Environment and Climate Change Canada | Environnement et Changement climatique Canada

Country Profile:

Trinidad and Tobago

World Meteorological Organization
Weather • Climate • Water

Caribbean Institute for Meteorology and Hydrology
CIMH

1. PHYSICAL GEOGRAPHY

The Republic of Trinidad and Tobago is an archipelagic state in the southern Caribbean, lying northeast of the South American nation of Venezuela and south of Grenada in the Lesser Antilles. It covers an area of 5,131 square kilometers (1 979 square miles) and also shares maritime boundaries with Barbados to the northeast and Guyana to the southeast. Trinidad and Tobago are the southernmost of the Caribbean Islands, located at 10-11°N.

Figure 1 Map of Trinidad and Tobago. (Credit: Wiki Commons)

The islands experience year-round warm, humid conditions associated with marine tropical climates. The annual rainfall totals around 1500 mm in Tobago and between 1800 mm and 3000 mm in Trinidad, with the highest amounts in the Northern Range. Trinidad and Tobago lie on the southern margins of the Atlantic Hurricane belt and normally escape the passage of tropical cyclones, including hurricanes, though the Island of Tobago is regarded as being more vulnerable to hurricane threats (McSweeney et al. 2010; UNFCCC 2013). The wet season spans June to November, with July to November totaling 200 mm or more each month in Trinidad and 150 mm or more in Tobago. Annual near-surface air temperature at sea level averages out at 26.6°C in Trinidad and 27.3°C in Tobago, running at 27.4°C in Trinidad and 28.1°C in Tobago in May and about 2°C lower from December to February. (http://rcc.cimh.edu.bb/). The elevated rainfall allow for rainforest over much of the inland regions, especially in the Northern Range of Trinidad, with some savanna type vegetation found in places.

2. CLIMATOLOGY

There is a network of 85 stations in Trinidad and Tobago. This number comprises nine stations (two synoptic and 7 Automatic Weather Stations-AWS) owned and operated by the Trinidad and Tobago Meteorological Service (TTMS) along with 76 rain gauges owned and maintained by the Water and Sewerage Authority (WASA) of Trinidad and Tobago (see Table 1). The rainfall climatology of two stations is summarised in Table 2.

Table 1. Composition of Network of Meteorological Stations in Trinidad and Tobago

Type of Station	Number of Stations	Details of Stations
Manual Rainfall Stations	76	Manual rain gauge Owned and operated by the Water and Sewerage Authority of Trinidad and Tobago
Automatic Weather Stations	7	All Located in Trinidad: Brasso Venado, Caroni, Centeno, Chatham, El Reposo, Penal and Guayaguayare
Synoptic (Manned) Stations	2	Piarco International Airport, Trinidad and A.N.R. Robinson Int'l Airport, Tobago

Source: Trinidad and Tobago Meteorological Service

The rainfall and temperature climatology at Piarco International Airport (1981-2010) are presented in Figure 2, with summary statistics presented for Piarco and the A.N.R. Robinson Airport station in Crown Point, Tobago, in Table 2. Lying farthest south of all islands, Trinidad has the Intertropical Convergence Zone overhead in July and August, and again in October and November, explaining much of the heavy rains in their wet season. Annual precipitation totals are high in most places and averaging 1897.8 mm at the Piarco International Airport. In some years, the wet season starts in May – a month with large variability (over 200 mm difference between the 10^{th} and 90^{th} percentiles) – and occasionally even in April. Much of this variability is associated with the El Niño Southern Oscillation (ENSO). Besides shifting the onset of the wet season to earlier dates in the year after its onset, El Niño episodes bring warmer and drier than average conditions between June and August. La Niña episodes bring colder and wetter conditions at this time. From June onwards, rainfall commonly hovers around 200 mm or higher, with a noticeably drier period in September, when the ITCZ has shifted north of Trinidad and before shifting back south. The annual temperature range is between 26°C in February and 28.1°C in June, with little fluctuation from May to October.

