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Executive summary

- A long lasting drought is currently affecting Central America, replicating the strong dry spell of mid-2018, and following the below-average rainfall of early 2019.
- Compared with the beginning of 2019, the drought has eased or halted in the southernmost part of Central America (Costa Rica and Panama), and has intensified in the north and up as far as central Mexico.
- Impacts are primarily on agriculture, with issues for water supply in some locations. Food security is at risk in the most vulnerable countries of Central America.
- The rainfall outlook up to November 2019 is positive overall, being slightly above average north of Honduras.

Concerning the dry spell of 2018 and the early onset of the current drought, please refer to the GDO report of March 2019¹.

¹ https://edo.jrc.ec.europa.eu/documents/news/GDODroughtNews201903_Central_America_and_Caribbean.pdf

Geographical context

According to the Food and Agriculture Organization (FAO) of the United Nations, Central America is one of the regions most vulnerable to disaster risks due to its geographical location, high climate variability, exposure to extreme hazards and the institutional and socio-economic weaknesses of its population.

The western coastal regions of Central America, spanning from Mexico to Colombia, receive abundant rainfall between May and November, followed by a shorter dry period. However the Pacific side of Central America - where most of the population lives and where there is the most agriculture - has an erratic rainfall pattern, periodically subject to strong dry spells. This area, encompassing primarily Guatemala, El Salvador, Nicaragua and Honduras, is known ecologically as the “Dry Corridor” (Figure 1), and is characterised by two main growing seasons, the “primera” from May to mid-July and the “postrera” from September to November, separated by a dry spell (“canicula”) in July and August, with little or no rainfall.

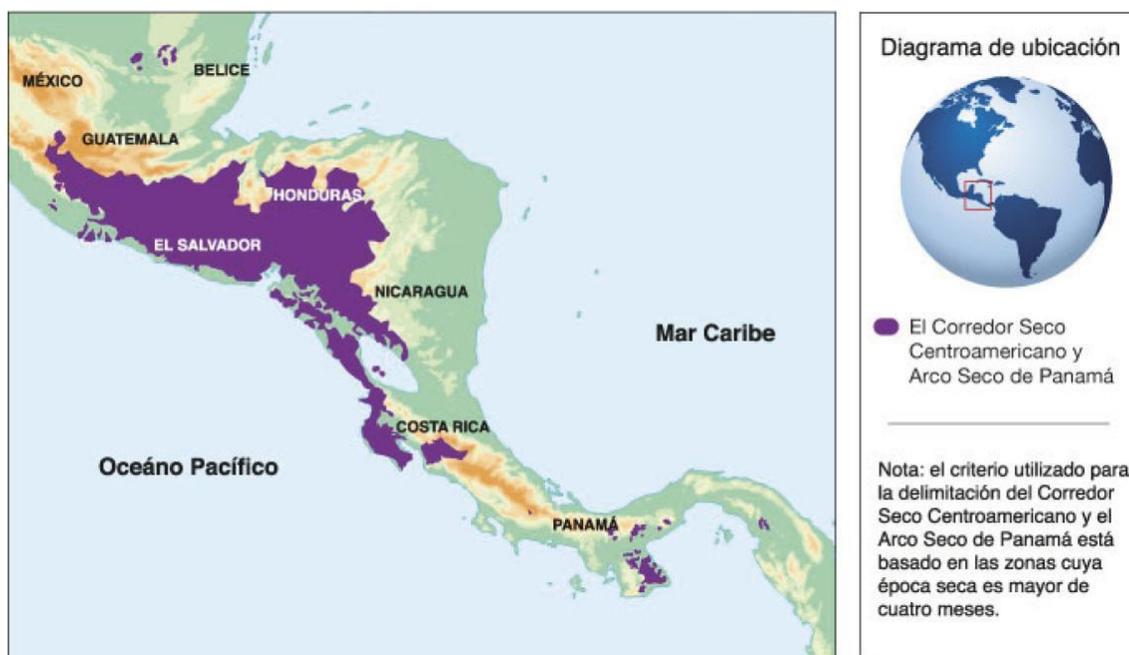


Figure 1: Location of the Dry Corridor in Central America and Arco Seco in Panama.² Source: based on the Atlas centroamericano para la gestión sostenible del territorio.

