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 2020 (section 5.1), as well as sections on recent disaster events (section 5.2), Drought impacts on rice production in lower Mekong river (5.3) and an update on El Niño (5.4).

5.1 CropWatch food production estimates

Table 5.1 presents this year's second estimate by the CropWatch team of global maize, rice, wheat and soybean production in 2021. Winter crops in the Northern Hemisphere are still growing and summer crops are in very early stages, or yet to be planted in May. The harvest of last year's summer season/monsoon season in southern hemisphers has been completed while winter crops were mostly in their vegetative growth period. CropWatch will further update and review the production in the August and November 2020 CropWatch bulletins when more in-season satellite data become available.

The current bulletin only focuses on the crops grown or harvested between January and April as listed in table 5.1 below, including Afghanistan, Argentina, Brazil and other 36 major agricultural producing and exporting countries. The production values for each country are all remote sensing-based estimates/predictions while global production is projected by combining remote sensing model estimates and production trends.The percentage of modelled global production varies according to crops: 18% for maize, 36% for rice, 76% for wheat (most of it being northern hemisphere winter wheat) and 47% for soybeans.

Based on the remote sensing monitoring and forecasting of mjor crops (maize, rice, wheat, and soybean) that are in growing period or to be harvested, this report further analyzes the impact of the Covid-19 on the production of major grain and oil crop.

Global production

Global maize production in 2021 is expected to be 1.059 billion tons, down 1.1% and 11.66 million tons; global rice production is expected to be 753 million tons, down 1.0%; global wheat production is 726 million tons, down 2.1% and 15.66 million tons; global soybean production is expected to be 320 million tons, down 1.0%. 2021 The widespread dry and hot weather in January-early May of the year adversely affected the production of global staple food and oil crops, and the impact of the Covid-19 on the production chain of food and oil crops further exacerbated the tight situation of international staple food and oil crop supply.

Wheat

Some of the major wheat producing countries in the northern hemisphere shrank in acreage. In India, Pakistans, winter wheat production is almost all irrigated agriculture, usually wheat sowing period of precipitation conditions will not have a significant impact on wheat planting area. Due to the impact of severe Covid-19 epidemic, wheat sown area shrunk by 2.0% and 3.0%, respectively. Since late March this year, there has been a steep increase in the number of confirmed cases of the Covid-19 in India, France, Germany and Iran, which may also affect the

upcoming wheat harvest. China is expected to increase winter wheat production by 0.7% due to effective controls and measures to protect winter wheat acreage and yields, which have increased slightly.

Most winter wheat-producing countries in the Northern Hemisphere suffered from low rainfall and generally lower yields. Wheat in most winter wheat-producing countries in the Northern Hemisphere was sown during September-October 2020, and the overall precipitation in the Northern Hemisphere since sowing was lower than the average of the past 15 years. By early May 2021, the growth of winter wheat in many countries such as Afghanistan, Belarus, France, Uzbekistan, India and Pakistan was significantly lower than that of the same period last year, and wheat yields decreased by 19.1%, 11.4%, 7.2%, 5.1%, 3.5% and 3.2%, respectively. Iran, Afghanistan, Uzbekistan, Poland, Hungary and other countries wheat shrinkage are more than 3%. The decline in winter wheat yields and acreage resulted in a more than 5%decline in winter wheat production in Afghanistan, France, Hungary, India, Iran, Pakistan, and Uzbekistan, resulting in a 2.1% reduction in global wheat production. Morocco saw a significant increase in wheat yields compared to the severe drought year of 2020, with a recovery increase in wheat production of 43.2%.

Global wheat production is generally lower than 2020 due to multiple factors such as drought and the Covid-19 epidemic.

