Chapter 5. Focus and perspectives

Building on the CropWatch analyses presented in chapters 1 through 4, this chapter presents initial CropWatch food production estimates 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 first revision by the CropWatch team of the global maize, rice, and wheat and soybeans production in 2019, which was published last May. It is issued at a time when almost all winter crops in the northern hemisphere have been harvested and summer crops are in their late stages; in the southern hemisphere winter crops are growing and the planting of the summer season or the monsoon season will start in a month or so. A final update will be published in the November 2019 CropWatch bulletin.

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 later during 2019, for which no directly observed crop condition information is as yet available. In Table 5.1 below, modeled outputs are red bolded. The percentage of modeled global production varies according to crops: 78% for maize, 84% for rice, 79% of wheat (most of it being northern hemisphere winter wheat) and 78% for soybeans. When considering numbers of countries, the percentages are smaller: 75%, 50%, 78% and 29%, respectively. While the percentage of countries and the share of total production will increase only marginally in the next bulletin that will be issued in November.

The 41 countries for which production estimates are provided are described in detail in chapter 3 while a whole chapter is devoted to China (Chapter 4). The 41 + 1 countries are referred to conventionally as the "Major producers". "Others" include the 142 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 reason for doing so is that countries sometimes phase out crops for a variety of reasons (e.g. soybean in Macedonia or Syria) and production projections that turn negative can be set to zero. This effect remains hidden when sums are projected.

The red bolded 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 80% or 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 1045 million tonnes of maize, down 0.5% from 2018, 736 million for rice (up 1.7%), 703 million tonnes of wheat (a 1.4% increase) and 323 million tonnes of soybeans, 1.2% lower than last year's output. The major producers contribute 964 million tonnes of maize (-0.1%), 667 million for rice (+1.9%), 633 million tonnes of wheat (+1.5%) and 304 million tonnes of soybeans (-1.0%). The share of the "minor producers" (shown as "Others" in the table) to the global production varies from 6% (soybean) to 10% (wheat) with maize at 8% and rice at 9%. Compared with the final CropWatch estimates for 2018, the relative importance of "others" did not change. Major producers outperform all "others", in particular for maize (-0.1% vs. -4.4%), rice (+1.9% vs. -0.1%) and soybeans (-1.0% vs. -5.0%), increasing the dominance of large exporters

The current estimate is one of the most pessimistic issued by CropWatch over the recent cropping seasons, in that maize and soybean performed poorly in the Unites States due to very unusual weather conditions. For the major producers, the current production estimate is below the trend for maize (-0.1% Vs. 3.1%), wheat (1.5% Vs. 2.3%) and soybean (-1.0% Vs. 4.9%), but above for rice (1.9% Vs. 1.2%) due to relatively more favorable environmental conditions in southern and south-east Asia than in the temperate northern hemisphere.

In China, the comprehensive CropWatch estimates posit the variation of maize at -2% and project positive changes for other crops, from 1% for rice to 2% for wheat and 3% for soybean.

Five countries that did well for all the cereals include Egypt and Pakistan (+11% and +10% compared with 2018), where the volume of cereals produced increased 2.4 and 3.8 million tonnes for maize, rice and wheat combined. They are followed by Argentina (+7%) and Brazil (+3%) where the output is up 5.2 and 1.7 million tonnes. Finally, the cereal production of the United States is up 1%, corresponding to 3.3 million tonnes, mostly wheat.

Maize

Similar to the other crops in table 5.1, the discussion concentrates on modeled estimates (those in bold red) rather than on statistical projections (black) that do not take current climatic and agricultural environments into account.

Countries that experienced large production increases include Argentina (+7%), Bangladesh (+8%), Nigeria and Pakistan (+8%) and Myanmar (+9%). Reduced output is projected France and Germany (-5% and -7%, respectively), Philippines (6%), Mexico (-9%), and in Africa, Zambia, South Africa and Kenya (-10%, -12% and -18%, respectively).

The two top global producers did poorly with the USA at 364 million tonnes, comparable with 2018, and China at 217 million tonnes, -2% down from 2018 (refer to chapter 4.1 for details). Significant increases in maize production are projected for Argentina, the 4th global producer (+7%) and for Egypt (+13%), Pakistan and Bangladesh (both +8%) and Myanmar (+9%) where the good performance occurs after one or more years of relative maize production stagnation or even drop (Egypt, Pakistan).

