

Climate, climate variability and change of Timor-Leste

Introduction

Geographic;

Timor-Leste is located in low latitude tropics and subject to monsoon regime, with the coordinates, Lon: 125.55°E & Lat: 8.5°S, and located at Southern Asia and Northwest of Australia. The total area is 15,007 sq km, with the total population of 1,062,777. Most of which live in the capital city Dili.

Climate;

The mountain range creates a dichotomy in rainfall regime between the north and south sides of the island. Most rainfall occurs from Dec-Apr.

Meteorology/Climate Service

- Number of staff: 17 staff
- Number of stations: 5 stations (1 synoptic station with AWS and 4 manual)
- Australian Bureau of Meteorology (BOM) provides weather forecasting
- Regional Integrated Multi-Hazard Early Warning System (RIMES) provides earthquake alerting and generating short term weather forecasting



Figure 1: Map of climate drivers and features influencing climate of Timor-Leste.

Data availability and homogeneity

The stations in Timor-Leste with the longest history of climate records is Dili and Baucau (Table 1 and Figure 2). Both are located on the northern coast of Timor-Leste. The rainfall data has been homogenized but there are still gaps of missing data during the mid-1970s and around the turn of the millennium.

There are no long-term temperature data records available.

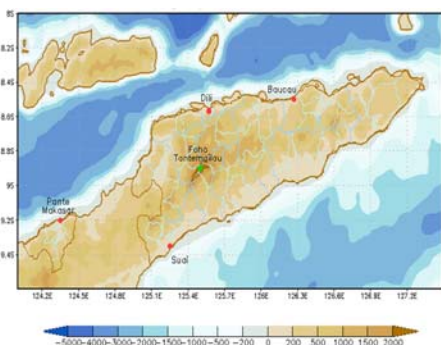


Figure 2: Topographic map of Timor-Leste including the highest mountain (Foho Tatamailau, 2963m)

Rainfall Station	WMO Number	Lon (°E)	Lat (°S)	Start year	End Year	Homog. rainfall record?
Dili	97390	125.31°E	08.38°S	1952	2008	Yes
Baucau	90395	126.40°E	08.50°S	1961	1999	Yes

Table 1: Timor-Leste rainfall stations with the longest records



Climate Drivers

Monsoon: Very active between November and April with rainfall regimes differing between Northern and Southern regions of Timor-Leste. Strong year-to-year variability of rainfall during wet season with pronounced dry season in between.

El Niño & La Niña: The El Niño Southern Oscillation (ENSO) strongly affects the wet seasons over Timor-Leste. During El Niño the monsoon onset is delayed and the wet season ends earlier leading to overall less rainfall. During La Niña the wet season is extended bring increased rainfall and floods to large areas in Timor-Leste.

Indian Ocean: The warming pattern in the Indian Ocean also affects rainfall over Timor-Leste. During the positive phase of the Indian Ocean Dipole (IOD) there is less rainfall compared to the negative phase.

Tropical Cyclones: Tropical Cyclone (TC) activity is generally low with more TCs during La Niña compared to El Niño.

Madden – Julian Oscillation (MJO): The MJO affects rainfall on intra-seasonal time scales such as during the monsoon onset and active and break periods during the wet season.

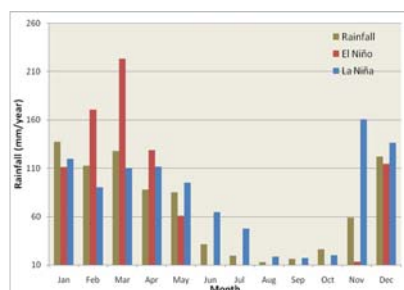


Figure 3: Annual cycle of rainfall for Dili, Timor-Leste for El Niño (red), La Niña (blue) and all years (green).

Seasonal Cycles

The seasonal cycle of rainfall (Figure 3) shows typical strong influence of the monsoon with marked dry and wet seasons. The figure above shows the effect of ENSO with a shortened wet season for Dili during El Niño and prolonged wet season during La Niña. The dry season extends to a 6 month period without rainfall during El Niño.

Observed inter-annual variability and trends

The inter-annual variability in rainfall at Dili Airport is high (Figure 4) and its driven by ENSO and the Indian Ocean Dipole.

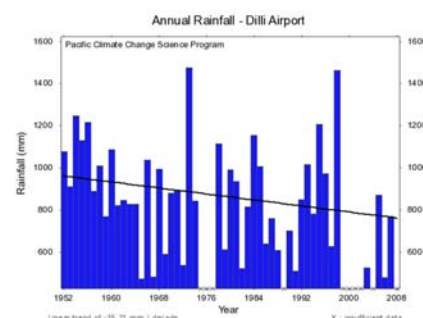


Figure 4: Time series of total annual rainfall and linear trend for Dili, Timor-Leste.

Overall there is a decreasing trend in annual rainfall of around 40mm per decade. But there are significant periods with missing data.

Impacts and extremes

Tropical Cyclone most affect to Timor-Leste in La Niña years. The chance of a direct hit is still fairly low with 2 TCs coming close in recent history.

Average number of tropical cyclones per season					
El Niño	0.88	La Niña	1.50	Neutral	1.14
				All seasons	1.11

Table 2: Average number of tropical cyclones per season separated by phases of ENSO: El Niño, La Niña and neutral conditions.

La Niña years brings more rainfall, stronger winds, flooding and land slides across the country.

El Niño years will result in drought, loss of spring water, temperature rise.



Figure 5: Historical tracks of tropical cyclones being in close vicinity to Timor-Leste during their lifetime since 1969.

Perceptions of Climate Change

Mostly the people of Timor-Leste believe that climate change is already happening with effects such as changes in rainfall patterns, flooding and land slides, temperature rise, sea level rise and long months of drought. Most people think that this is because of climate change.