Soybean

In 2021, the total soybean production in Argentina and Brazil, the two major soybean producing countries in the Southern Hemisphere, was 149.44 million tons, a 2.7% reduction. Among them, Brazil's soybean production was 96.3 million tons, a 4.7%reduction and 4.74 million ton reduction in production, achieving the lowest yield in the past three years, which is related to the reduction in planted area caused by the country's Covid- epidemic, drought-induced yield decline and fertilization and dosing and other field management measures are not timely, not in place and other factors. Argentina soybean production is 53.14 million tons, an increase of about 1.1%, mainly due to good agro-meteorological conditions in January-April prompted a small increase in soybean yields.

Maize

Unfavorable agro-meteorological conditions led to a year-over-year decline in maize production in the Southern Hemisphere and Equatorial countries. Total maize production in the Southern Hemisphere and Equatorial countries (Table 5.1) was 191.17 million tons, an increase of 3.5% year-on-year and a decrease of 6.94 million tons; Bangladesh, Angola, Brazil and Kenya experienced the largest year-on-year decreases in maize production, with 20.8%, 13.9%, 7.3% and 4.0% decreases, respectively. Among them, the main reason for the reduction in maize production in Kenya is the reduction in planted area, Bangladesh and Angola are mainly due to drought led to a decline in rain-fed maize yields, the significant decline in maize production in Brazil is affected by the dual impact of persistent drought and the new crown epidemic, maize production was substantially damaged. South Africa, Zambia and the Philippines 3 countries agro-meteorological conditions are generally conducive to maize production, 3 countries maize production increase of 5.5%, 3.1% and 4.5% year-on-year, respectively.

Using early monitoring indicators of crop acreage, it was found that the progress of maize sowing in Ethiopia, Pakistan, Nigeria, Mexico and Turkey is 22.1%, 11.4%, 11.0%, 6.6% and 3.9% lower than the same period last year, respectively, and if unfavorable agro-meteorological conditions continue later, it is expected that maize acreage and production in the above five countries will be lower than last year.

Rice

Most rice producing countries in South and Southeast Asia experienced a year-on-year decline in rice production. 2021 January - early May, precipitation in most parts of South and Southeast Asia was significantly low, with Bangladesh receiving the lowest level of precipitation in the same period in the past 15 years. Severe drought led to a significant decline in rice production during the dry season, with Bangladesh, Cambodia and Indonesia experiencing a 4.0%, 2.7% and 1.3% reduction in rice production, respectively. Myanmar was affected by a variety of unfavorable factors, and the rice planting area shrank by 6.2% year-on-year, which, coupled with the decline in yield due to drought conditions, caused a significant reduction of 7.7% in rice production in the country. On the contrary, dry season precipitation in Thailand and the Philippines was more than 30% higher than the average precipitation, prompting rice production to increase by 2.2% and 4.5%, respectively.

Table 5.1 2021 cereal and soybean production estimates in thousands tonnes. All the national production values in the table are remote sensing model-based estimates while the global production is projected by adding up the model-based production and trend-based model for all other countries. Δ is the percentage of change of 2021 production when compared with corresponding 2020 values

	Maize		Rice		Wheat		Soybean	
	2021	Δ%	2021	Δ%	2021	Δ%	2021	Δ%
Afghanistan					3905	-25.0		
Angola	2549	-13.9	45	-1.9				
Argentina	54307	0.5	1982	2.3			53140	1.1
Bangladesh	1891	-20.8	44161	-4.0				
Belarus					2983	-3.5		
Brazil	81126	-7.3	12049	4.1			96300	-4.7
Cambodia			9850	-2.7				
China					127981	0.7		
Egypt					11977	-0.7		
France					32184	-7.6		
Germany					26144	-1.9		
Hungary					4914	-5.7		
India					90726	-5.3		
Indonesia	15836	-4.9	64053	-1.3				
Iran			2750	-6.4	13413	-18.4		
Italy					7827	0.1		
Kenya	2774	-4.0						
Mexico					3389	-21.4		
Morocco					9024	43.2		

