World Food Programme

SAVING LIVES
CHANGING LIVES

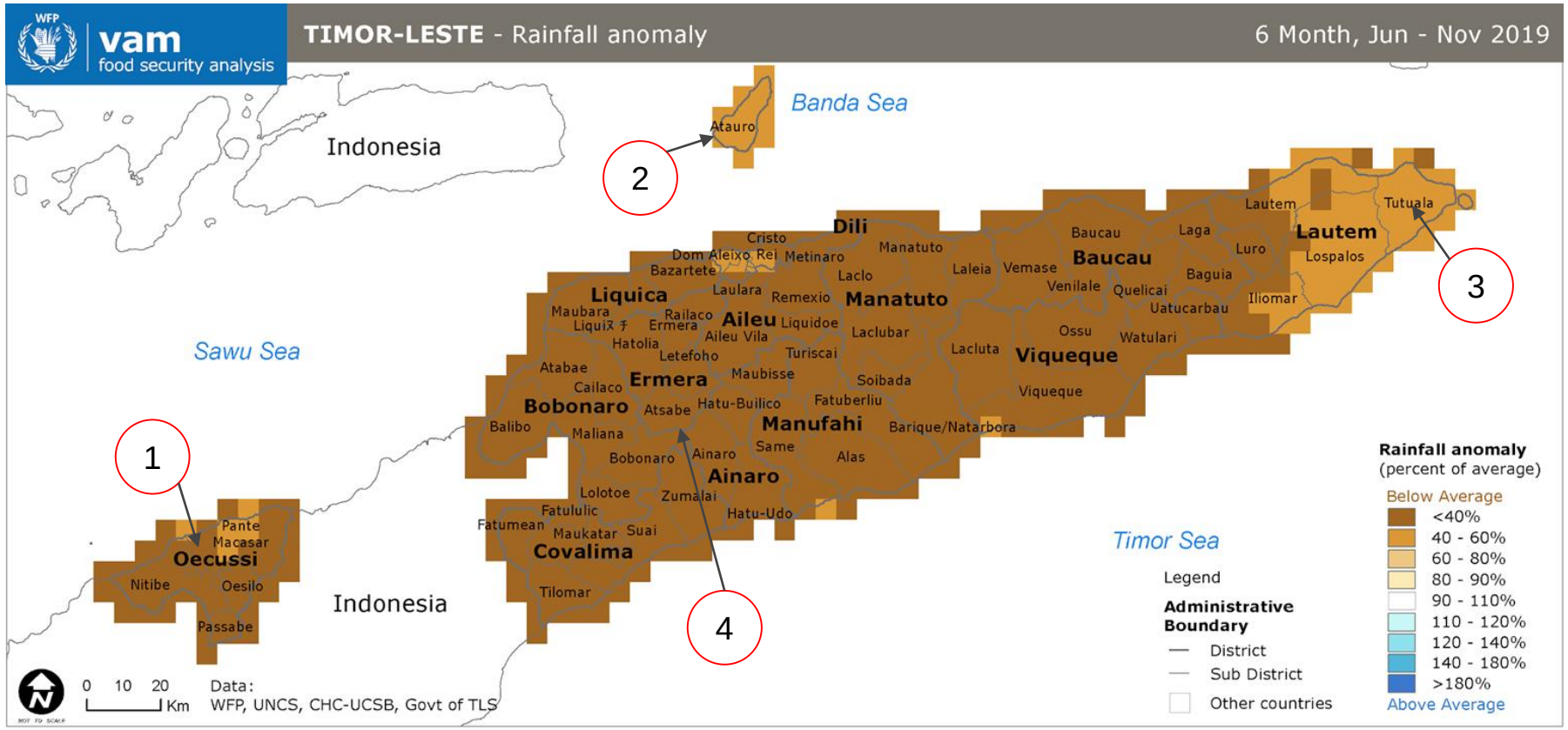
Timor-Leste, Start of Rainy Season 2019 - 2020

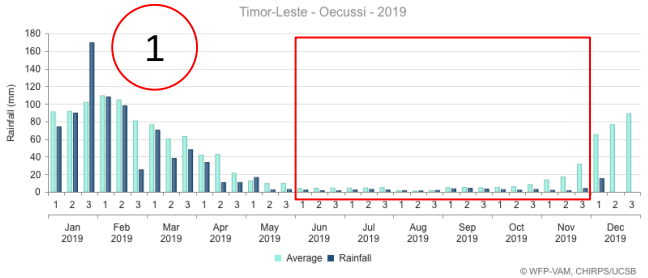
Timor-Leste Country Office and
Bangkok Regional Bureau for Asia and the Pacific

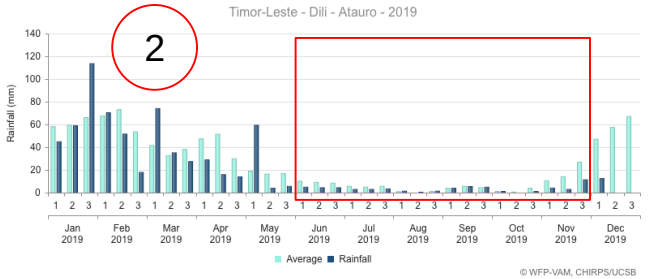
Ver. Dec 19, 2019

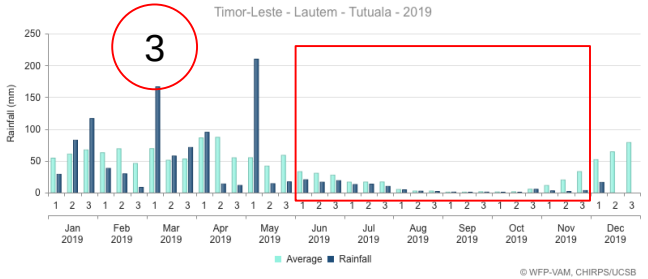
Contents

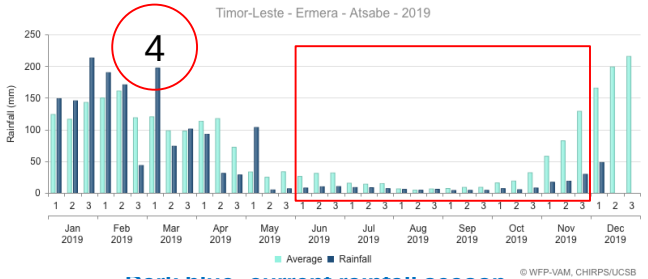
Rainfall performance in the last 6 months







