# 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

Table 5.1 presents the final revision by the CropWatch team of the global maize, rice, wheat and soybeans production estimates for 2019. It is issued at a time when all 2018-2019 winter crops and 2019 summer crops in the temperate northern hemisphere have been harvested; in the southern hemisphere winter crops are growing and the planting of the summer season/monsoon season is underway or about to start. The planting of the second crop is ongoing or about to start in equatorial areas.

CropWatch production estimates differ from most other global or regional estimates by the use of near-real time geophysical data and models. They are based on a combination of remote-sensing models (for major commodities at the national level) and statistical trend-based projections for minor producers and for those countries which will harvest their crops in the two last months of 2019, for which no directly observed crop condition information is as yet available. In Table 5.1 below, modeled outputs are in red bold font. The percentage of modeled global production varies according to crops: 85% for maize, 94% for rice, 89% of wheat (most of it being northern hemisphere winter wheat) and 82% for soybeans.

The 42 countries for which production estimates are provided are described in detail in chapter 3 while a whole chapter is devoted to China (Chapter 4). Kyrgyzstan was added for the first time in this bulletin. The 42 + 1 countries are referred to conventionally as the “Major producers”. “Others” include the 141 countries from Albania, Algeria, Armenia [...] to Venezuela, Yemen and Zimbabwe. The total output for “other” countries was obtained by adding national projections for 2019 rather than projecting the sum.

The red bold estimates in the present chapter are calibrated against national agricultural statistics (as opposed to FAOSTAT). This means that (1) sub-national statistics are used at least for the largest countries and (2) 2018 information in included in the calibration. It is also stressed that the calibration is crop-specific, i.e. based on different crop masks for each crop and that, for each crop and country, and both yield variation and cultivated area variation are taken into account when deriving the production estimates. The major producers represent at least 90% of production and 80% of exports. “Others” and the countries shown in black in the production table were extrapolated to 2019 based on a combination of two linear trends from 2009 to 2017 and 2014 to 2018.

## Production estimates

CropWatch estimates the global 2019 production of the major commodities at 1055 million tonnes of maize, up 0.5% from 2018, 754 million for rice (as paddy; up 4.2%), 716 million tonnes of wheat (a 0.9% increase) and 324 million tonnes of soybeans, 1.0% lower than last year's output. The major producers contribute 975 million tonnes of maize (+0.9%), 684 million for rice (+4.6%), 646 million tonnes of wheat (+0.9%) and 305 million tonnes of soybeans (-0.7%). Compared with the final CropWatch estimates for 2018, the relative importance of "others" did not change. Major producers outperform all "others" for cereals (maize, 0.9% vs. -4.5%; rice, +4.6% vs. -0.1% and wheat, 0.9% vs. 0.4%) as well as for soybeans (-0.7% vs. -5.0%), increasing the dominance of large exporters. For the major producers, the current production estimate is below the trend .

In China, the comprehensive CropWatch estimates in table 5.1 and chapter 4 assess variations of all crops as positive, including maize (+1%), rice and soybean (+3%) and wheat (+2%); some estimates were revised upward due to favorable summer crop growing conditions. This puts China together with Egypt, Pakistan and the United States in the group of countries where the three cereals did well in 2019, corresponding to output growth of 10.6 million tons, 2.0 million tons, 5.2 million tons and 9.7 million tons, respectively.

The largest net cereal production increases occurred in India (13.3 million tons, in spite of a drop in wheat output), China, United States, Pakistan (as mentioned), followed by Bangladesh (3.7 million tons), Argentina (3.3 million tons), Myanmar (2.6 million tons) and several central and western Asian countries (Afghanistan, Iran, Uzbekistan; 2.0 million tons to 2.4 million tons) where wheat did well after several years of poor performance.

The largest net cereal production decreases in excess of 1 million tons affected Australia (-5.4 million tons, wheat), Kazakhstan (-3.5 million tons, wheat), South Africa (-1.7 million tons, maize), Indonesia (-1.6 million tons, rice) and Ukraine (-1.4 million tons, maize and wheat). As described in the country narratives in Chapter 3, the listed situations are directly related to prevailing environmental conditions.