	Maize		Rice		Wheat		Soybean	
	2021	Δ%	2021	Δ%	2021	Δ%	2021	Δ%
Mozambique	2031	0.6	386	0.8	21	4.6		
Myanmar	1897	1.1	23616	-7.7				
Pakistan					25822	-6.1		
Philippines	7468	4.5	21666	4.5				
Poland					10425	-3.0		
Romania					8002	8.0		
Russia					57709	3.7		
South Africa	12413	5.5						
Sri Lanka			2527	0.5				
Thailand			41519	2.2				
Turkey					18663	-3.5		
Ukraine					24589	11.1		
United Kingdom					12281	-3.5		
USA					54150	1.5		
Uzbekistan					8024	-12.0		
Vietnam	5322	-1.5	45875	-2.0				
Zambia	3554	3.1						
Total	**191168**	**-3.5**	**270478**	**-1.4**	**554154**	**-1.5**	**149440**	**-2.7**
Others	**867433**	**-0.5**	**482381**	**-0.8**	**171659**	**-4.0**	**170810**	**0.6**
Global	**1058601**	**-1.1**	**752858**	**-1.0**	**725813**	**-2.1**	**320250**	**-1.0**

5.2 Disaster events

Introduction

Humans are facing unprecedented disasters in 2021, such as mega-fires, extreme weather events, droughts, desert locust swarms, and the COVID-19 pandemic. They negatively impact health, food production, nutrition and the economy. These disasters are highly interacting in a connected world to form various familiar and unfamiliar challenges, particularly to the agriculture sector. This report presents the major disasters that threatened human lives and food production in the first quarter of 2021.

Desert Locust

Locusts keep threatening and devastating crop fields, mainly in East and West Africa and the Arabian Peninsula(Figure 5.1). Thanks to the massive control process conducted during the last four months in the Horn of Africa, the number of adult locusts was notably reduced. However, high rains in April helped remaining swarms to mature in May, giving rise to hopper bands, particularly in Ethiopia. Small groups of adults were also observed over other African countries such as Sudan, Mali, Algeria, and Morocco. Moreover, a large movement of mature desert locust

adults carried by southerly winds from the Arabian Peninsula toward Syria, Lebanon, Jorden, and Iraq was also observed.

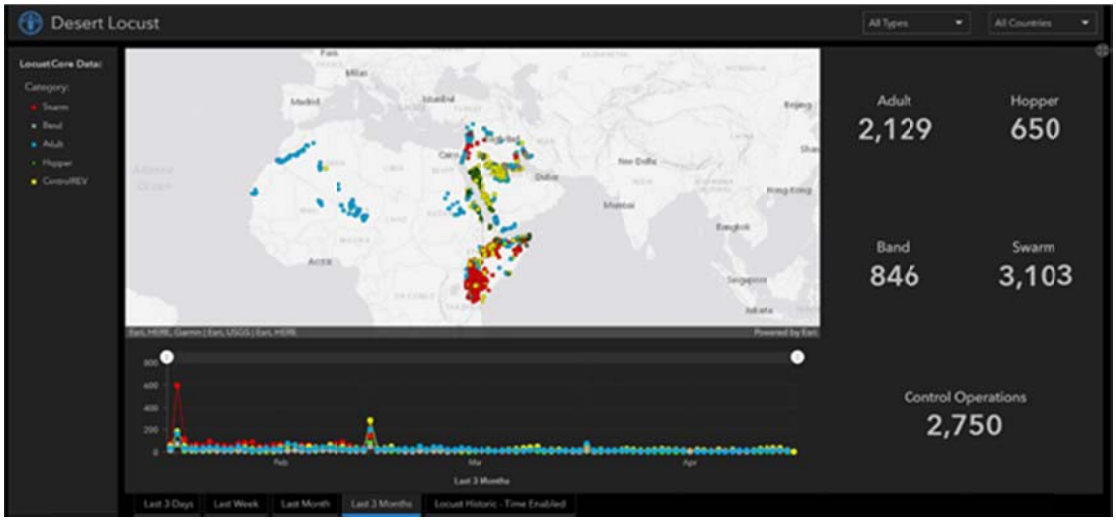

Figure 5.1 FAO Locust Data Explorer:
(https://www.arcgis.com/apps/dashboards/de4f7abc248545f6bb514c3d38f59f26)

