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 2021 (section 5.1), as well as sections on recent disaster events (section 5.2), and an update on El Niño (section 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 2022. The results are as follows.

Production estimates

This bulletin includes only the major producers in the Equatorial region, and the Southern Hemisphere where crop development is sufficiently advanced to ensure that estimates are reliable. Some isolated Northern Hemisphere countries are also included such as Pakistan, and India.

CropWatch production estimates rely on crop-specific remote sensing indicators, i.e. based on different crop masks for each crop. For each crop listed in Table 5.1, both yield variation and cultivated area variation are taken into account when deriving the production estimates. Depending on the agricultural practices, crop growing stages, and environmental conditions, different indicators are used to as predictor variables and to calibrate the yield model for each country.

Table 5.1 2022 cereal and soybean production estimates in thousand tonnes. Δ is the percentage of change of 2022 production when compared with corresponding 2021 values.

	Maize		Rice		Wheat		Soybean	
	2022	Δ%	2022	Δ%	2022	Δ%	2022	Δ%
				Africa				
Angola	2940	12	48	6				
Egypt					11254	-2		
Kenya	1990	-13						
Morocco						-27		
Mozambique	2163	3	380	-5				
Nigeria	10710	3						
South Africa	11203	-2						
Zambia	3284	-8						
Asia								

	Maize		Rice		Wheat		Soybean	
	2022	Δ%	2022	Δ%	2022	Δ%	2022	Δ%
Bangladesh	4026	2	51491	7				
Cambodia			9695	-2				
India					95942	3		
Indonesia	17315	3	67290	1				
Myanmar			24838	0				
Pakistan					27564	4		
Philippines			20469	0				
Sri Lanka			2485	-2				
Thailand			40421	0				
Vietnam			46942	1				
America								
Argentina	58142	9	1812	-5			53556	4
Brazil	79262	-5	11667	-2			97374	1
Mexico	25366	3			4187	22		

Maize

Table 5.1 lists the results of the maize production prediction for eleven countries, including the 2nd and 3rd largest exporters: Brazil and Argentina. The total maize production of the 11 countries roughly accounts for 20% of global production. Suffering from prolonged drought in Central Brazil, maize production dropped by 5% from 2021. The first season maize in Central and Southern Brazil was severely affected by the drought, resulting in a 7% production drop. Although the rainfall in January 2022 is beneficial for second maize, water deficits in the major maize producing states still exist, and a 4% decrease of second maize production is projected by CropWatch. Dry weather further expanded to Paraguay, while Argentina received sufficient rainfall for the summer crops. Favorable soil moisture benefited maize development, contributing to a 9% increase in production. Drought conditions also occurred in several major maize producing countries in Africa. Kenya and Zambia experienced continuous drought since or even before the sowing of maize, resulting in a drop of maize production by 13% and 8%, respectively. Shortage of rainfall delayed the sowing of maize which caused the decrease of planted area as compared to 2021. Meanwhile, insufficient soil moisture also hampered the development of maize and reduced the average maize yield. Adverse weather conditions in major maize producing regions in South Africa damaged maize yield and the maize production dropped by 2% from 2021. Favorable conditions benefited all crops in Angola with a 12% production increase for maize as compared to the 2021 drought year. Maize production in Mozambique, Nigeria, Bangladesh, and Indonesia are all projected to be slightly above 2021. Although maize in North-West Mexico sown in September 2021 was affected by drought, the total maize production for 2021-2022 is still 3% above 2020-2021.

Rice

This current production prediction mainly focuses on the key producing countries in South and Southeast Asia. The combined output from the 12 countries monitored, accounting for 36% global rice production, is expected to increase by 1.5%. Rice production of most countries remains close to that of 2021 except for Bangladesh, where weather conditions mostly benefited Aman rice development, with rice production up by 7% from 2021. In Cambodia, low water levels in the Mekong River and drought at the early growing stage of dry season rice and the key growing period of rainy season rice affected rice output. Total rice production is estimated to drop by 2% from the previous year. Rice production of Mozambique, Brazil and Argentina decreased by 5%, 2% and 5% mainly due to the reduced yield.