The production volume of the top 5 exporters (United States, Brazil, Argentina, Ukraine and France) is up 1.3%, equivalent to 6982 thousand tonnes (Table 5.2). This is about sixty times larger than the output the 6th through the 10th exporters (Romania, Russia, Hungary, India and Paraguay). Among the maize large maize producers and exporters only Argentina and Brazil and Paraguay did well. Demand is likely to increase as Mexico, the second largest importer after Japan, had a maize production drop of 9% this year. For the top 10 maize importers the increase in maize demand reaches 2404 thousand tonnes. The balance of maize availability for the top 10 exporters and importers reaches 4685 thousand tonnes.

Rice

A drop in paddy production is listed for several major South-east Asian producers, including Thailand and Vietnam (both down 2% from 2018). Larger reductions occurred in Sri Lanka (-4%), Philippines (-6%) and Cambodia (-8%). The largest increases are listed for Iran (+10%) and Pakistan (+12%) and India and Bangladesh (+6% each) and, outside the Asia continent, +9% in Argentina.

Among the top rice exporters only India (+6%), Pakistan (+12%), Argentina (+9%) and (presumably) Italy did well. With both Thailand and Vietnam down 2%, the production of the top ten exporters is up 8347 thousand tonnes, equivalent to 3.3%. Among the traditional large importers, the production is up in Nigeria (+2%) and in Iran (+10%), so that the likely demand of the top ten importers is up 1971 thousand tonnes, well below the production increase of exporters. The balance of maize availability for the top 10 exporters and importers reaches 10.9 million tonnes, the largest volume among the monitored cereals.

Wheat

Poor performance for wheat occurs on all continents, starting with several countries of the general European and Mediterranean area due to unusual spring and summer conditions. They include Belarus (-7%), Poland (-5%), Morocco (-6%) and Turkey (-6%). Production drops also affect Australia (-10%) and South Africa (-8%) and, in central Asia, Kazakhstan (-11%). Production is up more than 5% in Argentina (+7%), Egypt (+9%), Pakistan (+10%) and especially Iran (+16%), Mexico (+17%) and Uzbekistan (+37%).

Among the major exporters, production of wheat is significantly down in Kazakhstan (-11%) and in Australia (-10%) and to a lesser degree in Ukraine and Germany (-1%) and France (-2%). With increased production in the Unites States and Canada (+4% each) and Argentina (+7%), the production of the top 10 wheat producers is down 917 thousand tonnes or 0.3%. This is more than compensated by the improved output of importers (3686 thousand tonnes) which increased their production by 7.4%, especially in Egypt (+9%), Iran (+16%) and Mexico (+17%). The balance of maize availability for the top 10 exporters and importers reaches 2769 thousand tonnes, which is unlikely to lead to any tension.

Soybean

Soybean production increased over 2018 among most the major producers, including Brazil (+3%), Argentina (+9%), China and India which both produced about 14.4 million tonnes, up 3% in China and 27% in India. The first producer, the USA, is second this year: down 13% from last year's 112.6 million tons).

With the poor performance of the United States, the total production of the top 3 exporters is down 7093 thousand tonnes, and down 7971 thousand tonnes for the top 10 exporters as Brazil, Argentina and Russia (+8%), the only countries that did well, cannot make up for the difference. All major Soybean importers did well, including Mexico (soybean production up 8%), Indonesia (+1%) and especially China (+3%). For the top 10 importers, the production is up 487 thousand tonnes. However, contrary to the situation listed for the cereals, the balance of maize availability for the top 10 exporters and importers of soybean is negative: -7484 thousand tonnes. The situation is made particulalry complex by the small number of soybean suppliers and by the swine fever outbreak in China which, according to some estimates, may eventually halve the national pig population and considerably decrease national demand.