Based on current information on locusts' distribution and the future weather forecasts, it is expected that more swarms will immigrate from the African horn towards eastern Ethiopia by July and towards the south to reach Kenya in June. Moreover, according to FAO experts forecast, a large number of hopper bands are expected to move towards Yemen and west Iran by May-July(Figure 5.2).

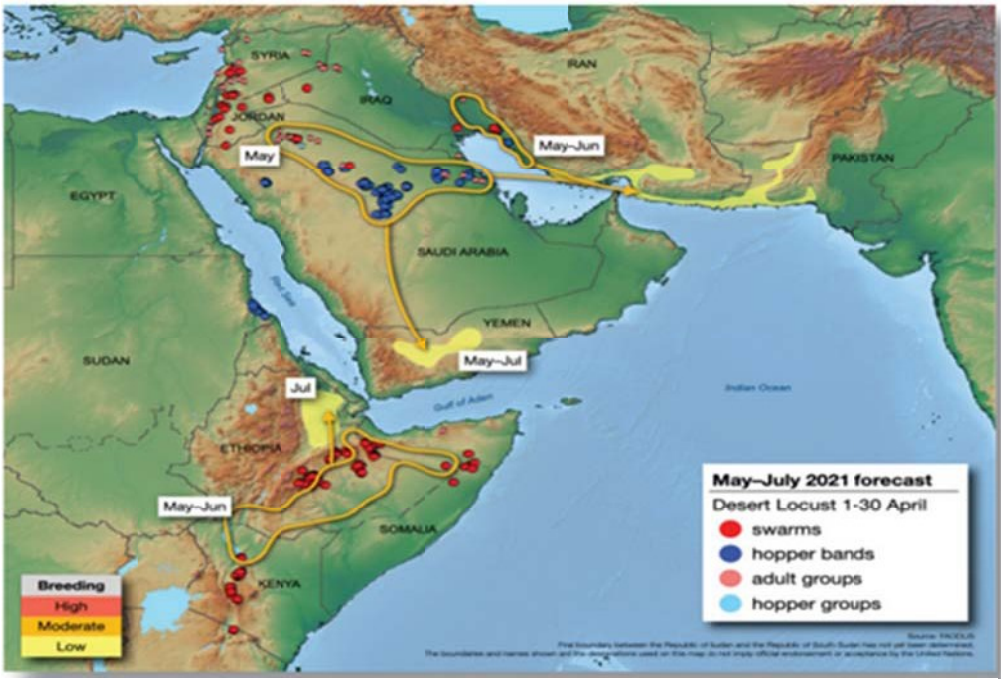

Figure 5.2 FAO forecast to locust movement in May-July 2021
(http://www.fao.org/ag/locusts/common/ecg/1914/en/DL511e.pdf).

Floods & Cyclone

Tropical Cyclone Eloise severely hit Southern African countries, notably Mozambique, in late January 2021, causing the death of a dozen people and severe damage to infrastructure due to heavy floods(Figure 5.3). In central Mozambique, the storm and subsequent floods caused the displacement of more than 16,000 people, damaged around 17,000 houses, and caused the loss of many people's lives. The floods also caused landslides near Beira, Mozambique. In this region, 25 centimeters of rain was recorded in only 24 hours, leading to rivers overflow and road closures. Moreover, tens of thousands hectares of farmland were submerged. In addition, many tree crops were destroyed by the intense wind storms associated with the cyclone.