Wheat

The harvest of wheat in Southern Hemisphere including Argentina, Australia, Brazil, Ethiopia, South Africa and Zambia concluded by the end of 2021. This bulletin focuses on the wheat producers in tropical and sub-tropical regions including Egypt, Morocco, India, Pakistan, and Mexico. Among these countries, wheat production in Morocco is forecast to drop by 27% from 2021 bumper production as affected by the lack of water. Significant negative departures of rainfall result in reduced yield and planted area. In contrast, Mexico outputs 22% more wheat compared with the previous drought year, which might result in decreased wheat imports. As wheat are mostly irrigated in Egypt, India and Pakistan, the wheat production is mostly affected by the wheat planted area. It is observed by satellite images that wheat area expanded from the previous year in the two Asia countries while it decreased in Egypt. A slight increase in Pakistan and India, by 4% and 3% respectively, is forecasted. Wheat production is projected to drop by 2% from 2021.

Soybean

Brazil and Argentina are among the top 3 exporters of the commodity. CropWatch projects increased soybean production for both countries. In Argentina, favorable meteorological conditions benefited the soybean in major producing states including Cordoba, Santa Fe and Buenos Aires, resulting in a 3% increase of soybean yield and a 4% increase of soybean production. In Brazil, drought in central and southern Brazil resulted in lower soybean yields in Parana and Rio Grande Do Sul. The largest soybean producing state, Mato Grosso, is less affected and an increased production is estimated. The national soybean production is forecast at 97,374 thousand tons, up by 1% from 2021.

5.2 Disaster events

Several natural or man-made disasters threatened human lives, food production, and the global economy. The current report discusses the main disasters and their global impacts during the period between October 2021 and January 2022. Extreme conditions by type are present as bellows:

Flood&Strom

In Indonesia, heavy rains, which were 70% to 100% higher than normal levels, hit the country between late November and January. They affected thousands of people and caused flooding conditions in urban and rural regions.

In Madagascar, which had been hit hard by a prolonged drought, a series of floods caused by heavy rainfall (226 mm falling during the night of 17-18 January 2022) hit the country's capital Antananarivo and other areas of the Analamanga Region in the center of the country. The floods caused the death of 11 people, landslides, and destruction of infrastructure. In Mozambique, tropical storm Ana made landfall in Angoche District, Nampula province, on January 24th. The storm significantly affected Zambezia and Tete provinces, causing the displacements of citizens, widespread floods, damages to public infrastructures and private homes, and interruption of basic services. As reported by the national government, the storm affected 180,869 people, injured 207 people, and killed at least 38 people, mostly in Zambezia, Nampula, and Tete provinces, flooding a total of 70,982 hectares of land.

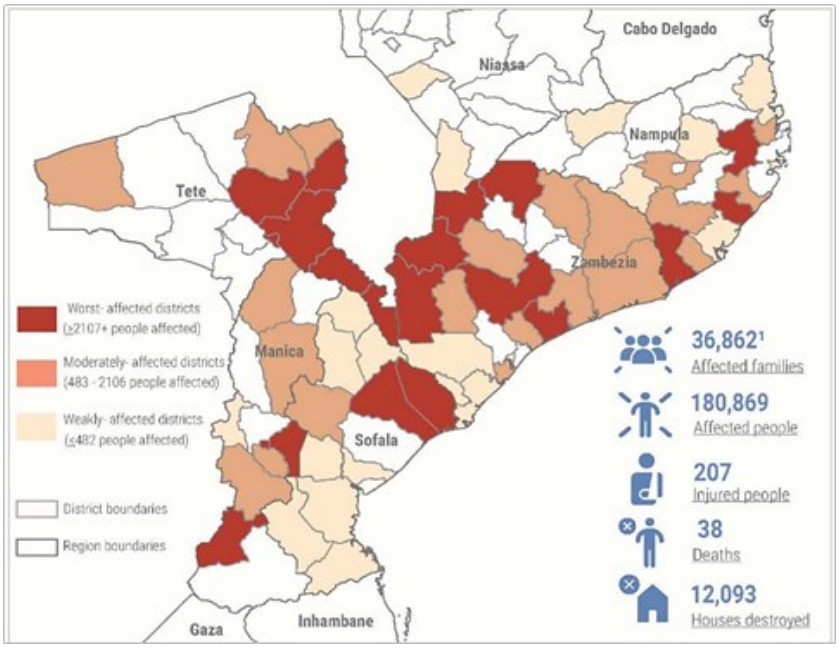

Figure 5.1 Impact of tropical storm Ana on six Mozambican provinces includes Nampula, Zambezi, Tete, Niassa, Sofala, and Manica. Data as of February 8th, 2022.