Table 5.1. 2019 cereal and soybean productions estimates in thousands tonnes. Although more complex situations do occur in the case of multiple cropping, numbers in black are trend-based while numbers in red generally 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	
	Production 2019 (ktons)	% change from 2018	Production 2019 (ktons)	% change from 2018	Production 2019 (ktons)	% change from 2018	Production 2019 (ktons)	% change from 2018
Afghanistan	197	−23	220	−25	**6630**	**98**		
Angola	**2776**	**−1**	77	12	3	3	19	3
Argentina	**53154**	**7**	**1849**	**9**	**19894**	**7**	**51459**	**9**
Australia	470	0	768	−13	**22215**	**−10**	62	−11
Bangladesh	**2368**	**8**	**47715**	**6**	1467	−2	97	−8
Belarus	763	15			**2583**	**−7**		
Brazil	**88073**	**3**	**11650**	**0**	**4327**	**1**	**100744**	**3**
Cambodia	702	24	**8081**	**−8**			173	1
Canada	**11973**	**0**			**32170**	**4**	**7743**	**0**
China	**217125**	**−2**	**198830**	**1**	**123516**	**2**	**14441**	**3**
Egypt	**6226**	**13**	**6839**	**12**	**11800**	**9**	50	2
Ethiopia	**7409**	**0**	150	1	**4090**	**2**	107	−1
France	**13643**	**−5**	69	7	**35586**	**−2**	475	17
Germany	**4406**	**−7**			**26732**	**−1**	72	34
Hungary	**5606**	**−1**	11	9	**4876**	**−3**	200	12
India	**17735**	**−1**	**163620**	**6**	**90267**	**−1**	**14415**	**27**
Indonesia	**17177**	**2**	**65409**	**0**			**1102**	**1**
Iran	1054	−15	**2710**	**10**	**16076**	**16**	185	15
Italy	**6001**	**−2**	1626	7	**7713**	**6**	**1553**	**2**
Kazakhstan	877	5	524	10	**14488**	**−11**	289	2
Kenya	**2850**	**−18**	98	−16	161	−15	2	−13
Mexico	**21573**	**−9**	265	7	**4188**	**17**	**666**	**8**
Mongolia					**271**	**7**		
Morocco	91	39	65	16	**6655**	**−6**	1	−15
Mozambique	**2042**	**−2**	**380**	**1**	15	−16		
Myanmar	**1859**	**9**	**25170**	**0**	94	−27	170	20
Nigeria	**12702**	**8**	**4800**	**2**	47	−15	767	4
Pakistan	**4888**	**8**	**9815**	**12**	**26409**	**10**		
Philippines	**7000**	**−6**	**18468**	**−6**			1	0
Poland	4674	−4			**9611**	**−5**	25	72
Romania	**12439**	**−3**	36	−1	**7656**	**2**	445	22
Russia	**12885**	**1**	1031	−3	**53048**	**0**	**3864**	**8**
South Africa	**11647**	**−12**	3	0	**1450**	**−8**	1286	7
Sri Lanka	216	−11	**2336**	**−4**			15	23
Thailand	**4677**	**−3**	**37610**	**−2**	1	−2	17	59
Turkey	**6550**	**0**	960	2	**18608**	**−6**	181	−6
Ukraine	**28759**	**−1**	49	28	**20933**	**−1**	4786	−2
United Kingdom					**13464**	**−2**		
United States	**364161**	**0**	**11254**	**2**	**37199**	**4**	**98475**	**−13**
Uzbekistan	465	−5	377	−6	**8170**	**37**		
Vietnam	**5126**	**0**	**44045**	**−2**			81	−14
Zambia	**2125**	**−10**	26	−13	186	−7	396	15
Major producers	**964464**	**−0.1**	**666935**	**1.9**	**632599**	**1.5**	**304361**	**−1.0**
Others	**80995**	**−4.4**	**69304**	**−0.1**	**70441**	**0.9**	**18907**	**−5.0**

	Maize		Rice		Wheat		Soybean	
	Production 2019 (ktons)	% change from 2018	Production 2019 (ktons)	% change from 2018	Production 2019 (ktons)	% change from 2018	Producti on 2019 (ktons)	% change from 2018
Total	**1045458**	**−0.5**	**736239**	**1.7**	**703041**	**1.4**	**323268**	**−1.2**

Table 5.2. Comparison of 2019 and 2018 production of major importers and exporters as well as the change in the offer and demand. The table lists percent changes as well as absolute amounts based on table 5.1