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**Table5.1 2019 cereal and soybean productions estimates in thousands tonnes. Numbers in black are trend-based while red bold numbers corresponds to modeled crops that have been harvested or were growing at the time of reporting. Rice is expressed as paddy. Δ is the percentage of change of 2019 production when compared with corresponding 2018 values.**

| | Maize | | Rice | | Wheat | | Soybean | |
|---|---|---|---|---|---|---|---|---|
| | 2019 | Δ% | 2019 | Δ% | 2019 | Δ% | 2019 | Δ% |
| Afghanistan | 197 | −23 | 220 | −25 | **6,630** | **+98** | | |
| Angola | **2,776** | **−1** | 77 | +12 | 3 | +3 | 19 | +3 |
| Argentina | **53,154** | **+7** | **1,849** | **+9** | **18,207** | **−2** | **51,459** | **+9** |
| Australia | 470 | 0 | 768 | −13 | **19,370** | **−21** | 62 | −11 |
| Bangladesh | **2,368** | **+8** | **48,239** | **+8** | 1,467 | −2 | 97 | −8 |
| Belarus | 763 | +15 | | | **2,927** | **+6** | | |
| Brazil | **85,390** | **0** | **11,650** | **+0** | **4,076** | **−4** | **100,744** | **+3** |
| Cambodia | 702 | +24 | **8,081** | **−8** | | | 173 | +1 |

| | Maize | | Rice | | Wheat | | Soybean | |
|---|---|---|---|---|---|---|---|---|
| | 2019 | Δ% | 2019 | Δ% | 2019 | Δ% | 2019 | Δ% |
| Canada | 11,889 | −1 | | | 32,338 | +4 | 7,660 | −1 |
| China | 224,345 | +1 | 203,084 | +3 | 123,516 | +2 | 14,441 | +3 |
| Egypt | 5,958 | +8 | 6,664 | +9 | 11,800 | +9 | 50 | +2 |
| Ethiopia | 7,222 | −2 | 150 | +1 | 3,884 | −3 | 107 | −1 |
| France | 14,591 | +2 | 69 | +7 | 35,586 | −2 | 475 | +17 |
| Germany | 4,790 | +1 | | | 27,768 | +3 | 72 | +34 |
| Hungary | 5,942 | +5 | 11 | +9 | 4,886 | −3 | 200 | +12 |
| India | 18,415 | +3 | 168,141 | +9 | 90,267 | −1 | 11,307 | −1 |
| Indonesia | 16,356 | −3 | 64,196 | −2 | | | 1,102 | +1 |
| Iran | 1,054 | −15 | 2,820 | +14 | 16,076 | +16 | 185 | +15 |
| Italy | 6,312 | +3 | 1,626 | +7 | 7,713 | +6 | 1,585 | +4 |
| Kazakhstan | 877 | +5 | 524 | +10 | 12,744 | −22 | 289 | +2 |
| Kenya | 2,735 | −21 | 98 | −16 | 161 | −15 | 2 | −13 |
| Kyrgyzstan | 670 | 0 | 43 | +10 | 589 | 0 | 4 | +48 |
| Mexico | 22,177 | −6 | 265 | +7 | 4,188 | +17 | 767 | +25 |
| Mongolia | | | | | 271 | +7 | | |
| Morocco | 91 | +39 | 65 | +16 | 6,655 | −6 | 1 | −15 |
| Mozambique | 2,084 | 0 | 383 | +2 | 15 | −16 | | |
| Myanmar | 1,859 | +9 | 27,607 | +10 | 94 | −27 | 170 | +20 |
| Nigeria | 11,474 | −2 | 4,584 | −2 | 47 | −15 | 767 | +4 |
| Pakistan | 5,230 | +16 | 10,885 | +24 | 26,409 | +10 | | |
| Philippines | 6,982 | −6 | 20,452 | +4 | | | 1 | 0 |
| Poland | 4,674 | −4 | | | 10,145 | +0 | 25 | +72 |
| Romania | 13,266 | +3 | 36 | −1 | 7,747 | +3 | 445 | +22 |
| Russia | 13,283 | +4 | 1,031 | −3 | 53,336 | +1 | 3,630 | +1 |
| South Africa | 11,647 | −12 | 3 | +0 | 1,367 | −13 | 1,286 | +7 |
| Sri Lanka | 216 | −11 | 2,400 | −1 | | | 15 | +23 |
| Thailand | 4,264 | −11 | 39,557 | +3 | 1 | −2 | 17 | +59 |
| Turkey | 6,882 | +5 | 960 | +2 | 18,608 | −6 | 181 | −6 |
| Ukraine | 27,674 | −4 | 49 | +28 | 20,933 | −1 | 4,786 | −2 |
| United Kingdom | | | | | 13,464 | −2 | | |
| United States | 368,548 | +2 | 11,514 | +4 | 54,700 | +4 | 102,572 | −9 |
| Uzbekistan | 465 | −5 | 377 | −6 | 8,170 | +37 | | |
| Vietnam | 5,179 | +1 | 45,916 | +2 | | | 81 | −14 |
| Zambia | 1,873 | −22 | 26 | −13 | 90 | −21 | 396 | +15 |
| **Total** | **974,843** | **+0.9** | **684,420** | **+4.6** | **646,250** | **+0.9** | **305,171** | **−0.7** |
| **Others** | **80,268** | **−4.5** | **69,261** | **-0.1** | **69,887** | **+0.4** | **18,903** | **−5.0** |
| **Global** | **1,055,111** | **+0.5** | **753,681** | **+4.2** | **716,136** | **+0.9** | **324,074** | **−1.0** |