Drought

The end of 2021 witnessed an extreme drought in the state of California (USA), while the first two months of 2022 are shaping up to be the driest January and February in California's history. On October 5th, 2021, the drought map showed that around 50% of the state was under exceptional drought, while most of the remaining area was under extreme drought conditions. A heavy storm in the last week of October brought some relief to the area. As of January 4th, the situation had improved to severe drought for most of the state.

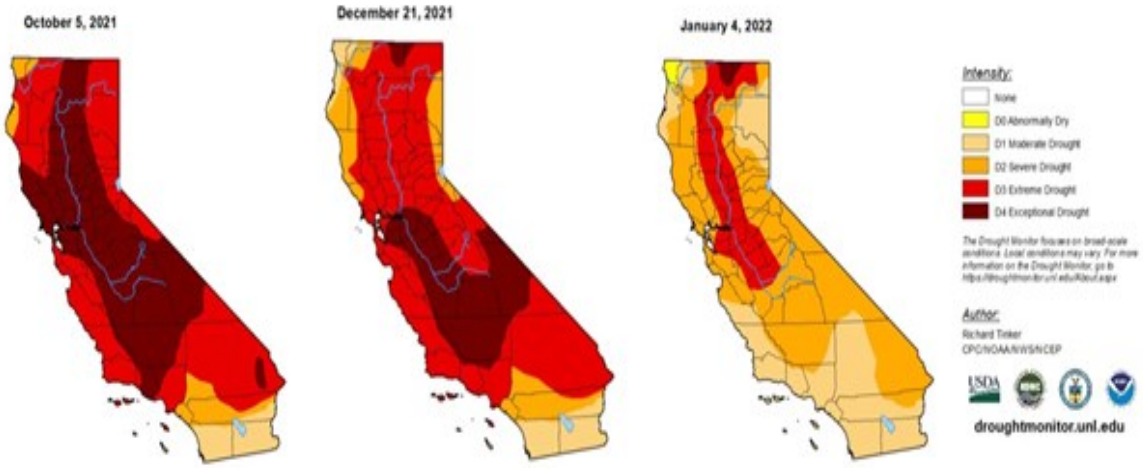

Figure 5.2 Maps show what California's drought situation looked like on October 5th, 2021 (left), December 21st, 2021 (middle), and January 4th, 2022 (right). (Source: U.S. Drought Monitor)

In Southern Africa, rainfall was significantly below average across Madagascar, Malawi, central and northern Mozambique, and northwestern Zimbabwe starting in October. Although rainfall improved in these areas in early January, significant delays in the rains were expected to impact crop production by reducing or delaying the planted area directly. The pastures' quality and livestock health will be highly dependent on the amount and distribution of rains. Besides the impact on agriculture, around 336,000 people (29% of the total population) are predicted to be facing high acute food insecurity and require urgent humanitarian assistance between December 2021 and March 2022 due to severe drought conditions. In Tanzania, several media outlets have reported that more than 62,000 animals have died as a result of the drought.