² www.fao.org/emergencias/resources/documents/resources-detail/en/c/330164/

Coping capacity differs within and among countries, with some regions particularly vulnerable and the poorest in the western hemisphere. With employment in agriculture above 20% of total workforce in several regions, many people are heavily dependent on rainfed crops and highly exposed to annual climatic fluctuations.

Risk of drought impact for agriculture (RDri-Agri)

GDO's "Risk of Drought Impact for Agriculture" (Rdri-Agri) indicator shows the risk of drought, accounting for the exposure and socio-economic vulnerability of a given area, with particular focus on the agricultural impacts.

As shown in Figure 2, the Rdri-Agri for the end of August 2019 shows an extended area across Central America associated with medium risk of impact. The current situation builds over the prior poor rainy season of 2018, which extended through 2019 in several locations. Between 20 and 30 million people are exposed to the ongoing drought.



Figure 2: Risk of drought impact for agriculture (RDri-Agri) over Central America, from 21st of August until the 1st of September 2019.

Precipitation

The bar charts of Figure 3 show monthly precipitation during 2018-2019 against the long-term average (black line) and variability, for three selected locations in the drought-affected region. In all cases, despite different rainfall patterns and large distances, a big gap marks the wet periods of both 2018 and 2019, reaching well below the expected monthly fluctuations for those months.