	Exporters							
	Change in production volume in 1000 tonnes				Change in production in %			
	Maize	Rice	Wheat	Soybean	Maize	Rice	Wheat	Soybean
Top1	1657	8700	1389	−14199	0.5	5.6	3.9	−12.6
Top3	7889	7210	2763	−7093	1.6	3.0	2.3	−2.8
Top 10	7088	8925	−917	−7971	1.2	3.0	−0.3	−2.7
1 to 5	6982	8487	−375	−7127	1.3	3.3	−0.2	−2.6
6 to 10	106	438	−541	−844	0.2	1.1	−0.6	−5.7
	Importers							
	Change in production volume in 1000 tonnes				**Change in production in %**			
	Maize	**Rice**	**Maize**	**Rice**	**Maize**	**Rice**	**Maize**	**Rice**
Top1	0	1505	1010	405	−5.3	0.8	9.4	2.9
Top3	−2075	1613	984	475	−8.7	0.8	7.4	3.2
Top 10	−2403	1971	3686	487	−5.7	0.7	7.4	3.0
1 to 5	−1932	1770	1465	476	−5.7	0.9	5.9	3.2
6 to 10	−471	201	2221	11	−5.8	0.3	8.8	0.7

Note: About 15 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 and Taiwan. We stress that some numbers in table 5.2.

5.2 Disaster events

At the end of July, serious food crises are reported by the Integrated Food Security Phase Classification (IPC) from Africa and southern Asia. In Africa, there was the aftermath of three tropical cyclones central-northern Mozambique, as well as drought in southern Mozambique, Eswatini [5], Lesotho [6], southern Zambia [7] and Zimbabwe [8]. In Asia, Yemen [9] remains one of major food insecurity hotspots next to drought affected Sindh [10] and Balochistan[11] in Pakistan. This is in addition to the long list of countries from central and southern America, northern sub-Saharan Africa and Libya, the Middle-East and South-East Asia where human action, often compounded by inclement climate is the main factor of difficult humanitarian situations.

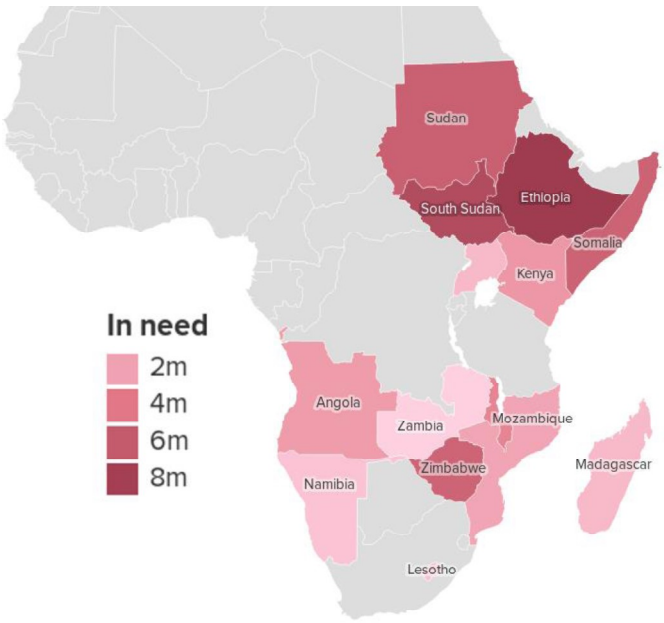
Food insecurity also continues to prevail in Mozambique as the result of several cyclones between January and May, which destroyed crops and infrastructure, and displaced thousands of people, mostly in central regions, as well as in Malawi and Zimbabwe. This was compounded by poor rainfall which affected the southern provinces and resulted in poor crop outputs. The previous CropWatch report provided detailed information on the impact of cyclones that occurred earlier this year (Desmond in January, but especially Idai in late March). Information on the latest cyclone (Kenneth) is provided below. Nationwide, an estimated 190,000 people are currently in IPC phase 4(Emergency) and IPC phase 3 (crisis) occurs throughout the country, with about1.6 million people having difficulties accessing adequate food in 63 districts out of 129. Depending on the assistance received, close to 2 million people maybe in a critical situation later this year in Cabo Delgado and the provinces south of and including Zambezia and Tete [12 to 16].

Drought, heat waves and fires

Prolonged drought and heat waves are reported for many areas, on all continents. While climatologists tend to be cautious when assigning the current situation to climate change, they nevertheless stress that the high temperature is compatible with prevailing scenarios. According to a World Meteorological Organization (WMO) statement "Such intense and widespread heatwaves carry the signature of man-made climate change. This is consistent with the scientific finding showing evidence of more frequent, drawn out and intense heat events as greenhouse gas concentrations lead to a rise in global temperatures" [17,18]. Readers are also referred to the recent revision (2019)by the World Resources Institute of its landmark 2013 AQUEDUCT-2.0 model report, which provides detailed global projections of water shortages [19]confirming recent reports about Cape Town in 2018 and Chennai in 2019 in Tamil Nadu [20 to 23]. An Indian government report estimates that 21cities will run out of groundwater by 2020 [6].