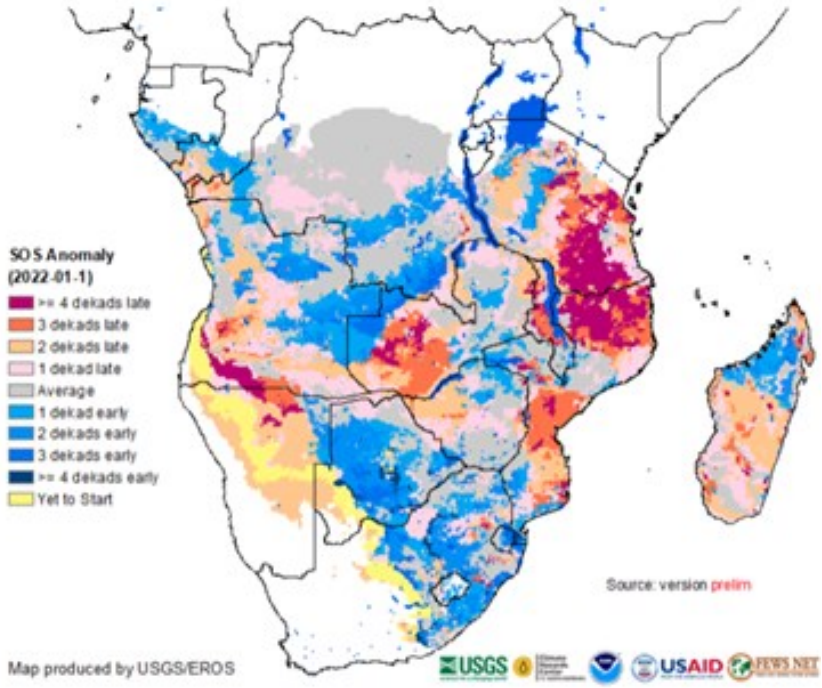

Figure 5.3 The Onset of 2021/2022 season rainfall compared to average timing, as of 10 January 2022. Source: USGS/FEWS NET.

In Morocco, the Moulouya River, a 500-kilometer waterway that is one of the longest rivers in the North African kingdom and a vital lifeline for farmers in areas near the Algerian border, was cutoff for the first time in November 2021 due to years of drought and over-pumping. Due to the lack of

rainfall and the drop in reservoir levels to unprecedented levels, Moroccan experts warn that the country is experiencing one of the worst droughts in the last three decades, which will lead to huge losses in cereal and legume crops. In addition to cereal production, high feed prices under the impact of the drought are also having an impact on the local livestock industry, and many farmers are selling their herds.

Figure 5.4 A farmer walks down his dried-out melon field in Morocco.

In Afghanistan, a prolonged, multi-year drought, in addition to the war, has caused a severe food shortage. The humanitarian situation in Afghanistan in 2021 was one of the worst globally, with nearly half of the population – some 18.4 million people – already in need of humanitarian and protection assistance in 2021. The UN World Food Program (WFP) reached approximately 9.4 million people with food assistance across 34 provinces between September 1st and December 30th, 2021. With the current drought conditions in 2022, an estimated 22.8 million people, or 55 percent of the population, are expected to be in crisis or at the emergency levels of food insecurity (IPC 3+) between November 2021 and March 2022.

In Syria, more than a decade of war has caused tremendous suffering for the civilian population. Northeastern Syria is experiencing its worst drought in nearly 70 years. It is exacerbated by Turkey's decision to withhold water from the Euphrates River. Historically low water levels in the Euphrates River have not just reduced access to water for drinking and domestic use for over five million people, but also triggered substantial harvest and income losses, decreased hydroelectricity generation, and an increase in water-borne diseases. In the mid to long-term, these developments are expected to have serious and cumulative impact on health, food insecurity, malnutrition rates, as well as the environment, with potentially irreversible consequences.

Jordan also faced an unprecedented drought crisis in recent months. The King Talal Dam, the Kingdom's largest dam, was at dangerously low levels, and six water dams out of 14 had dried up due to rainfall shortages. The dam covers 80% of the water needs of farmers in the Jordan Valley, which amount to 400,000 to 550,000 cubic meters per day, and the drying up will directly affect the irrigation of local crops.

In the Mekong River, the mainstream flows have dropped to their lowest levels in more than 60 years during the last three years due to reduced rainfall, construction of dams and diversion of water into other basins. This impacts not only the Tonle Sap basin in Cambodia, but the delta in Vietnam as well, where increased salinization of the rice fields is hurting production.