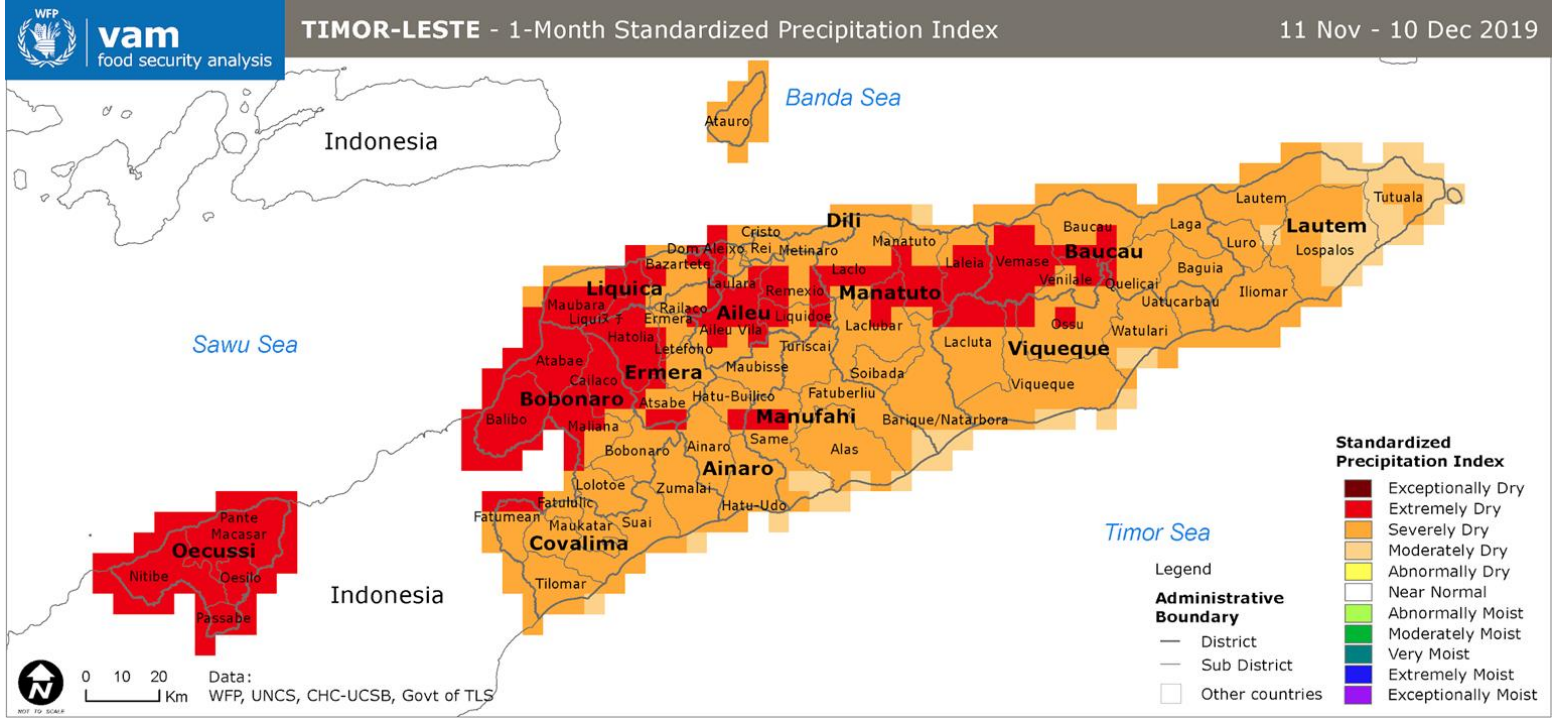


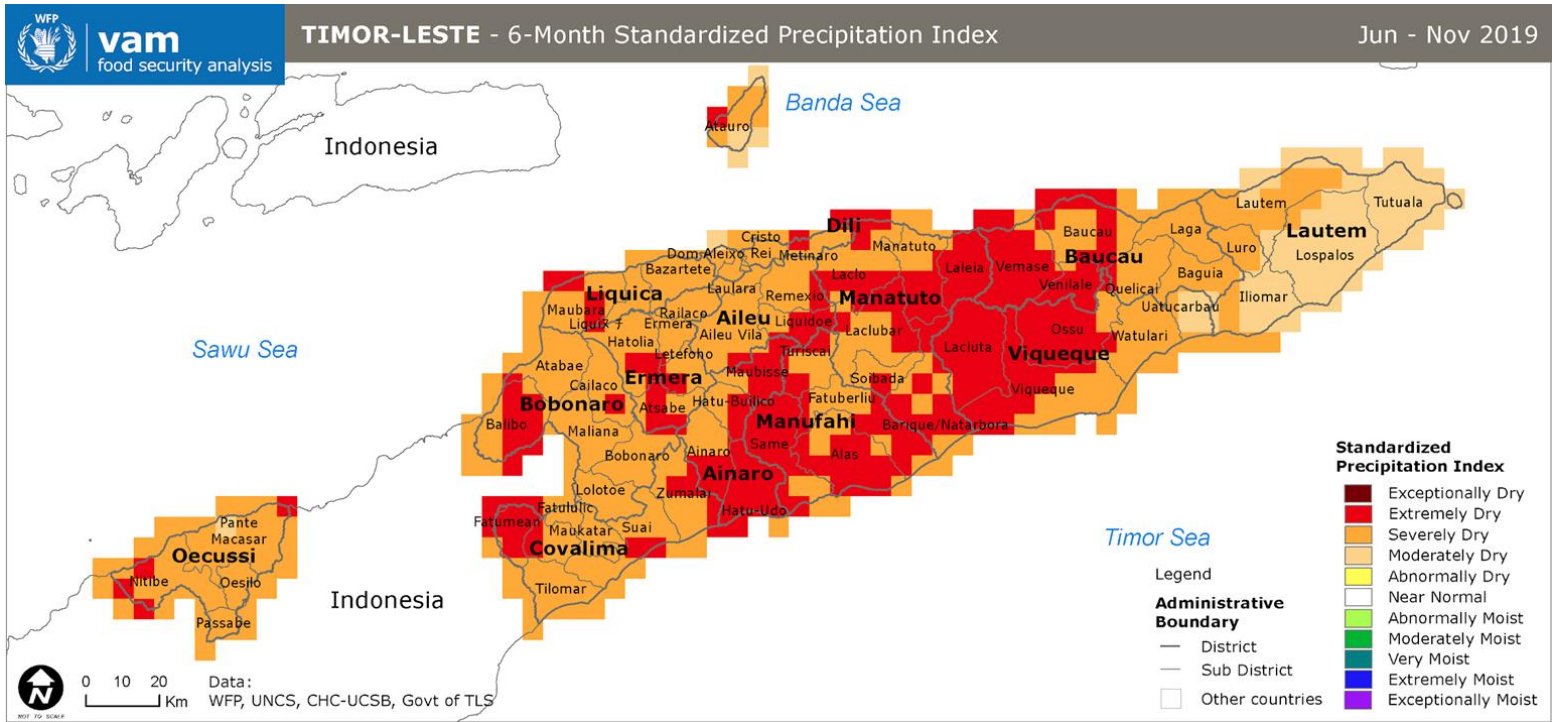


In the last 6 months from June to November 2019, Timor-Leste generally experienced far below normal rainfall, with a number of localized below normal rainfall e.g Los Palos and Tutuala; the eastern part of Lautem.

Intensity of rainfall is currently about 40% than long term average. As seen in the graphs, the current data is represented by the dark blue bar while the light blue bar represents the long term average

- Dark blue: current rainfall season
- Light blue: long term average (LTA) rainfall





1 and 6 month of Standardized Precipitation Index

On short timescales (**1 month, 11 Nov - 10 Dec 2019**), the standardized precipitation index (SPI) generally indicates soil moisture.

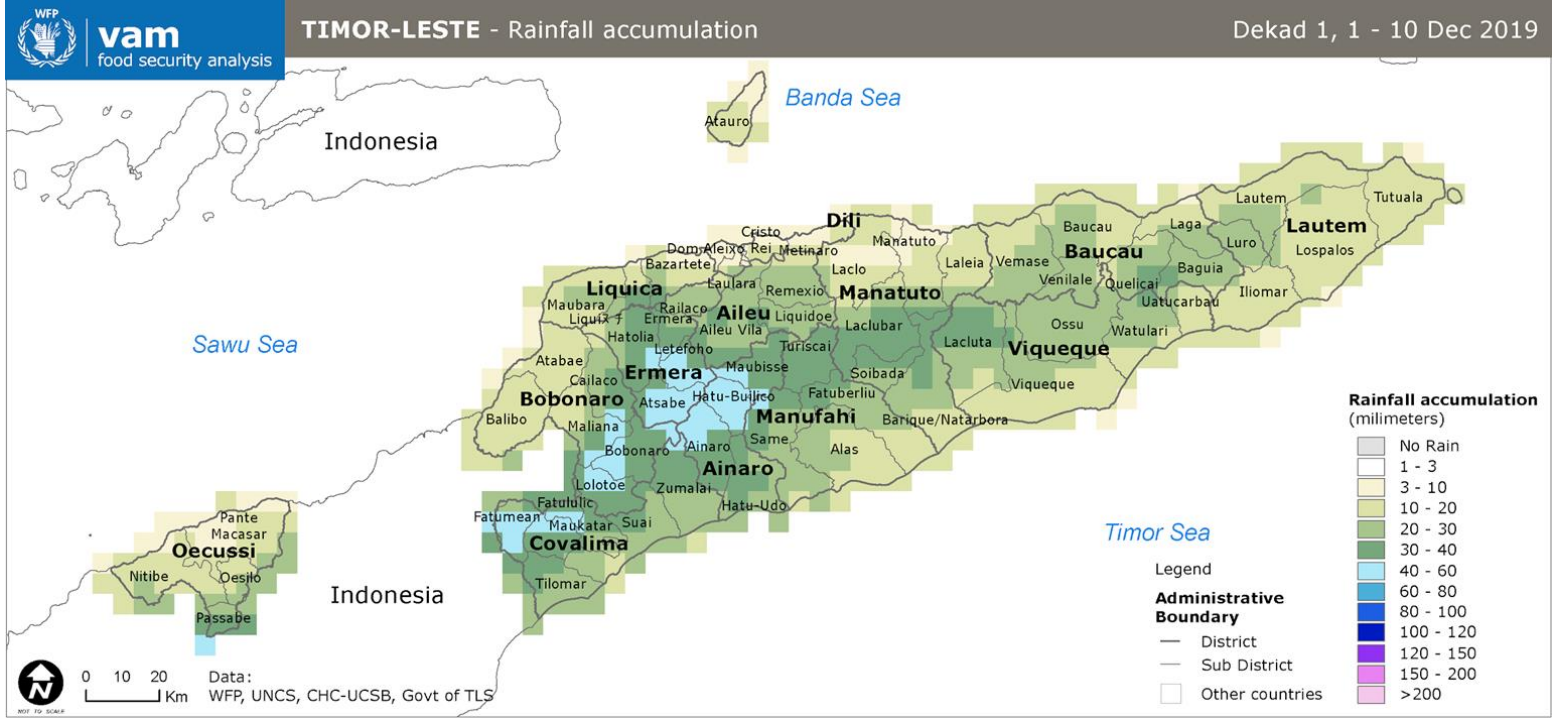
The country is currently entering a rainfall season as most areas have experienced 1-6 consecutive days of wet spell. However, the effects of the rainfall received are not reflected because the soil needs a certain span of permeation time. As such, the SPI analysis still identifies a number of severely dry condition areas (the red grids on the map).