Figure 5.3 Flooding occurred in Mozambique after Hurricane Eloise in January 2021. The left image was acquired before the floods on December 27, 2019, while the right image was acquired on January 30, 2021, which shows the flooded area (dark blue). Both images were acquired by Landsat 8 OLI sensor and displayed in false color (bands 7-5-3 in RGB combination). Source: (https://earthobservatory.nasa.gov/images/147866/eloise-floods-mozambique).

In Angola and, more specific the Luanda Province, severe flooding started after a period of heavy rain on April 19. Drainage channels blocked by garbage reportedly worsened the situation. The floods caused the death of 24 persons, the damage to 2289 houses, 4 bridges, and 14 schools, as reported by the national government. In the north of Africa, Morocco and Algeria were hit by floods in early March 2021.

Over the East Coast of Australia, heavy rains began on March 16, 2021. They led to widespread flooding, which affected regions from the North Coast to the Sydney metropolitan area in the south. The floods were considered the worst flooding in the last 60 years, and the Australian government declared many parts of the East Coast a natural disaster zone. The economic losses were extreme since the floods have forced 18,000 people to evacuate. The floods are expected to contribute to rising food prices due to the losses of hundreds of livestock and crops and infrastructure damage. The most severe damage was in the farms in the Mid-North Coast; the region produces bananas, avocados, and 75% of Australia's blueberries.

In South American countries, including Venezuela, Colombia, Bolivia, and Brazil, severe floods in April were responsible for the displacement of thousands of people and the destruction of infrastructures. More notably, the Floods in Oriximiná, Pará in Brazil, affected approximately 14,020 people, flooded 3,000 homes, and caused severe livestock and crop damage. In Asia,

severe floods were reported in Vietnam and Philippines in April 2021, affecting thousands of citizens in both countries and the death of 3 persons in North Vietnam.

Drought

Taiwan is facing the worst drought in more than five decades during 2021. The government had to ration the water for households and businesses. It resorted to cloud seeding around several reservoirs. However, most reservoirs in Taoyuan, Hsinchu, and Miaoli are less than 15% full, while in central Taiwan, many reservoirs are even less than 10% full, as measured in March and April 2021. For example, the official data showed that the Baoshan Reservoir was only 9% full in March 2021 compared to 34% in March 2020(Figure 5.4). Farmers were the group hit hardest by the extreme drought conditions. Struggling to ensure supplies, irrigatiion was stopped for more than 74,000 hectares of farmland last year.

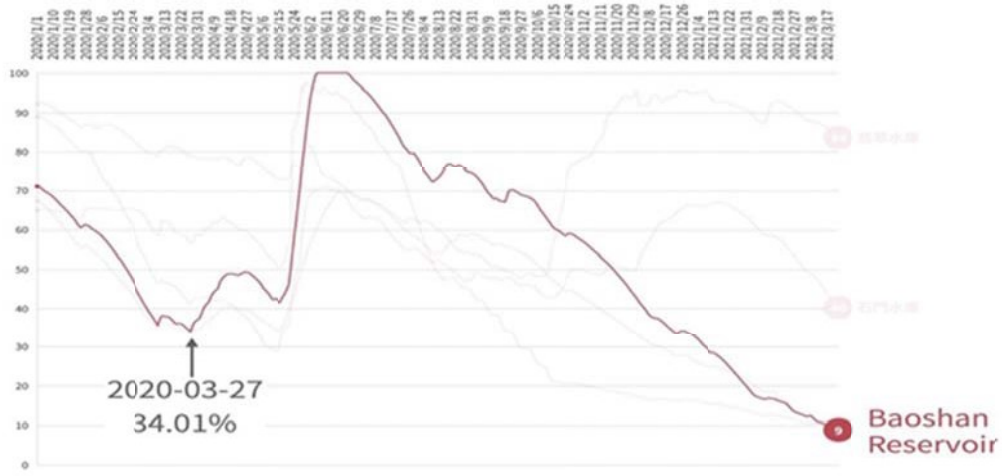

Figure 5.4 Water level changes observed in Baoshan Reservoir since 2020 (URL: https://international.thenewslens.com/article/149527).