### *Maize*

Countries that experienced large production rises include Morocco, a minor producer of maize (91 thousand tonnes), but nevertheless with a marked increase of 39%, and Pakistan, which passes the 5 million tons bar with a 16% percent increase. Increases between 7 and 9% occurred in Argentina, Egypt and Myanmar and several countries recorded a 5% rise: Turkey, Hungary and Kazakhstan. Large drops exceeding 10% affected some significant producers, including Thailand and South-Africa (-11% and -12%) as well as two African countries in the Horn of Africa (Kenya, -21%) and in Southern Africa (-22%).

Among the main exporters (Table 5.2) the top three countries (United States, Brazil and Argentina) increased their output by 9.6 million tons, or 1.9%, while the top ten are up only 10.9 million tons, meaning that the bulk of the increase is available from the United States and Argentina, as Brazilian production is Unchanged. Among the top three importers (Japan, Mexico and South Korea) only Mexico is also a significant producer (22 million tons during 2019). With a drop in the volume of production of the three listed countries reaching 1.5 million tonnes (6.2%), increased flows should be expected to Mexico.

### *Rice*

In 2019, the situation of rice production in South and Southeast Asian countries is generally good. Among them, rice production in Pakistan, Myanmar, India, Thailand, China, Vietnam and other countries all increased year-on-year, with yield increases of 24.4%, 8.5%, 10.2%, 3.2%, 2.9% and 2.4% respectively. Rice production in Iran, the United States, Egypt, Argentina and other countries has also increased; although the two major rice producing countries in Cambodia and Indonesia have reduced their output by 8.3% and 1.6%, the total global rice output has still increased significantly by 4.2%.

The global rice supply situation is loose. Rice production in the top five rice exporting countries (India, Thailand, Vietnam, Pakistan, and the United States) increased by 18.2 million tons year-on-year, an increase of 7.0%. At the same time, the output of major rice importing countries increased overall, and rice supply in exporting countries increased and imports The increase in domestic rice production in China can meet the increase in demand from rice importing countries. It is expected that the supply and demand situation in the international rice market will be loose.

### *Wheat*

In addition to China, a dozen of countries are estimated to have increased their wheat production by 3% or more, including several semi-arid central and western Asian countries such as Afghanistan (+98%), Uzbekistan (+37%), Iran (+16), Pakistan (+10), and Mongolia (+7%). In most cases, the large increase results from a poor 2018 crop. In Europe, the list includes Belarus and Italy (+6%), Germany and Romania (+3%). Egypt (+9%) was already mentioned above for generally favorable production of all Cereal. Finally, the three northern American neighbors need to be mentioned: Mexico (+17%), Canada and the United States (+4% each).

Several wheat producers of the general Mediterranean and central European area had low production, for instance Ukraine (-1%) and France (-2%) but larger drops compared with the previous season occurred in Hungary (-3%), Morocco and Turkey (both at -6%). Ethiopia is

mentioned too with -3%. Among the important producers and exporter, we need to mention Argentina (-2%), Brazil (-4%), South Africa (-13%) and Australia (-21%).