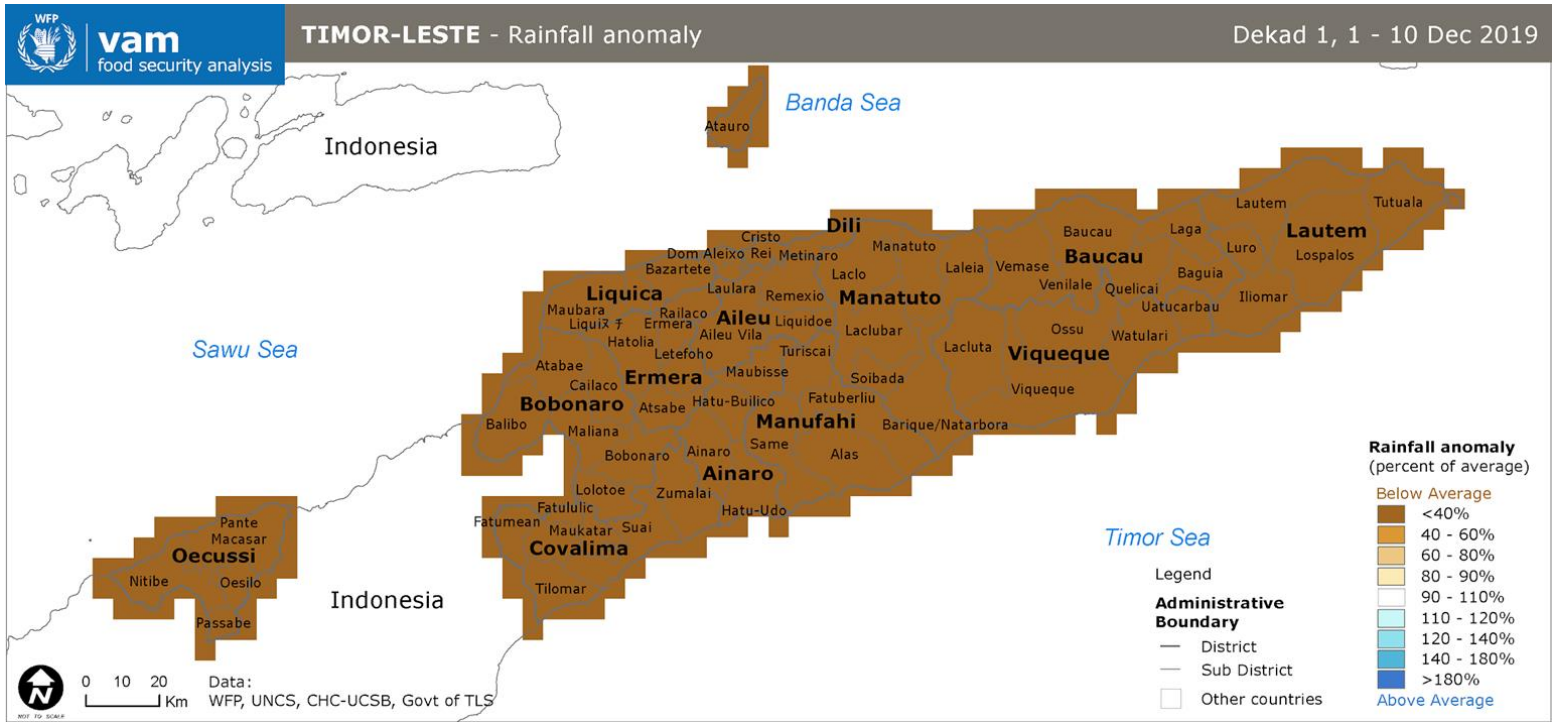
On the other hand, the SPI of longer timescales (**6 months; Jun - Nov 2019**) is related to groundwater and reservoir storage.

Over the long time scale, the most affected areas are: Viqueque and parts of Baucau, Manatuto, Manufahi, Ainaro and Manatuto.

Moderately to severely dry conditions are spreading from Ainaro, Manufahi, Manatuto, and almost all areas in Viqueque.