High fertilzier prices

In addition to the impact of trade restrictions and social distance restrictions in the context of COVID-19, higher fertilizer prices under the influence of the energy crunch, export restrictions, and trade sanctions are expected to have a large impact on agricultural production. The average retail price of most fertilizers reportedly continued to climb in the second week of February 2022. Russia is a low-cost, high-volume global producer of all major fertilizers and the world's second largest producer of potash after Canada. The war of Russia against the Ukraine and ensuing sanctions against Russia are expected to hurt trade flows and may lead to further increases in fertilizer prices. In Belarus, potash supplies account for one-fifth of the global supply. Sanctions have already led to turmoil in the potash market, leaving global potash contracts settled at the highest prices since 2008. The rise in fertilizer prices is expected to have a negative impact on food production in developing countries. From avocado, corn and coffee farms in South America to coconut and oil palm plantations in Southeast Asia, high fertilizer prices are putting pressure on farmers in developing countries, making cultivation expensive and forcing many to cut back on production. According to the International Fertilizer Development Center, a global nonprofit organization, demand for fertilizer in sub-Saharan Africa could fall by 30 percent in 2022. That would mean 30 million tons less food produced, which is equivalent to the food needs of 100 million people. Concerns about food production will in turn further boost rising food prices. In the U.S., wheat prices hit its highest level in nine years amid supply concerns. In addition, soybean prices climbed to a nine-year high.

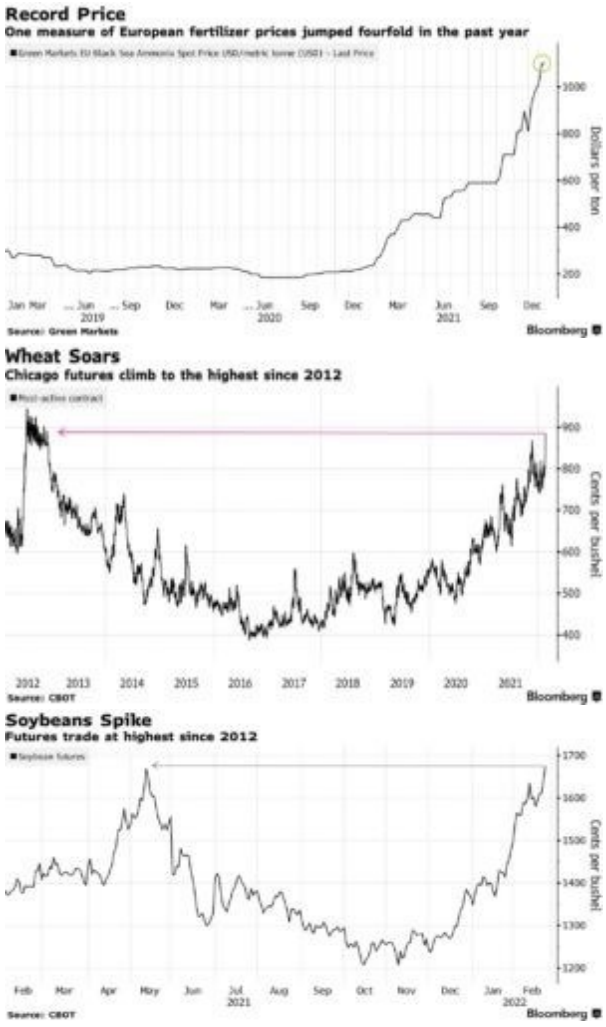

Figure 5.5 The Fertilizer Crisis Is Getting Real for Europe Food Prices, by Yuliya Fedorinova, Megan Durisin, and Veronika Gulyas, January 21, 2022 (left), Wheat Hits Nine-Year High on Supply Fears, by Megan Durisin and Allison Nicole Smith, February 23, 2022 (middle), Soybeans Soar to 9-Year High with South America Supply in Doubt, by Kim Chipman and Megan Durisin, February 23, 2022 (right).

Desert locust

After more than two years of threatening the agricultural and pastoral livelihoods and the food security of millions of people, mainly in the Horn of Africa and Yemen, the desert locust upsurge has finally declined. On January 4th, 2022, the last control operations took place against the remaining immature swarms in northeast Somalia. No more locusts were seen in Ethiopia and Kenya, where the dry conditions reduce the likelihood of any future development of new swarms. Limited breeding regions were still observed along the Egypt/Sudan border on the Red Sea coast, as well as in northern Eritrea, Saudi Arabia, and Yemen.