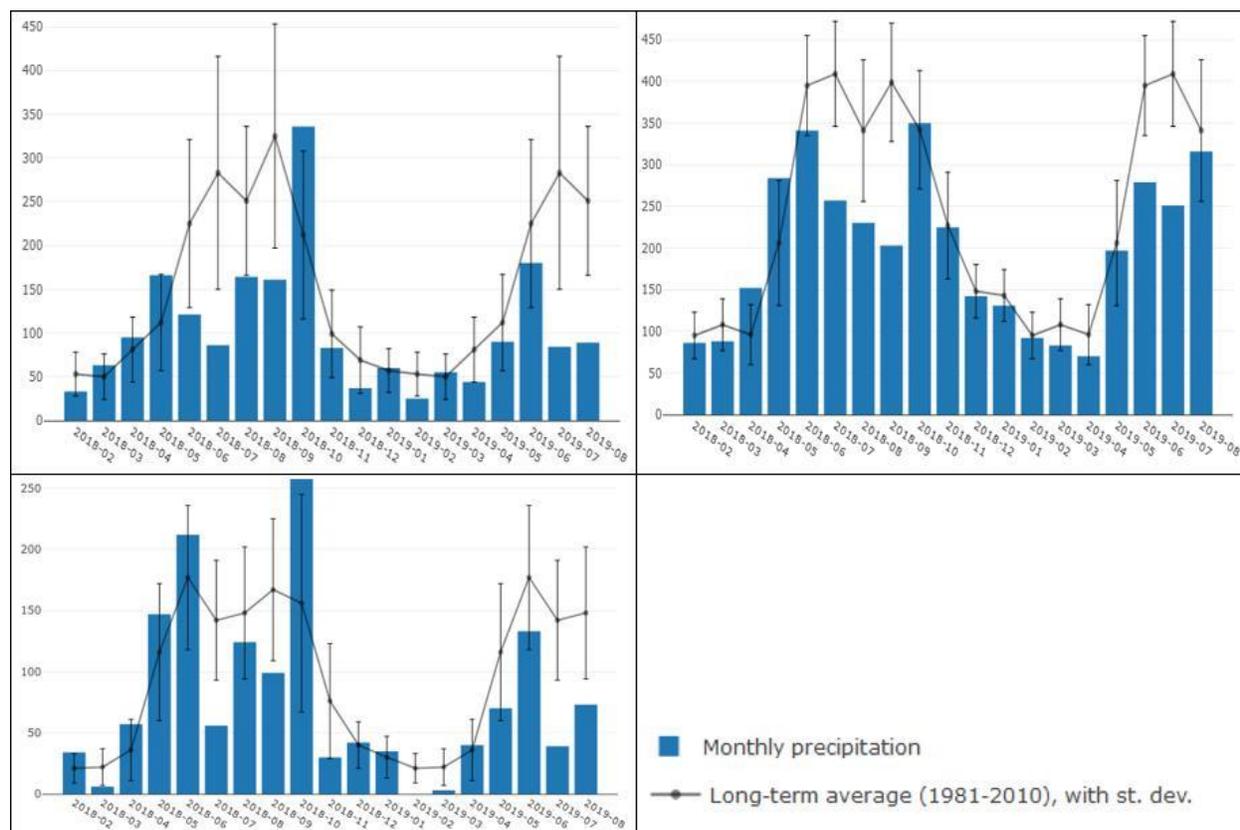


Figure 3: Monthly precipitation (mm) in selected locations. Upper left: Coatzintla (Mexico, 20.4 N, -97.4 E). Upper right: Coban (Guatemala, 15.7N, -90.2E). Bottom left: Danli (Honduras, 14.1 N, -86.4 E).

Standardized Precipitation Index (SPI)

The Standardized Precipitation Index (SPI) indicator is used to monitor the occurrence of meteorological drought. The lower (i.e. more negative) the SPI, the more intense is the drought.

Figure 4 shows the intense and geographically consistent lack of precipitation during the trimester June to August 2019 over Central America. When coupled with the yearly picture of Figure 5 (SPI 12), a severe cumulative deficit emerges over most of the region, with the exception of central Mexico. Indeed, the most affected countries are mostly the same already experiencing drought at the beginning of the year: Guatemala, Nicaragua, Honduras, El Salvador, Belize and Mexican Yucatan. While the drought eased towards the Isthmus since (Panama and Costa Rica), it extended north to the east coast of Mexico (Veracruz) and up to central Mexico (Durango).



Figure 4: SPI for the accumulation period June to August 2019 (SPI-3).

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Figure 5: SPI for the accumulation period September 2018 to August 2019 (SPI-12).

The event timeline is explained by Figures 6 and 7, illustrating the monthly SPI series for two representative locations. The three months anomaly (SPI 3) is negative for two wet seasons in a row, resulting in a deepening state of deficit yearly wise (SPI 12). In Guatemala, looking at the full time series since 1970, this is the worst meteorological drought on a two-year span (SPI 24). In addition, Central America suffered some drought during the El Niño event of 2015-2016.