Data: CHIRPS, CHG UCSB

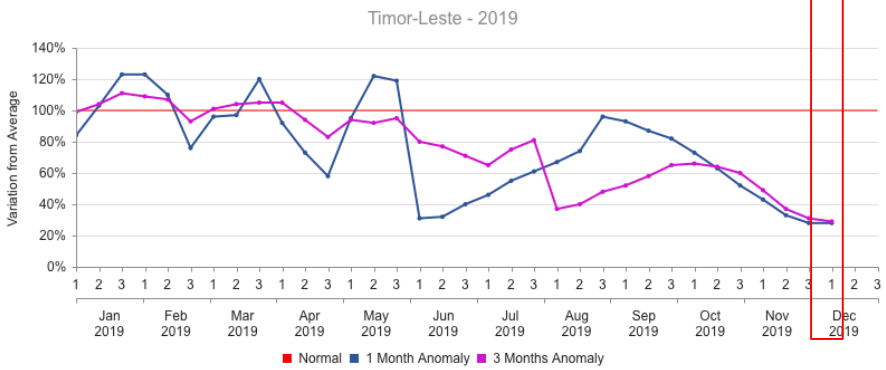




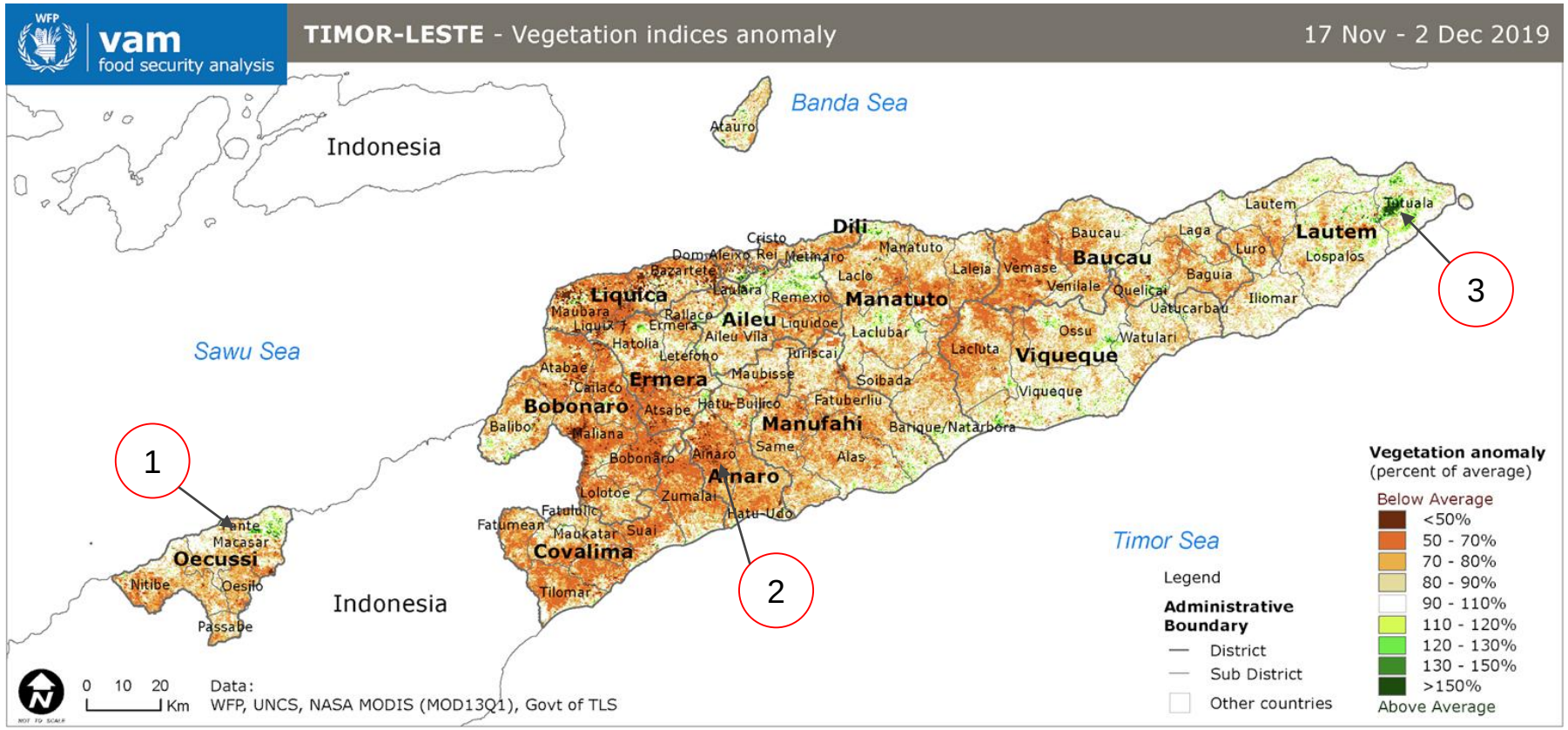
Latest situation

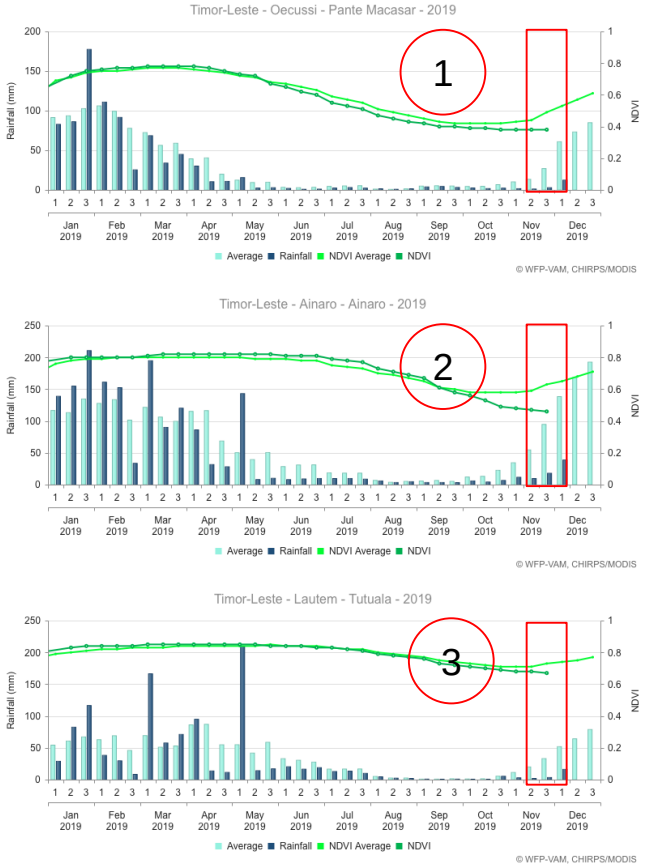
Dekad 1, 1 - 10 Dec 2019

In the 10-days ending 10 Dec 2019, all areas in Timor-Leste experienced below normal rainfall, only received rainfall max 40% than long term average (see graphs). However, this does not necessarily mean the whole area experienced dry conditions. Infact, some highland areas e.g. Atsabe in Ermera, Hatu-Builico and Maubisse in Ainaro experience rainfall ie. 40-60 mm in 10 days.