Among the top 10 exporters, 5 had production drops. In addition to the already mentioned ones (Argentina, Australia, France and Ukraine) also Kazakhstan underwent a drop in production compared with 2018 that reached 22%. As a result, the wheat output of the top 10 producers is down 1.7%, equivalent to 5.0 million tons. Among the top wheat importers, only Indonesia is not at the same time a producer. They did generally well in 2019 as they increased their production by 3.4 million tons, or 3.6%. The amount is more than half of the production shortfall of the main exporters (5.0 million tons, as mentioned).

### *Soybean*

Soybean production is up by 25% in Mexico, a minor producer (less than 1 million tons) and one of the top importers. Among the important producers, production is up 9% in Argentina, 3% in China and in Brazil. Both Russia and Indonesia increased their production by 1% over 2018 output. Production is slightly down in India (-1%) which not a major player in international soybean trade is.

The most spectacular drop is the one assessed for the Unites States (-9%) as a result of unfavorable weather and policy. A consequence is that the output of the top ten producers is down 1.4%, equivalent to 4.2 million tons. Importers, whose volume of production is about 15 times lower than that of the exporters, increased their output by 0.6 million tons (top 10), up 3.9% compared with 2018. No tension should affect markets.

**Table5.2 Comparison of 2019 and 2018 production of major importers and exporters as well as the change in the offer and demand between 2018 and 2019. The table lists percent changes as well as absolute amounts based on table 5.1.**

| Main exporters | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Change in production volume in 1000 tonnes | | | | Change in production in % | | | |
| | **Maize** | **Rice** | **Wheat** | **Soybean** | **Maize** | **Rice** | **Wheat** | **Soybean** |
| Top1 | 6,044 | 13,221 | 2,043 | −10,102 | 1.7 | 8.5 | 3.9 | −9.0 |
| Top3 | 9,594 | 15,548 | 3,873 | −2,996 | 1.9 | 6.5 | 2.8 | −1.2 |
| Top 10 | 10,897 | 21,031 | −4,956 | −4,190 | 1.8 | 7.0 | −1.7 | −1.4 |
| 1 to 5 | 8,550 | 18,155 | −2,110 | −3,113 | 1.6 | 7.0 | −1.1 | −1.1 |
| 6 to 10 | 2,347 | 2,876 | −2,845 | −1,077 | 4.3 | 7.0 | −3.2 | −7.3 |
| Importers | | | | | | | | |
| | Change in production volume in 1000 tonnes | | | | Change in production in % | | | |
| | **Maize** | **Rice** | **Wheat** | **Soybean** | **Maize** | **Rice** | **Wheat** | **Soybean** |
| Top1 | 0 | 5,759 | 1,010 | 405 | −5.3 | 2.9 | 9.4 | 2.9 |
| Top3 | −1,471 | 5,652 | 984 | 577 | −6.2 | 2.8 | 7.4 | 3.9 |
| Top 10 | −2,014 | 4,907 | 3,435 | 588 | −4.8 | 1.8 | 6.9 | 3.6 |
| 1 to 5 | −1,596 | 5,918 | 1,214 | 578 | −4.7 | 2.9 | 4.9 | 3.9 |
| 6 to 10 | −418 | −1,012 | 2,221 | 11 | −5.2 | −1.5 | 8.8 | 0.7 |

*Note: About 154 countries that are not covered in Table 5.1 are part of the top ten importers or exporters. They include Bolivia, Paraguay and Uruguay among the exporters and, among the importers, Algeria, Benin, Colombia, Côte d'Ivoire, Iraq, Japan,*

*Korean Republic, Netherlands, Nigeria, Saudi Arabia, Senegal, Spain We stress that some numbers in table 5.2 are based on extrapolations.*

## 5.2 Disaster events

### *Introduction*

Some food deficit areas listed by FAO south of the Equator (Zimbabwe, Malawi, Madagascar and Mozambique) now grapple with drought, but they badly suffered from floods when they were hit by cyclone Idai in March. They still struggling to recover from the cyclone to the extent that, on 23 October, the UN Economic Commission for Africa (UNECA) stated that "overUS$4 billion is needed to help Malawi, Mozambique and Zimbabwe recover."