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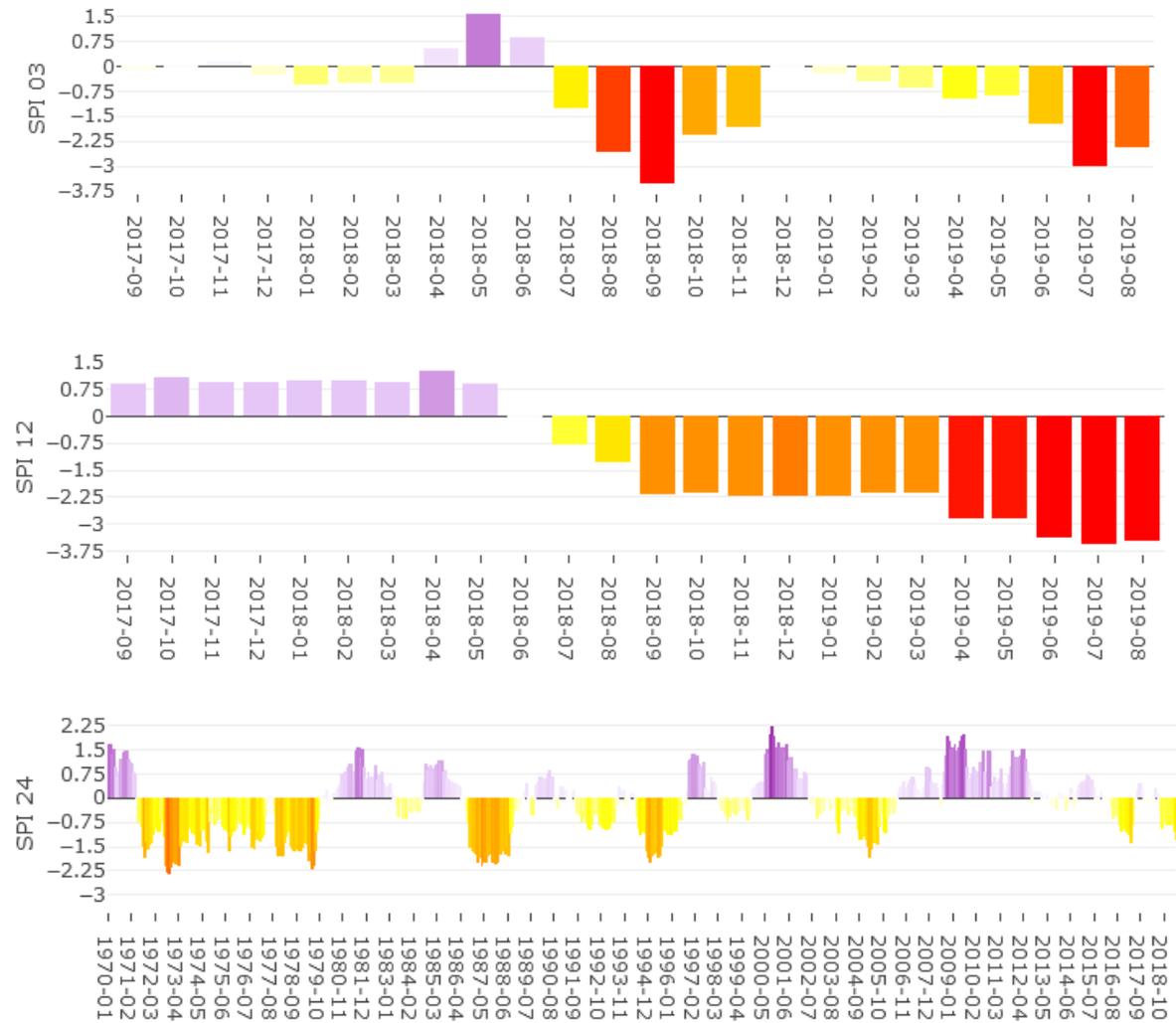


Figure 6: SPI for a period of 3, 12 and 24 months near Coban (Guatemala, 15.7 N, -90.2 E).

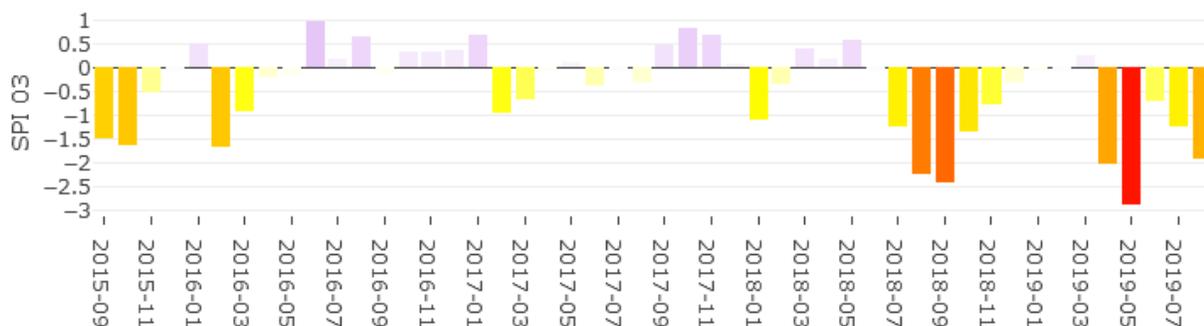


Figure 7: SPI for a cumulative period of 3 months (SPI-3) near Panuco (Mexico, 21.8 N, -98.1 E).