Vegetation status, 17 Nov - 2 Dec 2019

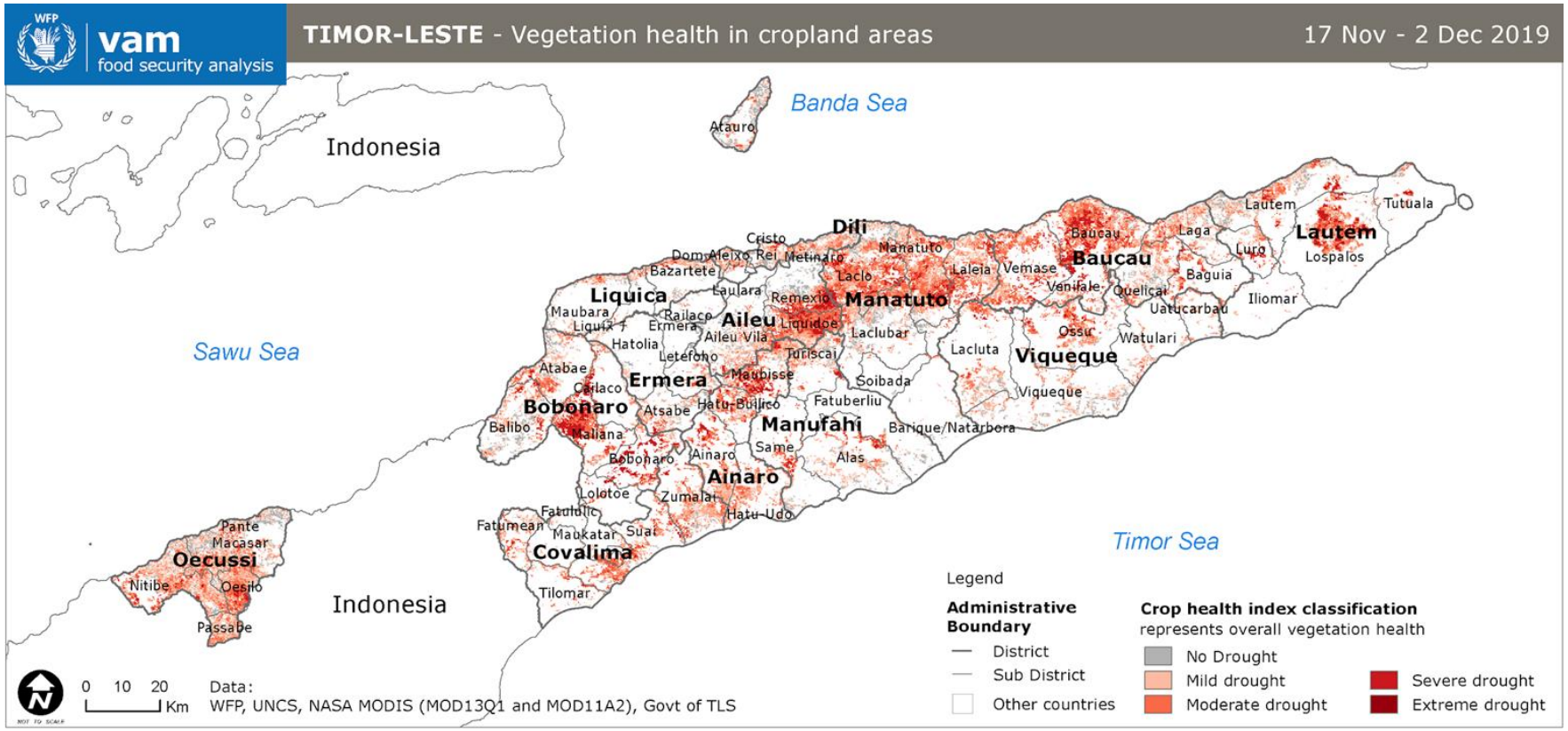




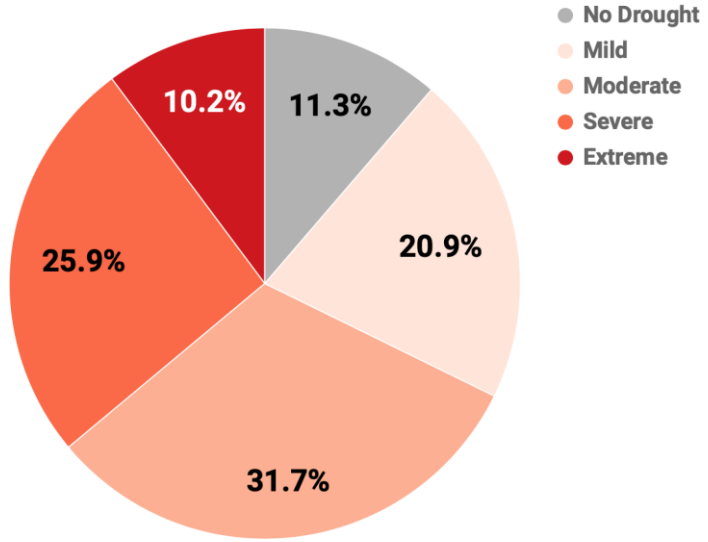
- Corresponding to SPI analysis, lower rainfall in early November (Dekad 1) is expressed in vegetation status map above. Dry condition remains detected in most areas.
- Low vegetation indices are found in Bobonara, Ermera, Ainaro and some other areas in the highland. Average or normal level of vegetation are maintained in some coastal areas and even above average is detected near Tutuala

- **Dark blue: current rainfall season**
- **Light blue: long term average (LTA) rainfall**
- **Dark green: current vegetation index**
- **Light green: long term average (LTA) EVI**

Vegetation health in cropland areas, 17 Nov - 2 Dec 2019



Potential Impact of drought in cropland areas

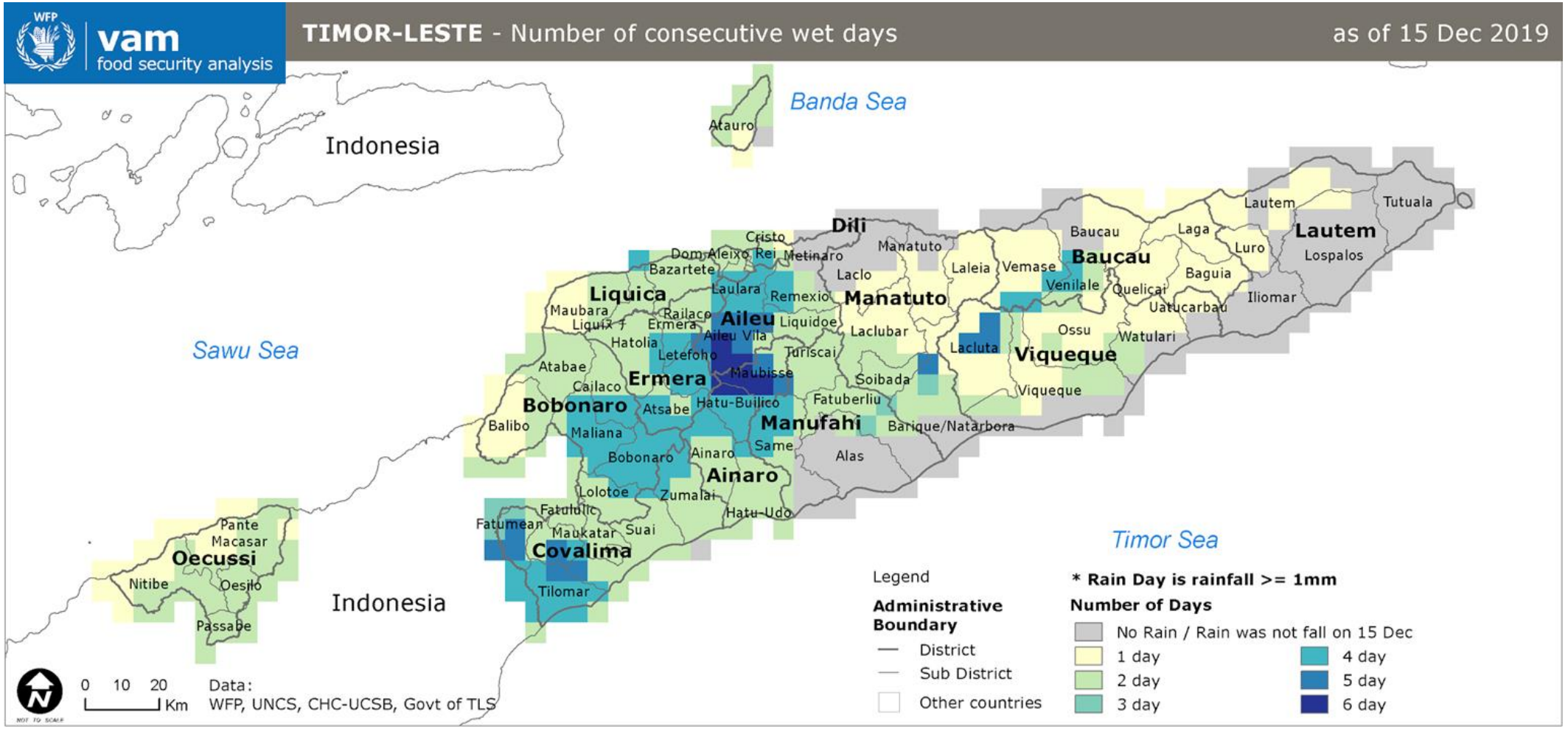


Estimates of hectares and percent of crop areas in drought nation-wide

The above chart displays the national estimates of crop areas in drought. Up to **210,000 hectares** of crop areas are estimated to be in **extreme** or **severe drought** for period 17 Nov - 2 Dec 2019, representing **36%** of all crop areas in **Timor-Leste**.

- Similar to vegetation status in general, vegetation health in cropland does not immediately respond to rainfall in late November/early December
- Also, poor vegetation health **does not** necessarily **mean harvest loss**, it instead shows the **potential impact** of a prolonged drought in **food crop areas**.
- The Vegetation Health Index (VHI) combines two components: deviations in land surface temperature and the extent to which vegetation density varies from normal patterns. The VHI depicts stress on vegetation and can be used to assess potential crops losses. **Data: USGS MODIS, MOD11A2 and MOD13Q1**