The USA is also facing a dry spring season in 2021 after a weak 2020-summer monsoon caused a lack of rainfall, particularly in states such as Arizona, Utah, Nevada, Colorado, and New Mexico(Figure 5.5). According to NOAA's forecast over those states, higher than average spring temperatures and low soil moisture caused drought conditions to intensify. The current spring drought is expected to hamper winter wheat production and force farmers to reduce the area cultivated with wheat or replace it with other crops such as yellow pea due to its relatively low input costs and its ability to survive on less moisture.

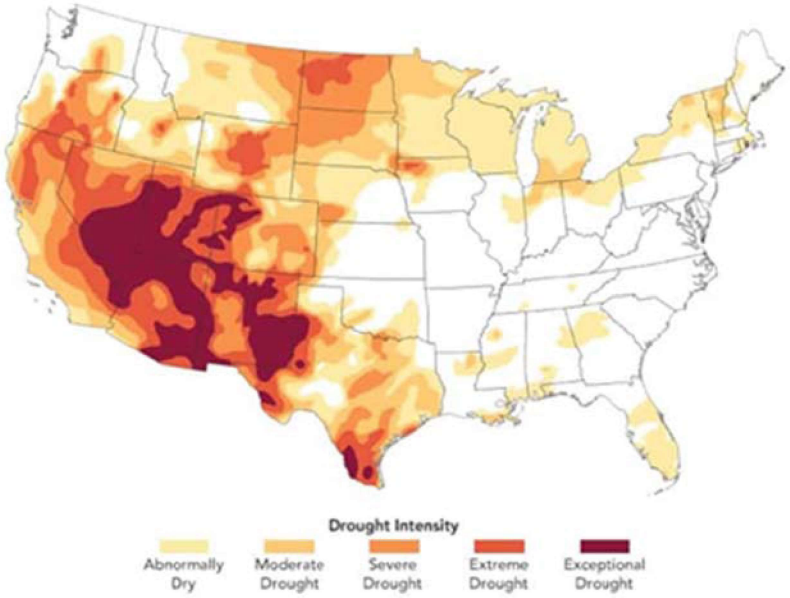

Figure 5.5 Map of drought conditions in the United States on March 23, 2021 (https://droughtmonitor.unl.edu/).

A severe drought hit Brazil during its rainy season from November to April 2021. It is still ongoing and is considered the worst drought in 20 years. It has caused the rise of major crop prices such as corn, wheat, and soybeans (Figure 5.6). Parana, the second-largest corn-producing state in Brazil, is currently experiencing the most severe drought conditions. Other regions that are badly affected are the Northeast and the Pantanal.