Forecasted SPI

The forecasts of SPI are based on the ECMWF (European Centre for Medium-Range Weather Forecasts) probabilistic seasonal model of precipitation (S5) and the map shows colors only where the forecast is relatively robust.

The trimester September to November looks positive overall (Figure 8), although the end of the wet season may entail a lesser impact on the deficit. In Honduras and further south precipitation should match with the long-term normal, while from Guatemala to north and central Mexico forecasts predict wetter than usual conditions. The cumulated deficit is remarkable and a positive end of season may not compensate for the last two years of underperforming rainfall.



Figure 8: Forecasted SPI for the trimester September to November 2019 over Central America (based on ECMWF S5 ensemble forecasts).

fAPAR anomaly

The fraction of Absorbed Photosynthetically Active Radiation (fAPAR) represents the fraction of the solar energy absorbed by leaves. fAPAR anomalies - specifically negative deviations from the long-term average over the same period - are a good indicator of drought impacts on vegetation. Figure 9 shows the fAPAR anomaly in the last ten days of August 2019. Vegetation stress is detected in Durango (Central Mexico), Veracruz (east coast of Mexico) and in patches from Yucatan peninsula through Panama isthmus. Wider fractions of land display positive anomaly, but most are outside the core areas of current precipitation deficit.

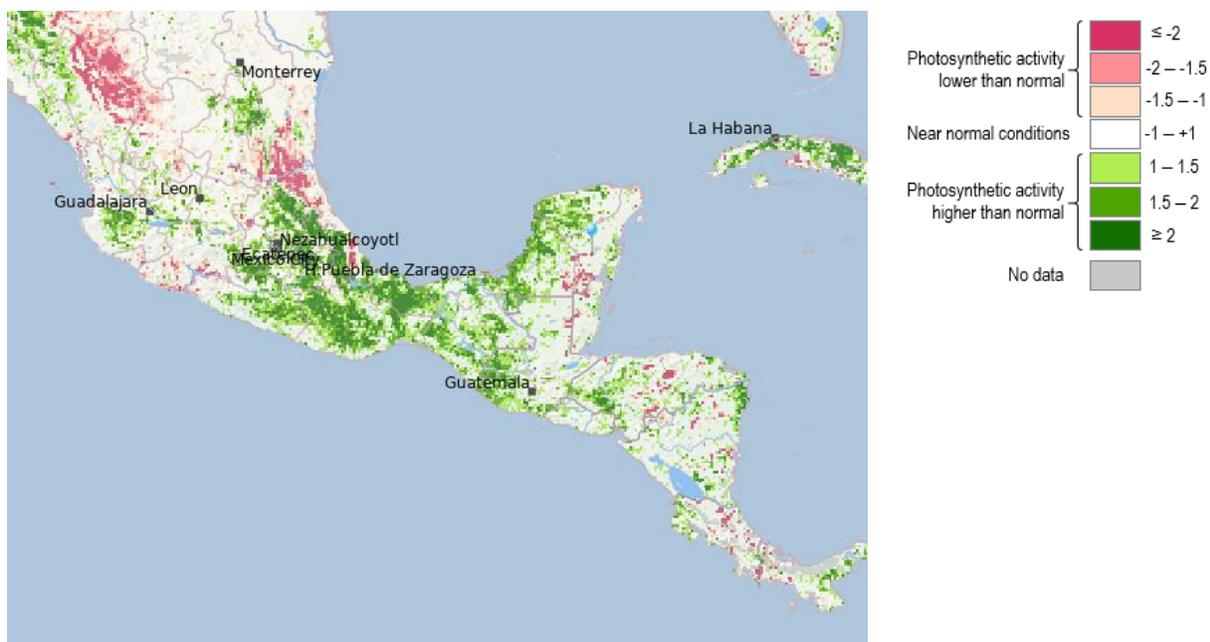


Figure 9: 10-day fAPAR anomaly for 21-31 August 2019.