Mozambique, which bore the brunt of the cyclone's impact, suffered a second though less severe impact at the end of April (cyclone Kenneth), which was followed by drought. By mid-September close to 2 million people were estimated to be seriously food insecure, with many living in tented camps, a situation that is estimated to last at least until the end of the year. In Malawi, according to the Southern African Development Community (SADC), 1.1 million people will be in IPC phase 3 (crisis) until March 2020, especially in the districts of Karongo, Balaka and Mchinji where malnutrition rates are above 10%, in spite of a nationwide mostly favorable 2018/19 crop. In Zambia 2.3 million people are projected to be severely food insecure (IPC Phase 3 or 4) in March 2020. ReliefWeb, quoting the UN Office for the coordination of Humanitarian Affairs (OCHA) indicated that, at the end of September, "More than 9.2 million people across the region are now severely food insecure, and this figure is expected to grow to 12 million at the peak of the lean season (October 2019-March 2020)."

### *Extreme conditions by type*

### *Drought and fires*

Drought and resulting fires have received wide media coverage during the current JASO reporting period. In several countries huge bush and forest fires resulted from initial indifference, climate change denial and unpreparedness, frequently leading to local and international tensions! Fires not only absorb vital national resources but also affect infrastructure, living conditions and the health of people. Examples include power cuts in California, closed schools in Malaysia (due to fires in Indonesia) in Bolivia and Brazil, respiratory problems, severe impacts on biodiversity and direct crop loss.

Fires were mainly observed at high latitudes in Asia (Siberia) and America (Canadian Arctic and Alaska), California, the Amazon (Peru and Paraguay, but mostly Brazil and Bolivia), Indonesia and Australia.

Siberian fires occurred mainly in July and August. 3 million hectares were burning at the end of July, with a total of 12 million destroyed in 2019. Unusually high temperature and strong winds are listed as main factors. Similarly, the fires which affected south-central Alaska in August were also assigned to "unprecedented temperatures."

In California, the 2019 “fire season” is reported to have been one of the most destructive in history with 6200 incidents destroying about 80000 hectares. More than 100 people lost their lives and thousands of houses were lost. In addition to heat and wind, reduced snow and an increase of the snow-fewer periods in the Sierras by 75 days are given as contributing factors.

Contrary to semi-arid areas such as California and Australia, fires in rain-forest areas in south-east Asia and south America are mostly due to human activities, such as logging and deforesting to expand agricultural land for grazing and soybean cultivation (Brazil). In 2019, about 900000 hectares of forest were lost due to fire, which represents about 0.1% of the total Amazonian forest area. At the end of August, INPE, the national Brazilian Remote sensing research institution reported 80000 fires across the country, a 77% increase over average, and including 40000 fires in nine core Amazonian states. Bolivian Amazon fires, which lasted from late August to September, were eventually reduced by rain. The department of Santa Cruz was severely affected, with 521 thousand hectares of forest and grassland and hundreds of hectares of crops burnt. Amid lots of national and international tension, the fires eventually led to international assistance and legislation aiming at reducing future fires.

Toxic smoke from Indonesian fires in Sumatra and Kalimantan in September were monitored closely by the ASEAN Specialized Meteorological Centre (ASMC) that provided detailed regional maps of haze over Sumatra, Borneo and peninsular Malaysia, Singapore and Brunei Darussalaam. The smoke has affected much of the region and has led to some tension among neighboring countries.

Bush fires in Australia, which started in September and continued into November destroyed 700000 Ha especially in the south-east (New South Wales and Queensland); they even locally moved into rainforest areas in Queensland, which is exceptional. Several hundred houses were lost. Australia suffered from the worst drought in 100 years; many catchment basins in New South Wales (Macquarie River, Lachlan River, the fourth-longest in Australia) recorded less than 10 % of their average water inflow.

**Figure 5.1 Track of cyclone Idai: the beginning of a fire in Sherman Oaks, California, fills the skyline with smoke. Photograph: John Fredricks/NurPhoto via Getty Images. Source:**

https://www.theguardian.com/world/2019/oct/25/a-special-kind-of-hell-fires-smoke-and-heat-turn-la-into-a-deadly-paradise.