Wet-spell, as of 15 Dec 2019

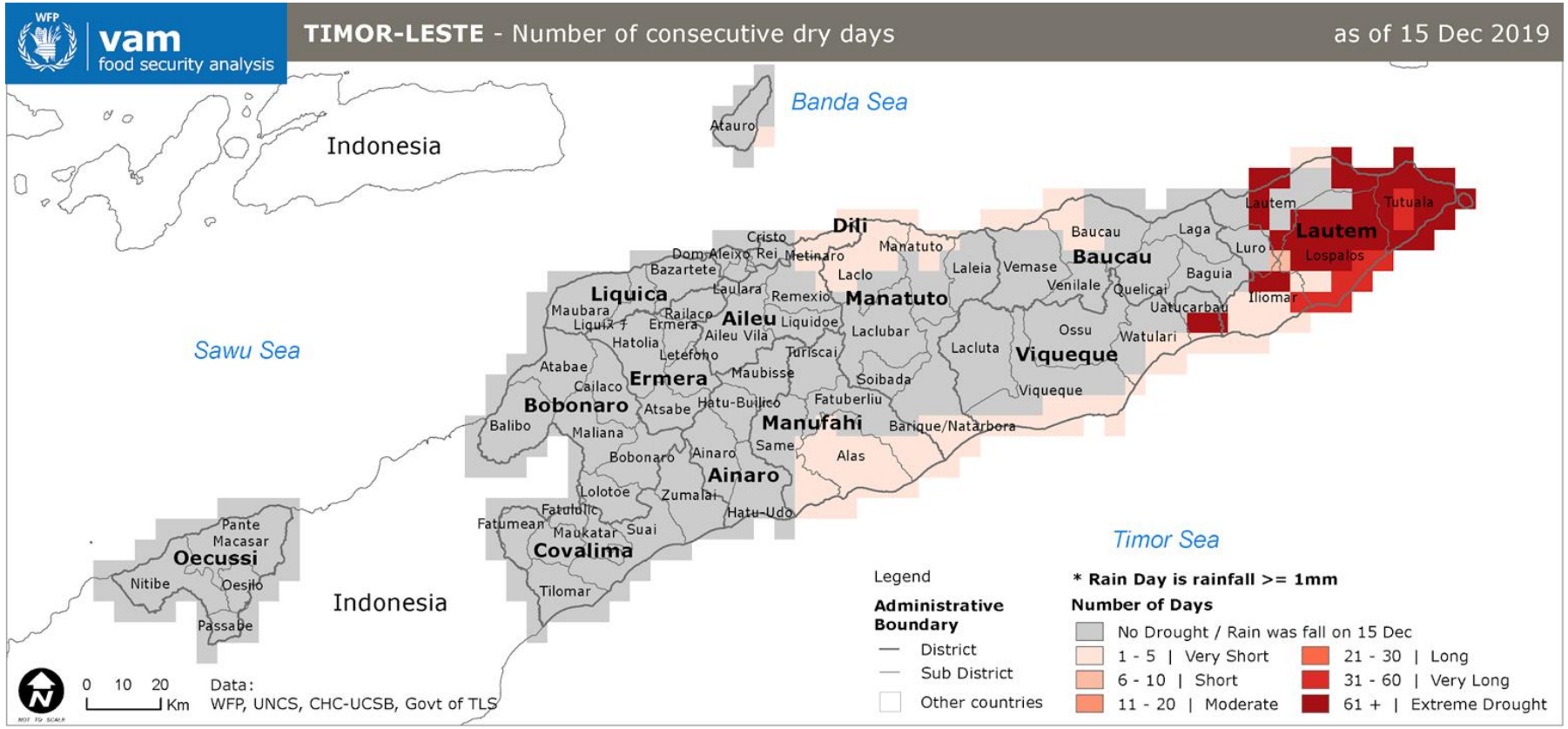


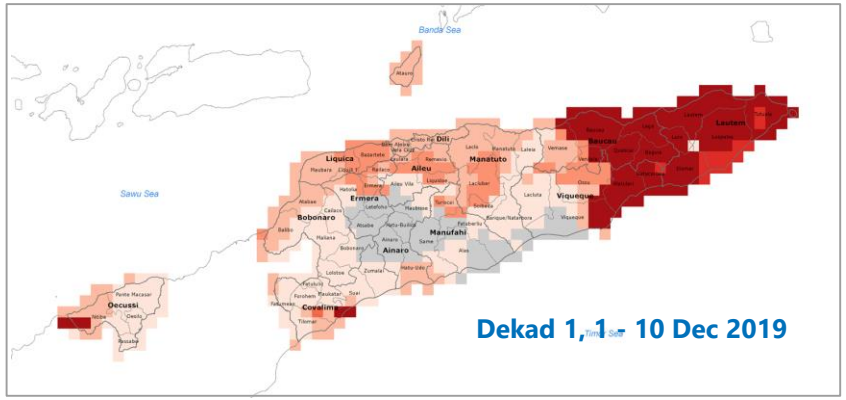
Timor-Leste is entering the rainy season this month

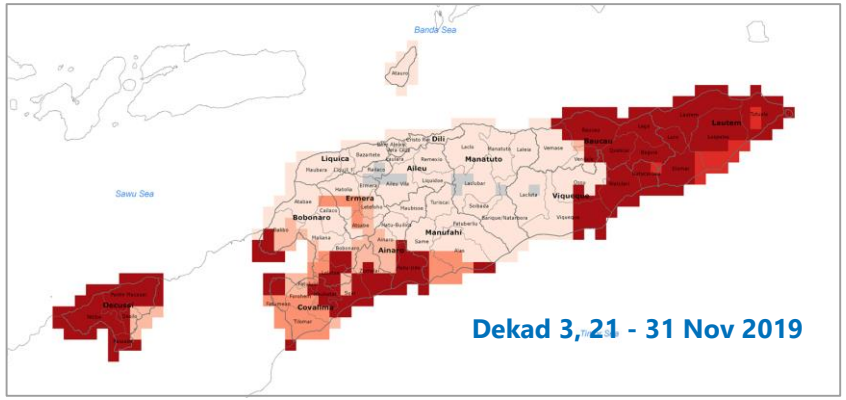
Rainfall as of 15 Dec is indeed lower than long term average. Yet, as the rainfall occurred consecutively the area has been considered to enter rainy season.

Highland areas near Ermera and Aileu have experienced at least 6 consecutive days of rainfall. The other areas experienced rainfall ranging from 1-5 days, while few places at the coastline had no rain. **Data: CHIRPS CHG-UCSB**

Dry-spell, as of 15 Dec 2019







Very long and extreme drought remains identified in Lautem

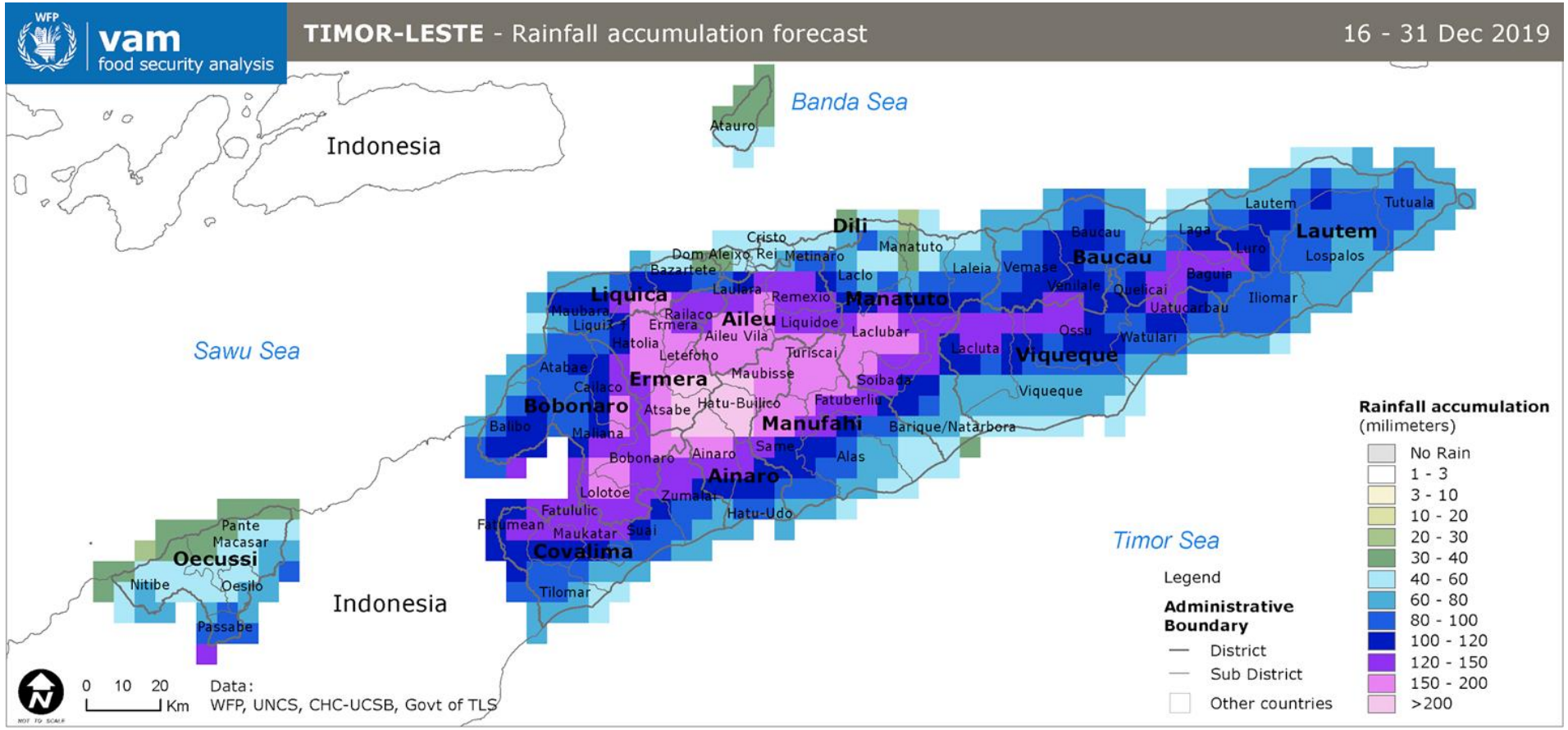
Despite experiencing rainfall,the situation remains dry in a number of areas.