Soil Moisture Anomaly (SMA)

The Soil Moisture Anomaly (SMA) indicator assesses top-soil water content, which is a direct measure of drought conditions, specifically the difficulty for plants to extract water from the soil. Soil moisture displays strong and persistent dry anomalies over the affected regions, particularly over Belize, Honduras, Guatemala, Mexican states of Durango, Veracruz and Quintana (Figure 10). The anomalies match well the spatial distribution of fAPAR negative anomalies and negative SPI at different time scales. Soil moisture anomalies increased in the past few months, as shown by Figure 11, where two representative regions display an increasing dryness, in parallel with the peak of the wet season, during which long-term expectations of rainfall were not met.

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Figure 10: Soil moisture anomaly across Central America during August 2019.

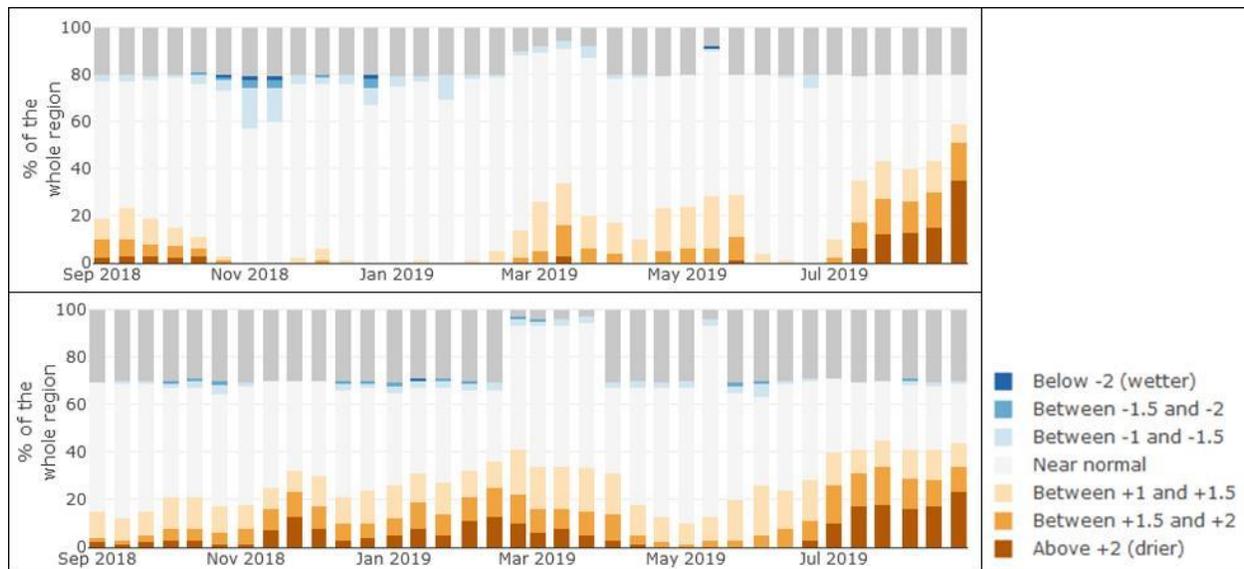


Figure 11: Soil moisture anomaly evolution over time for Veracruz, Mexico (above) and Guatemala (below), as a percentage of total area for each class.

Reported impacts

Central American countries were experiencing drought conditions already in mid-2018. In the last quarter of 2018, precipitation improved and pushed forward the risk of impacts, but it came back again after the poor beginning of the year. In early March, FAO released its quarterly survey with ground information about agricultural commodities and expressing concerns for the area under analysis in this report³, which were later confirmed for the most. Below follows a quick review of impacts by country, intended for quick indicative reference only. For detailed information on agricultural impacts, please refer to dedicated sources of information^{4 5}.

Guatemala suffered primarily impacts on agricultural production⁶, as well as **Belize**⁷, but few reports are found on the issue. Food security issues were foreseen from August onwards by FEWS Net (Famine Early Warning System Network)⁸. The Caribbean regional climate centre (CARICOF) confirmed drought warning for Belize⁹.

In **Nicaragua** water deficits and high temperatures, particularly in the eastern half of the country, affected crops yield¹⁰.