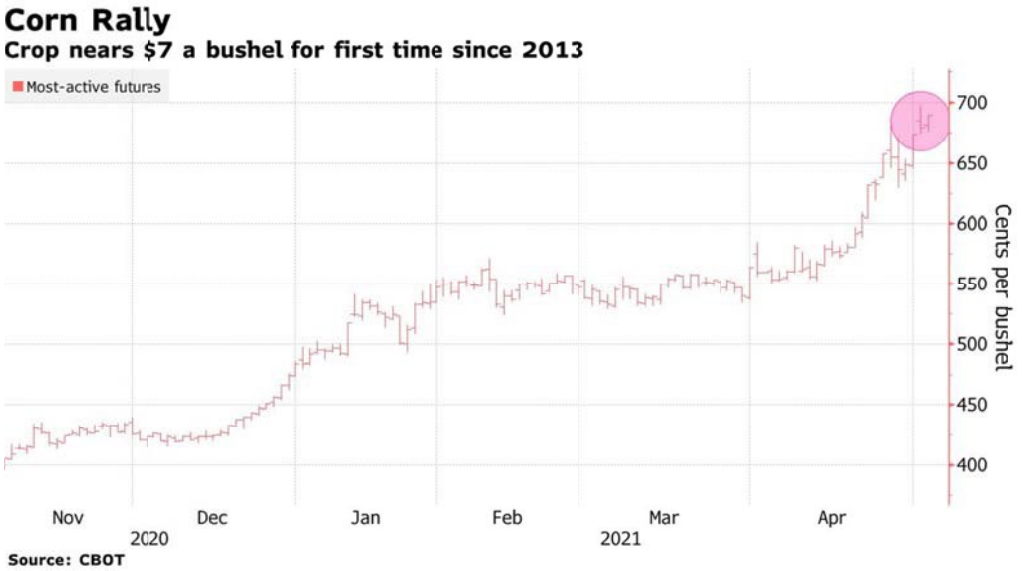

Figure 5.6 The rise of corn price due to severe drought in Brazil started in April 2021.

In Afghanistan, below-normal rainfall since October 2020 led to severe drought by the beginning of this year. It is still ongoing and has caused reduced accumulation of snow. This is critical for water access during the spring and summer agricultural seasons. Hence, a deficit in wheat production by 16 to 27% is expected this year. This deficit is expected to worsen the food

insecurity situation in the country since the number of provinces under acute hunger has increased from four provinces in the first quarter of 2020 to 10 provinces in March.

COVID-19

The COVID-19 pandemic continues to threaten human health, the economy, and food production in 2021. Although many vaccines were developed by the end of 2020, the vaccination process has only started in January 2021 and is still ongoing. The third wave of COVID-19 severely hit several countries. India was the world's worst-hit country in early April 2021. The number of infected people in India by the end of April exceeded 19 million people, and the number of the total deaths was above 200 thousand, as reported by national and international organizations.

The sharp rise in coronavirus cases overlaps with a so-called "agriculture crisis" in India because thousands of Indian farmers have been protesting since September 2020 over three new agricultural laws that they say threaten their livelihoods. These three laws allow farmers and traders to do business outside government-run wholesale markets that have dominated agriculture since the Green Revolution. The laws also shorten the list of staple crops, which are considered essential to Indians' nutrition and to the agricultural economy, to 22 crop types. Nearly 90% of India's agricultural sector comprises small and marginal farmers, making them particularly vulnerable to economic shocks. Particularly with COVID-19 lockdowns, the farmers found their movements restricted and faced a shortage of laborers, including farmworkers and operators for harvest machinery. The overlap between economic shocks and the COVID-19 pandemic threatens India's national food security and adds more pressure on Indian farmers.

5.3 Update on El Niño

The El Niño–Southern Oscillation (ENSO) continues at neutral levels. Climate model outlooks currently indicate this neutral phase will last at least until October. Oceanic indicators of ENSO persist at neutral levels, with Pacific sea surface temperatures close to the long-term average across most of the equatorial region. Beneath the surface, temperatures are near average, with slightly warmer than average waters across much of the sub-surface. Atmospheric indicators such as the Southern Oscillation Index (SOI) and cloud patterns are also close to average. Trade winds have been stronger than average in the far west, but near average elsewhere [1].

Figure 5.7 illustrates the behavior of the standard Southern Oscillation Index (SOI) published by the Australian Bureau of Meteorology (BOM) for the period from April 2020 to April 2021. 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 decreased from 16.5 in January to 11.5 in Feburary, then decreased to -0.3 in March, then increased to 2 in April.

