavior of the standard Southern Oscillation Index (SOI) published by the Australian Bureau of Meteorology (BOM) for the period from October 2019 to October 2020. Sustained positive values of the SOI above +7 typically indicate La Niña while sustained negative values below -7 typically indicate El Niño. Values between about +7 and -7 generally indicate neutral conditions. During this monitoring period, SOI increased from 4.2 in July to 9.8 in July, then increased to 10.5 in September, then decreased to 4.2 in October, indicating a La Niña has developed.

The sea surface temperature anomalies in October 2020 for NINO3, NINO3.4, and NINO4 regions were  $-0.8^{\circ}\text{C}$ ,  $-1.0^{\circ}\text{C}$ , and  $-0.5^{\circ}\text{C}$ , respectively, somewhat warmer than the 1961-1990 average according to BOM (see Figure 5.4 and Figure 5.5). La Niña has developed and is expected to last

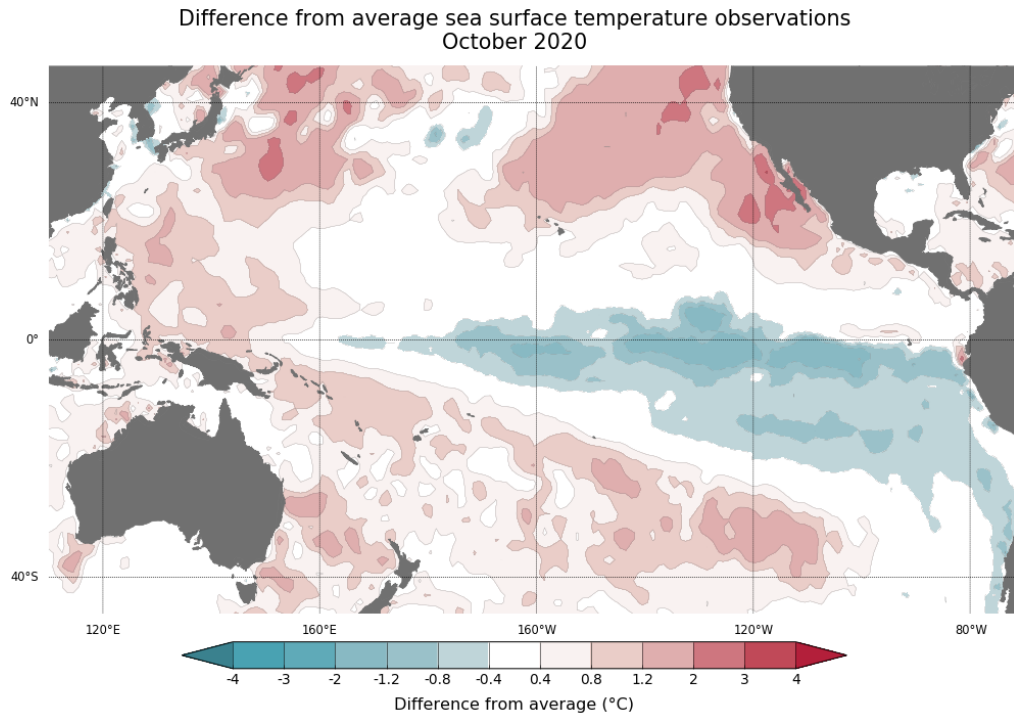
into next year, affecting temperatures, precipitation and storm patterns in many parts of the world, according to the World Meteorological Organization (WMO). CropWatch will keep monitoring the situation (Figure 5.6).



**Figure 5.8 Monthly SOI-BOM time series from July 2019 to July 2020**  
 (Source: <http://www.bom.gov.au/climate/current/soi2.shtml>)



**Figure 5.9 Map of NINO Region** (Source: [https://www.climate.gov/sites/default/files/Fig3\\_ENSOindices\\_SST\\_large.png](https://www.climate.gov/sites/default/files/Fig3_ENSOindices_SST_large.png))



Data: BOM SST  
 Climatology baseline: 1961 to 1990  
 © Commonwealth of Australia 2020, Australian Bureau of Meteorology

Monthly average: October 2020  
 Created: 09/11/2020  
<http://www.bom.gov.au/climate>

**Figure 5.10 October 2020 sea surface temperature departure from the 1961-1990 average**  
 (Source: [http://www.bom.gov.au/climate/enso/wrap-up/archive/20201110.ssta\\_pacific\\_monthly.png?popup](http://www.bom.gov.au/climate/enso/wrap-up/archive/20201110.ssta_pacific_monthly.png?popup))