Food security is at stake since the end of 2018 in **El Salvador**¹¹. The country water issues attracted attention from the United Nations, whose latest report on the area largely focused on its water and related problems¹². **Honduras** is officially recording major impacts to agriculture^{13 14 15} and water restrictions are put in place in the capital Tegucigalpa¹⁶. News outlets are reporting incumbent water supply and a potential food security crisis¹⁷.

All links accessed on 18/09/2019

³ <http://www.fao.org/3/ca3696en/ca3696en.pdf>

⁴ <http://fews.net/central-america-and-caribbean>

⁵ <https://mars.jrc.ec.europa.eu/asap/>

⁶ <https://www.eleconomista.net/actualidad/La-sequia-afecto-a-50000-familias-y-dano-42000-hectareas-en-Guatemala-20190826-0042.html>

⁷ <http://lovefm.com/drought-severely-impacting-belize/>

⁸ https://reliefweb.int/sites/reliefweb.int/files/resources/GT_FSOU_2019_08_Final_0.pdf

⁹ <http://rcc.cimh.edu.bb/long-range-forecasts/caricof-climate-outlooks/>

¹⁰ <https://www.ineter.gob.ni/met>

¹¹ <https://www.elsalvador.com/eldiariodehoy/estudio-revela-crisis-alimentaria-en-280000-familias-por-sequia/633796/2019/>

¹² <https://documents-dds-ny.un.org/doc/UNDOC/GEN/G19/257/98/PDF/G1925798.pdf>

¹³ <https://www.elheraldo.hn/pais/1317497-466/gobierno-hondure%C3%B1o-pide-asistencia-externa-ante-emergencia-por-sequia%C3%ADa>

¹⁴ <https://cnnespanol.cnn.com/video/honduras-declara-estado-de-emergencia-por-sequia-pkg-elvin-sandoval/>

¹⁵ <https://www.eluniverso.com/noticias/2019/09/05/nota/7505086/decretan-emergencia-honduras-sequia>

¹⁶ <https://www.laprensa.hn/honduras/1319290-410/huracan-fif%C3%AD-honduras-sequia%C3%ADa-devastacion->

¹⁷ <https://www.prensa-latina.cu/index.php?o=rn&id=305149&SEO=sequia-en-honduras-causa-severas-perdidas-en-agricultura-y-ganaderia>

According to a September 2019 report on Central America and the Caribbean by the Famine Early Warning Systems Network (FEWS NET)¹⁸, this year some areas of **Guatemala, Honduras and Nicaragua** including the Dry Corridor have registered below-average rainfall and above-average temperatures (caused by the El Niño event) that have affected basic grains crops during the primera season, with the poorest households likely to incur significant losses (above 50%) of the primera harvests (FEWS NET, 2019).

Finally, it has been reported that in several federal states of **Mexico**, reservoirs are below average for the period and special measurements were adopted to meet water supply needs. CONAGUA (Comisión Nacional del Agua) has issued reports on the situation¹⁹. As in the other Central American countries, agriculture is affected, particularly on the Mexican Gulf coast and the Yucatan peninsula, while the government is taking action^{20 21 22 23}.

¹⁸ <http://fews.net/central-america-and-caribbean/key-message-update/september-2019>

¹⁹ <https://www.gob.mx/conagua/prensa/170286>

²⁰ <https://www.tribuna.com.mx/campo/Ganaderos-piden-declarar-a-Tamaulipas-como-zona-de-desastre-por-la-sequia-20190917-0063.html>

²¹ <https://www.eleconomista.com.mx/empresas/Ganaderos-reciben-indemnizaciones-para-enfrentar-afectaciones-por-sequia-20190819-0068.html>

²² <https://www.lajornadamaya.mx/2019-08-26/Aumenta-9-por-ciento-la-sequia-en-el-territorio-nacional>

²³ <https://www.imagendelgolfo.mx/noticias-veracruz/Nacional/41258966/Se-desploma-42-la-siembra-de-frijol-en-Mexico-por-sequia.html>

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Distribution: for ERCC and related partners use

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