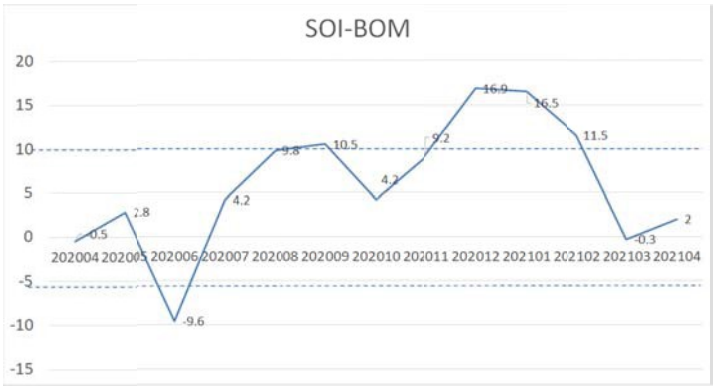

Figure 5.7 Monthly SOI-BOM time series from April 2020 to April 2021 (Source: http://www.bom.gov.au/climate/current/soi2.shtml)

The SST map (Figure 5.8 and Figure 5.9) for April shows cooler-than-average SSTs along most of the eastern half of the equator in the Pacific Ocean, extending into the tropics along the coastline of South America. These cool anomalies were generally stronger in April than during March in the east of the basin, while in the central and western equatorial Pacific SSTs have returned to near average temperatures. April values of the three key NINO indices were: NINO3 −0.4 °C, NINO3.4 −0.3 °C, and NINO4 −0.1 °C.

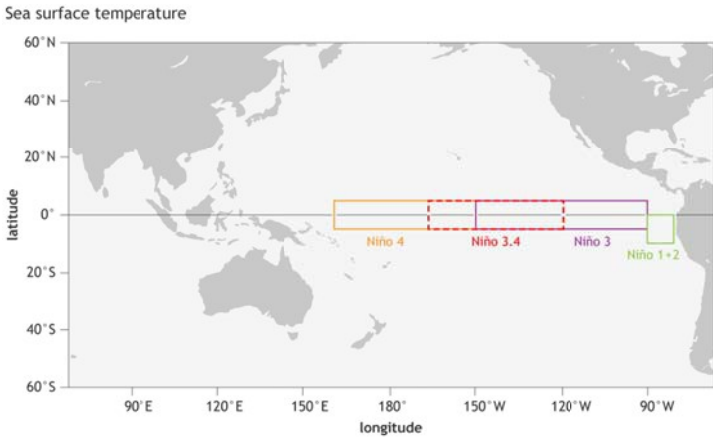

Figure 5.8 Map of NINO Region (Source: https://www.climate.gov/sites/default/files/Fig3_ENSOindices_SST_large.png)

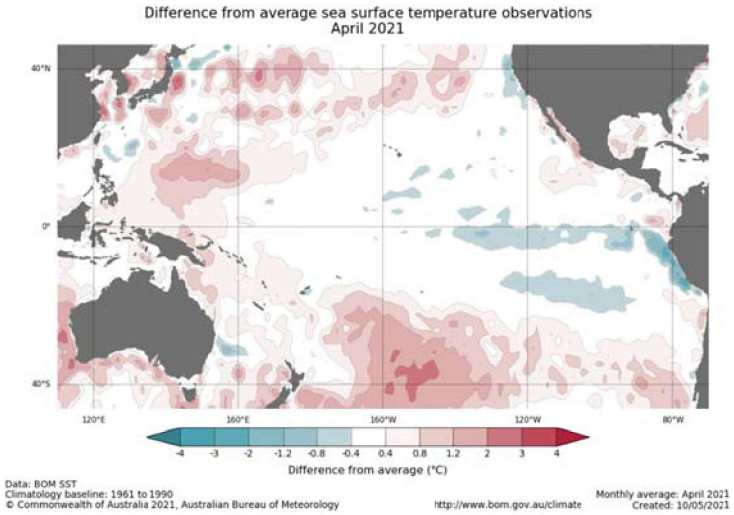

Figure 5.9 April 2021 sea surface temperature departure from the 1961-1990 average (Source:http://www.bom.gov.au/climate/enso/wrap-up/archive/20210511.ssta_pacific_monthly.png?popup)