In the Horn of Africa "short rains" have been scarce between April and July, resulting in poor crops, loss of livestock and high food prices. According to ACAPS [24, 25] about 12 million people are currently severely food insecure in the region. This may increase to 17 million by August, with close to two million people having been displaced due to drought in the region (Figure 5.1). The situation is aggravated by inter-communal clashes and the difficult recovery from previous droughts (due to the 2016/17El Niño). According to the International Organization for Migration [26] the region recorded 8 million internally displaced persons in 2018, as well 3.3million international refugees. Needless to say, the need to deal with the displaced people adds considerable burden to the host countries, to the extent that OCHA was targeting 8.3 million people for assistance in Ethiopia only at the beginning of July [27].

Figure 5.1. Million People in need of assistance, mostly due toprolonged drought, other environmental as well as man-made stresses. Source from [61]



Drought has prevailed in the countries of the Central American"drought corridor" from February, as a result of the ongoing weak El Niño, affecting Guatemala, Honduras, El Salvador and Nicaragua. The shortage of water from mid-June will reduce the Primer harvest in August. ACAPS projects that the food situation will remain tense until early next year [28]. The situation is further made complex by nationally and internationally displaced person's inconnexion with the Venezuela crisis.

Siberia has received wide international media attention at the end of July, when about 3 million hectares of land were on fire in the centre and east of the country. Suffocating smoke has affected cities in Western Siberia, the Altai region and the Urals (Chelyabinsk and Yekaterinburg). Summer fires are not unusual in Siberia, but they never reached this year's extent. Greenpeace estimates that close to 12 million hectares of forest have been lost with biomass destruction and large CO2 emissions[29].

Very warm weather is also reported from the Arctic and British Columbia at the end of July [30], as well as from France at the end of June [17].Spain was said to fight the largest forest fires in 20 years as successive heatwaves engulfed Europe. In both countries, some areas passed the 40℃threshold during the last dekad of June [31].

Similarly, India recorded one of the longest heat waves on record during mid-June, in parts of north and central India with temperatures exceeding 40℃. Several records were broken in June, including 48℃ near Delhi in June and more than 50℃ in Rajasthan. Many northern Indian villages ran out of water for themselves and their cattle, creating an exodus of tens of thousands of people. Crops failed due to drought in 80% of districts in Karnataka and 72% in Maharashtra. More than 8 million farmers in these two states are struggling to survive [32, 33]. India is facing the worst water crisis in its history, especially in Tamil Nadu, as mentioned above. At the end of June, the Guardian reported that Chennai, the southern metropolis with a population of 10 million, is the first of them. Recent rain was insufficient to fill the four main reservoirs and to put an end to the worst drought for 70years [34].

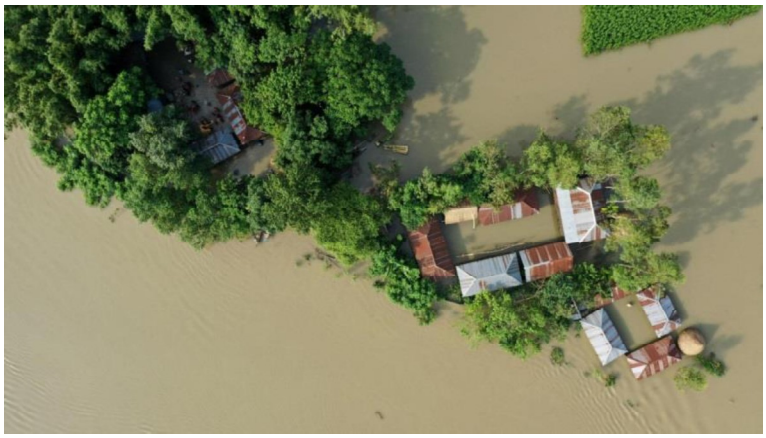
Floods

In addition to southern Asia, which will be mentioned with more detail below, relief agencies have reported numerous episodes of excess and violent precipitation, often accompanied by landslides, which have created loss of infrastructure, houses, crops, death and intense – even if local –suffering. They include heavy rain in Bamako (Mali) on 16 May, killing 16people; floods at the beginning of June in Tajikistan and in Serbia, affecting more than 1000 households each. Still in early June, floods led to population movements in three counties in Sudan, affecting about 11,000 households by destroying crops and killing livestock. In May and June heavy rains and floods have affected close to 80,000 people in Yemen for several weeks [35]. The United Kingdom was affected as well by floods [36].