*Drought*

The Central American "dry corridor" has been experiencing drought for the last five seasons. This has resulted in the loss of staple crops, mostly maize and beans in many areas, including the Honduran Departments of Choluteca, Valle, La Paz, El Paraíso and Francisco Morazán. According to FEWSNET, subsistence farmers were the most affected, with drought occurring at advanced phenological stages between flowering and ripeness. Temperature anomalies during August and early September exceeded 2.5°C in most of western Nicaragua, eastern Honduras, as well as central and northern Guatemala. El Salvador deplored the greatest losses (40 to 60%) while they reached 15% in the center and west, although rainfall improved in September. For many people, emigration is seen as the only way to cope with repeated crop failures. The Honduran government declared an emergency in August 2018 when it became clear that the crisis situation would last throughout 2019. In early August 2019 more than 1.4 million people were in need of urgent assistance in Guatemala, Honduras, El Salvador and Nicaragua, with a total of 2 million affected. At the end of September the Guatemalan government has taken steps to assist 6.7 million people (almost 40% of the population) at risk of malnutrition. According to the World Food Programme 25% of households in the region have insufficient income to cover their basic food needs and 8% indicated that migration was their only hope.

In the Horn of Africa, the spring rainy season was among the top three driest on record, just one year after the end of a major drought in 2016-2017. Households had no time to recover, nor pastures and herds to regenerate in areas where livestock is the basis of livelihoods. As a result food prices are high in the entire region, further reducing access to basic food supplies. In Somalia the cereal harvest is the poorest since 2011, according to FAO. Delayed spring rains (the "Gu" season from April to June), and insignificant river flow have resulted in yields not exceeding a third of normal values. Around 2.6 million people are estimated to be severely food insecure, falling under IPC phases 3 and 4. The situation is not likely to improve until the "Deyr" crop (starting in October) will be available from December. The Somali drought has even received a name ("Sima") and has claimed 250000 lives since 2011. In the Sudan 6.3 million people (14% of the population) are experiencing a food crisis, the largest since 2007.

*Floods*

Floods were reported in August on all continents. In parts of the lower Mississippi Delta, about 220000 hectares had been under water since February (Yazoo backwater area). Floods also affected Asia, including India, Myanmar and Pakistan. In India, parts the south (Kerala and Karnataka) and west (Gujarat and Maharashtra) were hit, leaving 224 people dead in some areas where floods returned in October. At the end of the month torrential rain destroyed shelters for displaced people in northeast Nigeria, severely flooding temporary camps and leaving vulnerable families homeless, about 7000 people in Maiduguri and 500 people in Dikwa. Relief organizations have reported that displaced people are living in sub-human conditions across the region, but several international Donors are focusing their assistance to the north-eastern States of Borno and Yobe, strengthening recovery and building conflict resilience.

In September, parts of eastern Spain have received the heaviest rainfall on record, which killed several people. At the end of the month, floods brought misery to India in northern states (e.g.

Bihar and Uttar Pradesh) and in the east, where the casualties exceeded 100 after the delayed monsoon rains eventually started. In the north (Uttar Pradesh), 93 people have died as the rains caused homes to collapse. In neighboring Bihar, dozens of people died.

October brought excessive precipitation to eight south-western French departments in the Regions of Languedoc-Roussillon, Gard and Pyrénées Orientales. Abundant rain also fell in most of the Horn of Africa (except in northern and western south Sudan and south-west Uganda) potentially improving prospects for the ongoing or starting crop seasons and range-land, referred to as "Deyr" in Somalia (as mentioned above), "Meher" in Ethiopia, “short rains” in bimodal rainfall areas in the east and southern areas. The current rain corresponds to the main season in northern Tanzania and western Kenya. The region is currently under the influence of the “Indian Ocean Dipole”, sometimes referred to as the “Indian Ocean El Niño”, which is likely to boost precipitation until the end of the year. However, the region was affected by the “tail” of cyclone Kyarr which originated on 24 October off the western Indian Coast in the southeastern Arabian Sea, first moving east and affecting the western Indian coast (Maharashtra, Karnataka, and Goa). It then turned westwards, moving south of the Arabian Peninsula and eventually reaching Somalia on 3 November. Although the cyclone had lost its super cyclonic storm features, it lead to additional abundant precipitation affecting about 1 million people through floods in 27 counties in South Sudan, but also in Somalia and Kenya. In Somalia, 180000 people were displaced and crops were destroyed in areas where moderate to severe drought had affected crops earlier in the season. 38 people died in Kenya. At the very end of October landslides due to heavy rain killed about 35 people in Cameroon and made hundreds homeless. The abundant rains created damage, but most of it was lost in runoff.