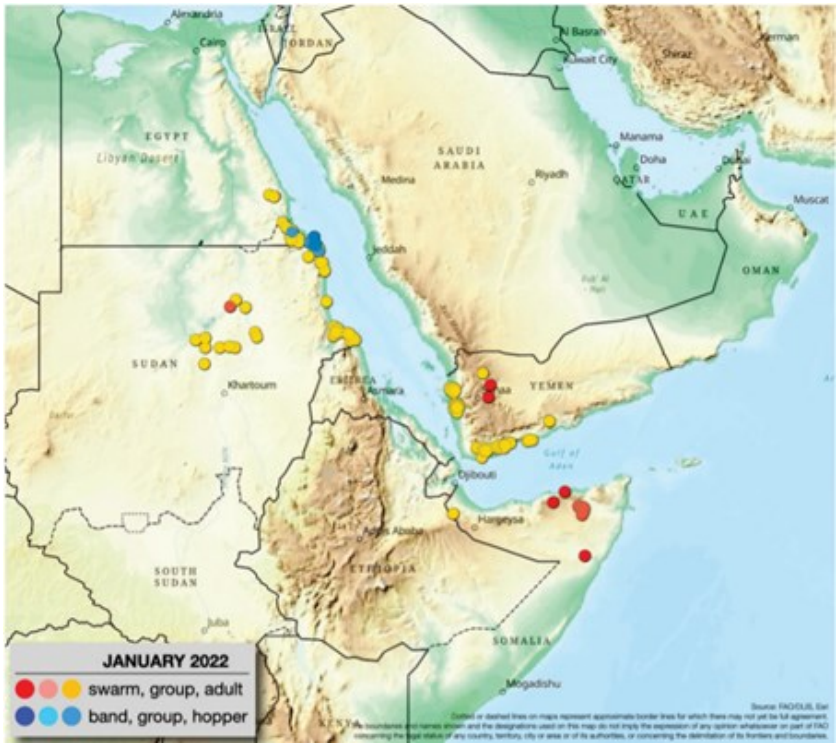

Figure 5.6 The distribution and movement of desert locusts in January 2022, as observed by FAO (https://www.fao.org/ag/locusts/common/ecg/1914/en/DL517e.pdf).

External links

https://themalaysianreserve.com/2021/12/30/major-floods-mark-the-end-of-2021/

https://floodlist.com/asia/indonesia-floods-landslides-november-2021

https://reliefweb.int/report/indonesia/indonesia-flooding-asahan-regency-north-sumatra-18-nov-2021

https://reliefweb.int/disaster/st-2022-000138-mdg

https://www.weforum.org/agenda/2022/02/global-worries-2022-covid-climate-change/

https://openknowledge.worldbank.org/handle/10986/35454

https://ourworldindata.org/explorers/coronavirus-data-explorer

https://www.nytimes.com/2021/11/18/us/colorado-wildfire-kruger-rock.html

https://www.ncdc.noaa.gov/sotc/fire/202111

https://www.nytimes.com/2021/12/31/us/colorado-wildfires.html

https://www.eptrail.com/2021/11/16/630-p-m-update-kruger-rock-fire-crews-to-monitor-overnight-resume-fight-in-the-morning/

https://www.teaomaori.news/far-norths-waiharara-wildfire-damages-some-wahi-tapu-sites

https://www.stuff.co.nz/national/127677158/far-north-fire-firefighters-to-leave-waiharara-but-peat-to-burn-for-six-months

https://reliefweb.int/disaster/dr-2021-000022-afg

https://reliefweb.int/disaster/dr-2018-000429-zwe

https://reliefweb.int/report/mozambique/mozambique-tropical-storm-ana-flash-update-no2-25-january-2022

https://www.fao.org/ag/locusts/en/info/info/index.html

https://www.mrcmekong.org/assets/Publications/Mekong-low-flow-and-drought-conditions-2019-2021df.pdf

Afghanistan: ICCT Real-Time Response Overview Situation Report (11 January 2022) - Afghanistan | ReliefWeb

https://farmpolicynews.illinois.edu/2022/01/high-fertilizer-prices-impacting-developing-countries-and-europe-food-price-repercussions-a-concern/

https://www.carbonbrief.org/cropped-12-january-2022-brazilian-deforestation-wildfires-rage-uk-rewilding-scheme