Intense early monsoon conditions have hit southern Asia in throughout July, killing 17 people in Nepal just before mid-July and triggering landslides. As floods developed, about 80,000 people were displaced. According to UNICEF [37] the heavy rainfall, flooding and landslides have killed at least93 children, and put the lives of millions more at risk. Next to Nepal, abundant rainfall affected Bangladesh and India [38] with Assam and Biharamong the worst-hit regions (Figure 5.3). Millions were affected: about 4.3million in Assam while about 100,000 have been forced to seek shelter. In Bihara further 2.6 million people were hit by flash floods, with many homes quickly submerged in muddy water [39].

In Myanmar, according to OCHA [40] at least 45,000 people were displaced by flooding in Kachin, Rakhine, Mon and Chin States and Mandalay, Sagaing, Bago and Magway regions. By mid-July rivers were still overflowing, raising concern for downstream areas as water levels will increase all the way to the Irrawaddy Delta and since the monsoon was just starting. The heavy downpour also leads to floods in Mrauk-U Township. In Kachin State, according to the State Government, more than 6,200 people have been evacuated to 39 sites in Myitkyina, Bhamo and Shwegu townships as of 13 July. The number of affected person, some of them very vulnerable, is expected to rise significantly as more reports are received and verified [40].

Figure 5.2. The village of Uttarnay bash in Bangladesh has beenaffected by the heavy flooding that has disrupted the lives of thousands aroundthe country. © UNICEF/UN0328241/Chakma. Source from [41]



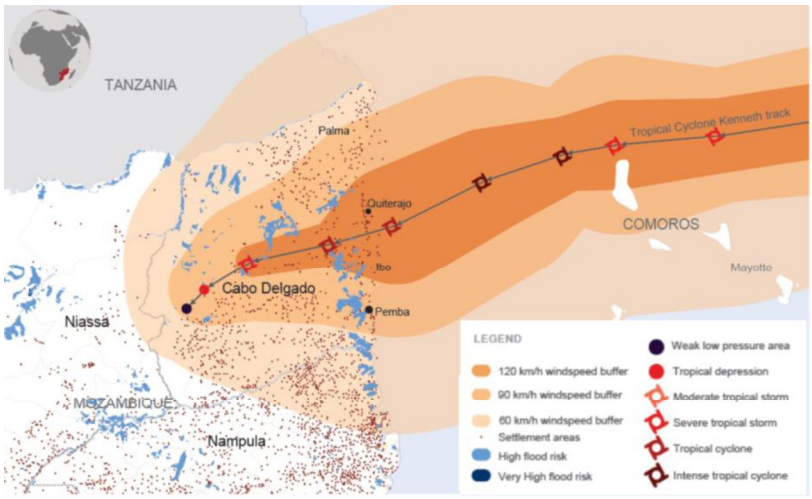
Cyclones

The Extremely Severe Cyclonic Storm Fani affected eastern India, Bangladesh and neighbouring areas. It made landfall near Puri (Odisha State inIndia) on 3 May and reached Bangladesh in a weakened form the next day [42].Fani left a trail of deadly destruction after passing through hundreds of densely populated, low-lying communities along the Bay of Bengal [43]. About100 people died in India and Bangladesh. The total damage is close to 2 billion US$. For the agricultural sector, very little reliable information is available. It is noted, however, that April-May (summer crops pre-planting or planting) is usually less affected by strong cyclones than October to December, when the kharif season crops are close to harvest. Reports from Bangladesh, which was relatively little affected compared with India, mention that 70000 Ha were damaged for a total value of about 5 million US$ of paddy (Boro), maize, vegetables and jute. 15 million people were affected in India, where reports stress losses to coconut plantations and shrimp farming, especially shrimp export earnings, which may drop 25%. Unofficial sources state that 200,000 ha of crops were destroyed as well as heavy losses in the poultry sector (38million birds killed). It may be assumed; however, that the effects of Fani will be felt later this season as seeds may have been lost before planting in June.