Cumulative dry spells data reveal that nearly **40,000** people in **Lautem** experience more than **30 days without rainfall**, a condition categorized as **very long drought**.

Moreover, about **90%** of the 40,000 in Lautem (37,000 people); are further identified to experience **extreme drought** ie. more than **60 days without rainfall**.

Data: CHIRPS CHG-UCSB and JRC GHSL

Short forecast rainfall until end of the year, 16 - 31 Dec 2019



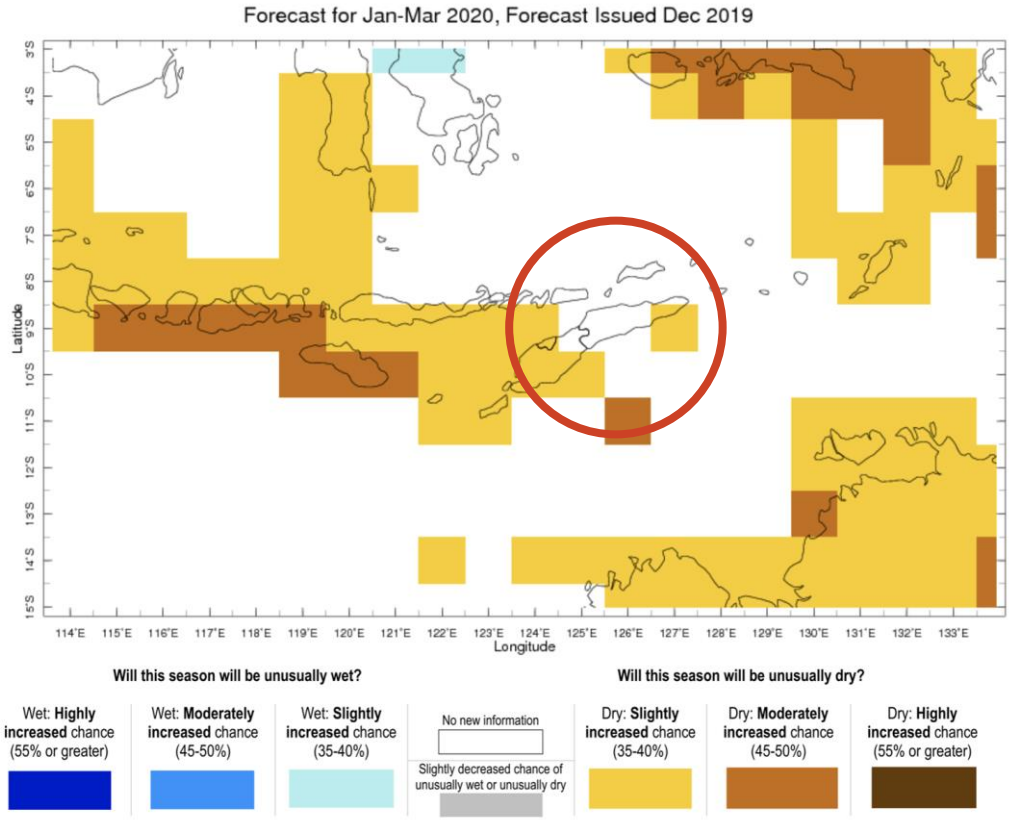
Timor-Leste is expected to experience high intensity of rainfall by the end of the year

Forecast indicates that almost all areas of the country are likely to experience heavy rainfall especially; the highland areas, e.g Aileu Vila, Atsabe, Ainaro, Hatu Bullico, Maubisse and Laclubar.

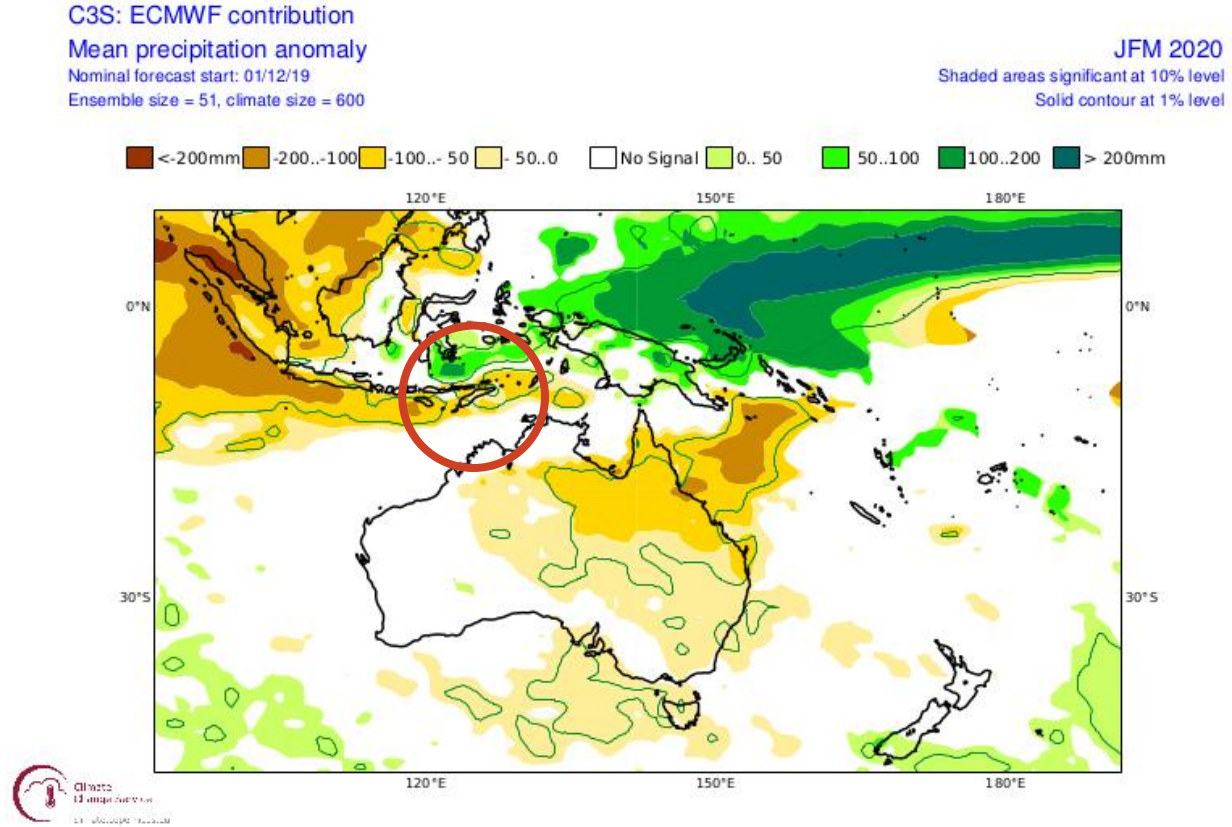
Many areas at the coastline: from Citrana to Sacato in Oecusse, Balibo, Dili, Atauro, Manututo in north-coast, parts of Tilomar - Covalima and Barique/Natarboba - Manatuto in south-coast are expected to have lower rainfall until end of December; compared to other areas in the country.