Corrientes, Argentine Wildfires - Center for Disaster Philanthropy

Water crisis and drought threaten more than 12 million in Syria and Iraq - Syrian Arab Republic | ReliefWeb

Morocco faces its worst drought in three decades | Atalayar - Las claves del mundo en tus manos

5.3 Update on El Niño

According to the Australian Government Bureau of Meteorology, the ENSO Outlook remains that La Niña has peaked, but its influence will persist until April. Climate models and observations suggest the 2021-22 La Niña has peaked, and will most likely return to neutral El Niño-Southern Oscillation (ENSO) (neither La Niña nor El Niño) during March to May. La Niña increases the chance of tropical cyclones and above average rainfall across northern and eastern Australia from December 2021 to February 2022 and, to a lesser degree, from March to April. As La Niña weakens it can continue to influence global weather and climate. Atmospheric and oceanic indicators remain at La Niña levels, but have likely peaked in strength. While eastern tropical Pacific sea surface temperatures remain cooler than average, beneath the surface, waters in the central and eastern Pacific are now warming. These changes in the sub-surface typically foreshadow a breakdown in a La Niña event, which normally occurs from March to May. In the atmosphere, decreased cloudiness along the Date Line, strengthened trade winds in the western Pacific and a positive Southern Oscillation Index (SOI) reflect a mature La Niña.

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 January 2021 to January 2022. 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 6.7 in October to 12.5 in November, and peaked at 13.8 in December before falling back to 4.1 in January.

Another commonly used measure of El Niño is known as the Oceanic Niño Index (ONI). Figure 5.8 shows several ONIs and their locations. Historically, scientists have classified the intensity of El Niño based on Sea surface temperature (SST) anomalies exceeding a pre-selected threshold in a certain region of the equatorial Pacific. The most commonly used region is the Niño 3.4 region, and the most commonly used threshold is a positive SST departure from normal greater than or equal to +0.5°C. Since this region encompasses the western half of the equatorial cold tongue

region, it provides a good measure of important changes in SST and SST gradients that result in changes in the pattern of deep tropical convection and atmospheric circulation. The criteria, that is often used to classify El Niño episodes, is that five consecutive 3-month running mean SST anomalies exceed the threshold. SST values in the Niño 3.4 region may not be the best choice for determining La Niña episodes but, for consistency, the index has been defined by negative anomalies in this area. A better choice might be the Niño 4 region, since that region normally has SSTs at or above the threshold for deep convection throughout the year. Values of the three key NINO indices for January 2022 were: NINO3 -1.0°C, NINO3.4 -0.7°C, and NINO4 -0.2°C. It will most likely return to neutral El Niño-Southern Oscillation.

Sea surface temperature (SSTs) for January 2022 (Figure 5.9) indicate weak cool SST anomalies across most of the eastern half of the equatorial Pacific. Weak warm SST anomalies were observed over parts of the Maritime Continent and the Coral Sea and parts of Queensland's east coast.

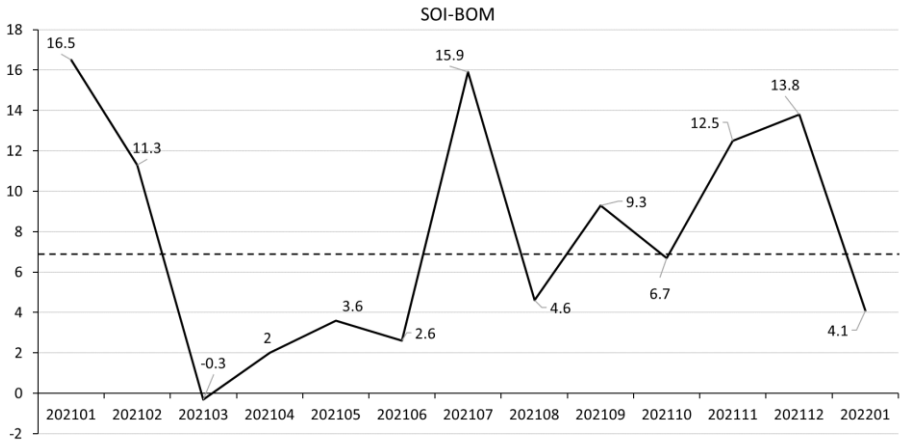

Figure 5.7 Monthly SOI-BOM time series from January 2021 to January 2022

(Source: http://www.bom.gov.au/climate/enso/soi/)