On 25 April, Mozambique was affected by the most intense cyclone that ever made landfall in the country (Intense cyclone Kenneth, [44]) which killed close to 50 people, causing damage in Nampula but especially in Pemba, capital of the north-eastern province of Cabo Delgado (Figure 5.4). 55000hectares of crops were affected. In Cabo Delgado, many people made vulnerable as a result of cyclone impacts were forced on the roads by insecurity brought about by the Islamic insurrection. Kenneth also affected Comoro Islands, Northern Madagascar, Malawi and Tanzania, but most causalities occurred in Mozambique. The total damage is estimated at 100 million US$, with60-80% of staple crops destroyed in Comoros [45]. Altogether, however, the damage assigned to Kenneth remains well below the catastrophic impact of Idai, which is estimated to be in excess of two billion UAS$ with casualties close to 1300.

In the USA, hurricane Barry created widespread but relatively benign floods in Alabama, Arkansas, Florida, Louisiana, Mississippi and Southern Ontario at the beginning of July [46].

Figure 5.3. Track of cyclone Kenneth (21 to 29 April) in north-eastern Mozambique modified from [47].

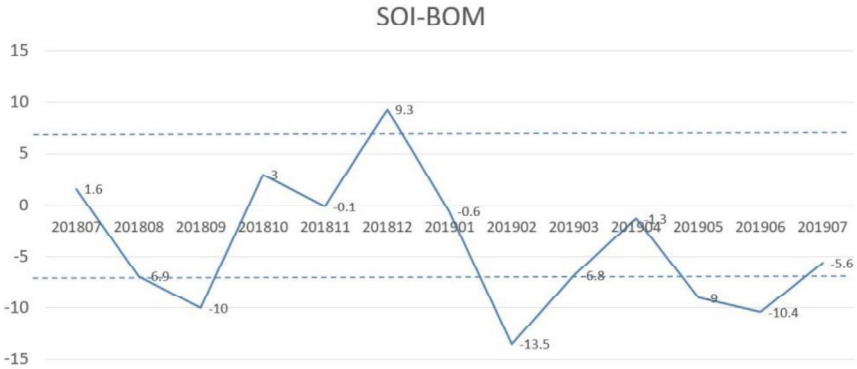


5.3 Update on El Niño

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 July 2018 to July 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 decreased sharply from -1.3 in April to -9 in May, then decreased further to -10.4 in June, then increased to -5.6 in July 2019, indicating a neutral El Nino situation.

Figure 5.4. Monthly SOI-BOM time series from July 2018 to July 2019[48]



The sea surface temperature anomalies in July 2019 for NINO3, NINO3.4, and NINO4 regions were +0.3℃, +0.5℃, and +0.8℃ in sequence, a litter warmer than the 1961-1990 average according to BOM (see Figure 5.5-5.6). Both BOM and NOAA conjecture that the warmer condition indicates a neutral El Niño [49]. CropWatch will keep monitoring the situation.

Figure 5.5. Map of NINO Region

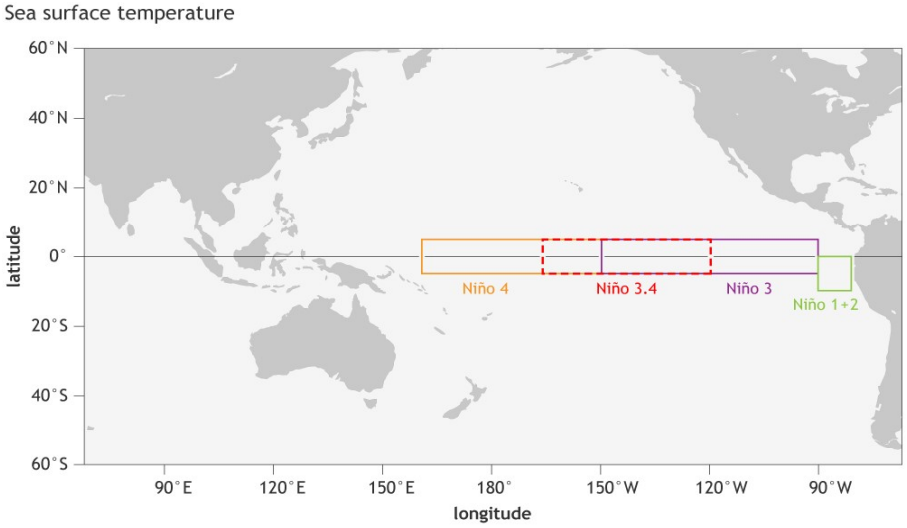


Figure 5.6. July 2019 sea surface temperature departure from the 1961-1990 average