Data: CHIRPS-GEFS, CHG UCSB

Rainfall outlook for Jan - Mar 2020



IRI Columbia University. Source: http://iridl.ldeo.columbia.edu/maproom/IFRC/FIC/prcp_fcst.html?bbox=bb%3A113.617%3A-15.014%3A133.930%3A-2.991%3Abb



ECMWF. Source: https://climate.copernicus.eu/charts/c3s_seasonal/c3s_seasonal_spatial_ecmf_rain_3m?facets=Parameters,precipitation&time=2019120100,744,2020010100&type=ensm&area=area07

In general, IRI and ECMWF are suggesting similar forecasts of rainfall during the period of January - March 2020. All areas in the country are projected to experience below normal to normal level of rainfall.

These forecasts show only the likelihood of 3-month accumulated rainfall being unusually high or low, and do not indicate chances of individual heavy rainfall events. The forecasts apply over large areas only, and should not be used to forecast local conditions, or as a flood forecast.

Key message and recommendation

- Despite experiencing lower than the long term average rainfall until the first dekad of December 2019, the country is generally considered to have entered the rainy season and crop growing might start soon.
- Higher intensity of rainfall is expected towards the end of December.
- Lautem remains categorized as having suffered a very long drought given that the municipality experienced more than 30 days without rainfall hence affecting the estimated 40,000 people living there in.
- As soil and vegetation need a span of time to respond to rainfall experienced in first dekad of December, a number of areas still fall under the category of severe to extreme drought (about 210,000 Ha or 36% of cropland in Timor-Leste).
- As crop growing might start soon, further monitoring on crop growth (esp. rice and maize) is necessary to support decision making and complement better analysis.

The analysis is merely based on remote sensing data. Ground checks would thus be necessary to ensure coherence of satellite and field observed data.

Mensajen Savi no Rekomendasaun

- Maske nasaun ne'e infrenta udan menus too iha fulan Dezembru 2019, jeralmente Timor-Leste tama ona iha tempu udan nune'e iha tempu badak nia laran ema bele hahu kuda ona aihan
- Posibilidade sei akontese udan boot iha fin do Dezembru
- Lautem kontinua nudar Municipiu ida ne'ebe afeita makaas hosi bailoron naruk tamba kuaze liu loron 30 iha municipiu refere laiha udan nune'e afeita ema kuaze 40,000 ne'ebe hela iha neba.

- Rai no vejetasaun persija tempu hodi responde ba udan iha loron sanolu dahuluk iha fulan Dezembru, iha area balun ne'ebe identifika sei tama iha kategoria hetan afeita makaas hosi bailoron naruk (kuaze 210,000 Ha ka 30% hosi toos iha Timor-Leste).

- Iha tempu badak ema sei hahu kuda aihan, nune'e persija monitorizasaun ba plantasaun liu-liu haree no batar hodi bele halo analize no foti desizaun ida ne'ebe diak liu.

Analize ida ne'e bazeia ba dadus sekundariu. Nune'e importante hodi halo observasaun liu hosi satellite no observa direitamente iha baze.

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Methodology and Data

Method

The maps in this bulletin are largely based on satellite data which is the processed and used to create various indicators related to climate and vegetation.

Meteorological drought happens when the actual rainfall in an area is significantly less than the climatological mean for that area. Meteorological drought can be monitored using indicators such as:

- Rainfall anomaly - a measure of lack of rainfall in a period compared to the average;
- Standardized Precipitation Index (SPI) - a normalized index representing the probability of occurrence of an observed rainfall amount when compared with the rainfall climatology over a long-term period. Negative SPI values represent rainfall deficit, whereas positive SPI values indicate rainfall surplus. Drought, according to the SPI, starts when the SPI value is equal or below -1.0, and ends when the value becomes positive. Reference: SPI http://www.wamis.org/agm/pubs/SPI/WMO_1090_EN.pdf and SPI classification came from https://droughtmonitor.unl.edu/About/AbouttheData/DroughtClassification.aspx
- The number of consecutive dry and wet days is also calculated as the count of the most recent days since a day had more/less than 1mm of rain. CHIRPS data is then processed to determine the number of days since the last rainfall (were a day with rainfall is noted as one where more than 1 mm of precipitation as observed). Using a standard classification, drought or wet level is then determined.

Agriculture drought is a situation where rainfall and soil moisture are inadequate during the crop growing season to support healthy crop growth to maturity, causing crop stress and wilting. Agriculture drought can be monitored using these indicators:

- Normalized Difference Vegetation Indices (NDVI) and or Enhanced Vegetation Index (EVI) anomaly: a measure of lack of greenness vegetation in a period compared to the average;
- Vegetation health index (VHI): is based on a combination of Vegetation Condition Index (VCI) and Temperature Condition Index (TCI). In Timor-Leste, the VCI is constructed using the Enhanced Vegetation Index (EVI). EVI is used instead of NDVI as it is more sensitive to changes in areas having high biomass, it reduces the influence of atmospheric conditions on vegetation index values, and it corrects for canopy background signals. The VHI is effective enough to be used as proxy data for monitoring vegetation health, drought, moisture, thermal condition, etc.
- The vegetation health also based on MODIS vegetation indices MOD13Q1 and land surface temperature MOD11A2 using the approach from https://journals.ametsoc.org/doi/pdf/10.1175/1520-0477%281997%29078%3C0621%3AGDWFS%3E2.0.CO%3B2

Data

Rainfall

- Daily precipitation from 1981 - now, 0.05deg ~ 5.6km spatial resolution. Source: CHIRPS CHC UC Santa Barbara - https://www.chc.ucsb.edu/data/chirps
- Forecast for Daily 5-day, 10-day, 15-day. 0.05deg ~ 5.6km spatial resolution. Source: CHIRPS-GEFS https://www.chc.ucsb.edu/data/chirps-gefs
- Seasonal (3 month) Forecast. Source: IRI Columbia University http://iridl.ldeo.columbia.edu/maproom/IFRC/FIC/prcp_fcst.html?bbox=bb%3A113.617%3A-15.014%3A133.930%3A-2.991%3Abb and ECMWF Copernicus https://climate.copernicus.eu/charts/c3s_seasonal/c3s_seasonal_spatial_ecmf_rain_3m?facets=Parameters,precipitation&time=2019120100,744,2020010100&type=ensm&area=area07
- Rainfall and vegetation charts for every 10 and 16 days. Source: https://dataviz.vam.wfp.org/seasonal_explorer/rainfall_vegetation/visualizations

Vegetation

- Enhanced Vegetation Index (EVI), MOD13Q1. 16 days temporal resolution from 2000 - now, 250m spatial resolution. Source: MODIS Terra, USGS https://lpdaac.usgs.gov/products/mod13q1v006/

Temperature

- Land Surface Temperature, MOD11A2. 8 days temporal resolution from 2000 - now, 1km spatial resolution. Source: MODIS Terra, USGS https://lpdaac.usgs.gov/products/mod11a2v006/

Cropland extent

- MODIS cropland 2010, 250m spatial resolution. Source: http://www.iwmi.cgiar.org/2016/02/irrigated-africa-and-asia/

Population density and footprint

- Global Human Settlement Layer, 250m spatial resolution. Source: Joint Research Centre - EU https://ghsl.jrc.ec.europa.eu/download.php

WFP Climate and Food Security Analysis

The United Nations World Food Programme (WFP) - saving lives in emergencies and changing lives for millions through sustainable development. WFP works in more than 80 countries around the world, feeding people caught in conflict and disasters, and laying the foundations for a better future. WFP is a committed partner of Timor-Leste in combating all forms of malnutrition and achieving Sustainable Development Goals 2 for Zero Hunger by 2030. WFP has been present in Timor-Leste since 1999.

In the advent of more frequent and intense climate change induced disasters, people's ability to produce, access and consume food could be greatly hampered. Moreover, the rural populations and vulnerable groups; including female-headed households and those with limited access to land, productive assets or education stand the highest risk. Therefore, a profound understanding of the associated impacts of climate change to food security can inform relevant action and enhance the ability of governments and communities to prepare for or adapt to the adverse effects of climate change. It is upon this background that WFP produces this agricultural climate risk analysis for Timor-Leste.

WFP World Food Programme

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