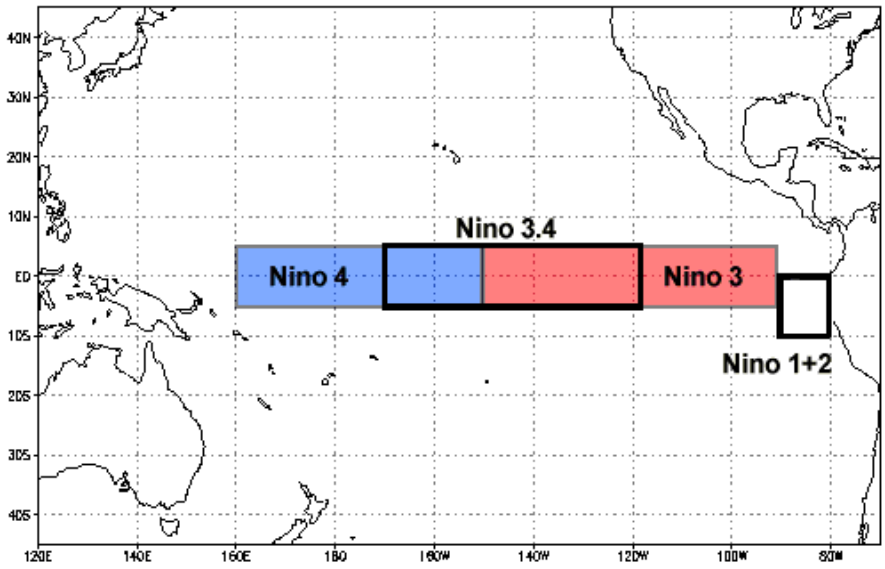

Figure 5.8 Map of NINO Region

(Source: https://www.ncdc.noaa.gov/teleconnections/enso/sst)

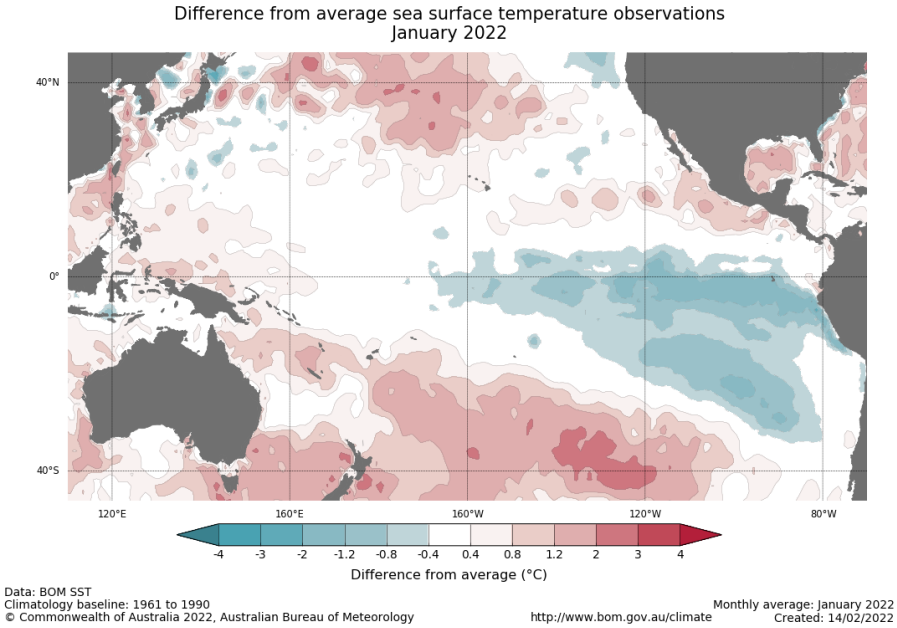

Figure 5.9 Monthly temperature anomalies in the tropical Pacific for January 2022

(Source: http://www.bom.gov.au/climate/enso/wrap-up/#tabs=Sea-surface)