**Figure 5.2 Floodwaters between Bor and Pibor (South Sudan) on 20 October 2019. Source: Médecins sans frontières, published by https://www.spokesman.com/stories/2019/nov/01/flooding-in-east-africa-affects-more-than-1-million**

*Cyclones*

In addition to the above mentioned Kyarr, the most notable cyclones were Dorian (Caribbean) and, In Asia. Lekima, Faxai and Hagibis.

Heavy rain exceeding 200 mm fell over eastern China after Typhoon Lekima (known as Hanna in the Philippines) made landfall late on 9 August, affecting Zhejiang - where the impact was strongest -, Jiangsu, Shandong, Anhui and Fujian Provinces. Wind peak speed reached 240km/h. Daily rainfall as high as 291 mm was recorded in Beilun district in Zhejiang Province. The highest precipitation fell in Linqu County (Shandong Province) at 387 mm. A second landfall occurred on 11 August in Shandong province (Qingdao). More than 1.7 million people had to be evacuated (including from parts of Shanghai) and about 13 million people were affected in nine provinces, with casualties exceeding 60 deaths. Lekima is the third strongest typhoon in East China since 1949, and the worst in 13 years. Total damage is estimated at 9.3 billion US$, including damage to just under 1000000 Ha of agricultural lands. Thousands of trees were uprooted or broken, the price of vegetables increased by 9% in some areas. According to Xinhua news agency, the government has released relief material and 86 million US$ (665 million RMB) for recovery operations to Liaoning, Zhejiang and Shandong Provinces.

(13) Hurricane Dorian very slowly (1.5 to 8 km/hour) crossed the Bahaman islands of Grand Bahama and Abaco in 1 September, with wind gusts reaching 320 km/h and a storm surge of close to 7.5 m. 67 people were left dead and more than 600 were still missing at the beginning of October. According to the International Red Cross and Red Crescent Federation as many as 13,000 houses have been severely damaged or destroyed and drinking water was contaminated by saltwater. 76000 people were affected out of a total population just under 400000. The Hurricane subsequently moved along the eastern American coast and died off the Canadian coast, resulting in broken trees and power cuts in Canada.

Typhoon Faxai, the worst storm in Japan in 60 years, just browsed Wake Island in the east of the country on 9 September. Damage is estimated at 7 billion US$ but only three deaths occurred. After affecting Guam and the Mariana Islands, a second cyclone, Hagibis, brought havoc to much of Japan, after making landfall on Izu Peninsula and then near Yokohama on 11 October. It also brought rainfall to the Korean Peninsula, eastern China, Russia and Alaska as it circled off northern Kamchatka up to 20 October. In central and eastern Japan at least 25 rivers burst their banks. About 90 died and some are still missing; 3560 were injured. At least 25000 Ha were flooded. Insured losses exceed 9 billion US$. The combined damage to the agricultural sector of cyclones Faxai and Hagibis in 38 Prefectures reaches 2.3 billion US$, with 350 million US$ assigned to Hagibis, of which about one third results from direct crop damage to horticultural crops and rice. As a result, some prices of particularly affected vegetables rose between 30% and 80% in Tokyo. Agricultural infrastructure losses (including irrigation) are estimated at 1 billion US$.

**Figure 5.3. The site of the landslide on 11 August 2019 in Shanzao Village of Yantan Township in Yongjia County, Zhejiang Province. (Xinhua/Han Chuanhao). Source: http://www.ecns.cn/hd/2019-08-12/detail-ifzmwwnr7045884.shtml#1**

## 5.3 Update on El Niño

Neutral El Nino condition prevails across the Pacific Ocean. Figure 5.4 illustrates the behavior of the standard Southern Oscillation Index (SOI) of the Australian Bureau of Meteorology (BOM) from October 2018 to October 2019. 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 the current season, SOI increased gradually from -5.6 in July to -4.4 in August, then decreased sharply to -12.4 in September, then increased to -5.6 in October 2019 again, indicating a neutral El Nino situation. The sea surface temperature anomalies in October 2019 for NINO3, NINO3.4, and NINO4 regions were +0.3°C, +0.6°C, and +1.0°C, respectively, somewhat warmer than the 1961-1990 average according to BOM (see Figure 5.5-5.6).

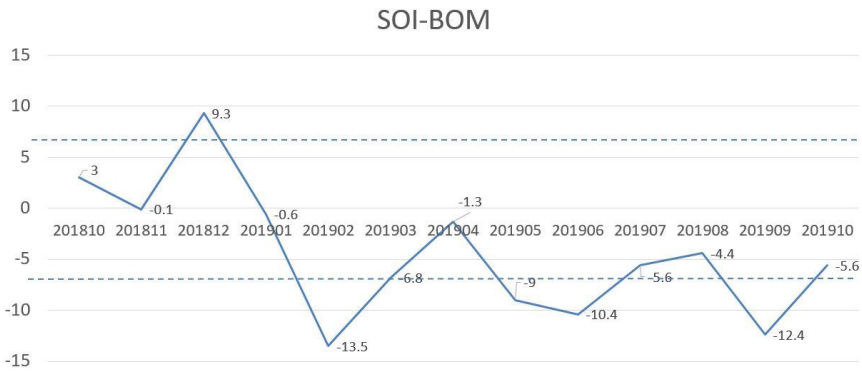


**Figure 5.4. Monthly SOI-BOM time series from October 2018 to October 2019**

The sea surface temperature anomalies in April 2019 for NINO3, NINO3.4, and NINO4 regions are +0.7°C, +0.7°C, and +0.6°C in sequence, a litter warmer than the 1961-1990 average according to BOM (see Figure 5.8-5.9). Both of BOM and NOAA conjecture that the warmer condition indicates a weak El Niño trend. CropWatch will keep monitoring the situation.

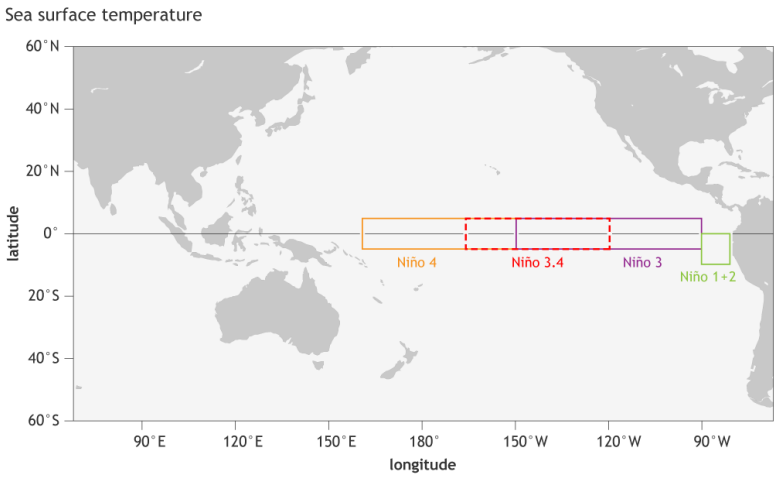


**Figure 5.5 Map of NINO Region**

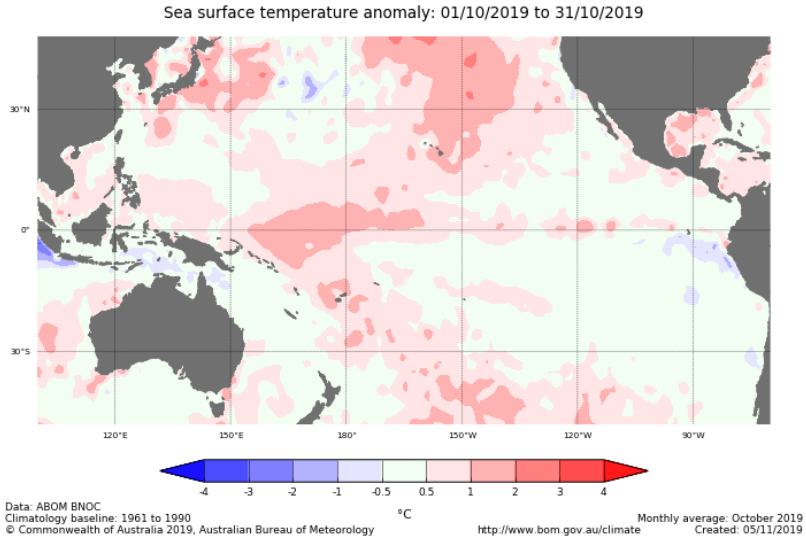


**Figure 5.6. July 2019 sea surface temperature departure from the 1961-1990 average**