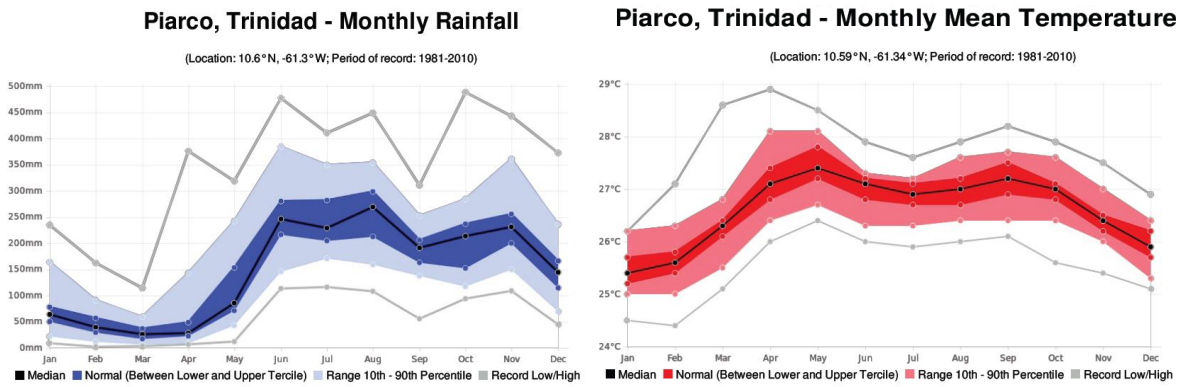

Figure 2 1981-2010 reference climatology of monthly rainfall totals (left) and mean near-surface air temperature (right) at the Piarco airport station in Trinidad. Source: rcc.cimh.edu.bb (data from Trinidad and Tobago Meteorological Service)

Table 2. Summary statistics of rainfall and temperature for Piarco International Airport in Trinidad and for A.N.R. Robinson International Airport in Tobago

Station Name	Piarco Int'l Airport (Period/Year/Month of Occurrence)	ANR Robinson Int'l Airport (Period/Year/Month of Occurrence)
Mean Annual Rainfall	1863 mm (1971-2016)	1475.5 mm (1971 -2015)
Wettest Year / Month / three-month period	2603.2 mm (1981) / 488.4 mm (Oct. 1988) / 1151.9 mm (May to Jul. 1983)	1987 mm (2004) / 429 mm (Nov. 2004) / 860.4 mm (May to Jul. 2010)
Driest Year / Month / three-month period	1453.7 mm (1987) / 2.1 mm (Feb. 2010) / 24.1 mm (Jan. to Mar. 2010)	835.9 mm (1981) / 2.4 mm (Mar. 1992) / 20.2 mm (Feb. to Apr. 2010)
Mean Annual Temperature	26.5 °C (1973 – 2015)	27.1 °C (1989 – 2015)
Warmest Year / Month / three-month period	27.5 °C (2010) / 29.3 °C (Apr. 2016) / 28.7 °C (Mar. to May. 2010)	27.7 °C (1998) / 28.7 °C (Sep. 2005) / 28.5 °C (Aug. to Oct. 2005)
Coldest Year / Month / three-month period	25.6 °C (1971) / 24.1 °C (Jan. 1976) / 24.3 °C (Dec. 1975 to Feb. 1976)	26.8 °C (1989) / 25.1 °C (Feb. 2008) / 25.4 °C (Jan. to Mar. 2008)

Source: http://rcc.cimh.edu.bb/

3. SOCIO-ECONOMIC LANDSCAPE

The twin island Republic has a (combined) population (2014) population of around 1.354 million and Tobago (much smaller than Trinidad), comprises about 6 % of the total area and 4 % of the population (UNFCCC 2013; http://data.worldbank.org/country/trinidad-and-tobago). The Republic's 2012 HDI of 0.760—puts Trinidad and Tobago in the high human development category—positioning the country at 67 out of 187 countries and territories (UNDP 2013). The (2014) GDP was estimated by the World Bank at USD 28.88 billion (USD 2127/ capita). Mean life expectancy is 70.86 years (67.98 for males and 73.82 for females). Trinidad and Tobago is the leading Caribbean producer of oil and gas (the main economic activity of the country) and is regarded as a good site for hydrocarbon investments (UNFCCC 2013).

4. KEY NATIONAL STAKEHOLDERS AND THEIR NEEDS

A 2015-2016 survey of user climate information needs in the Caribbean captured responses from 29 sectoral users in Trinidad and Tobago representing a range of sectors including energy, agriculture, water, health, disaster risk management, as well as, other important sectors including the media, infrastructure, fire, aviation and environment. One representative from the tourism sector participated in stakeholder interviews, while two stakeholders from the DRM and health sectors participated in focus group discussions convened in May 2016. Trinidad and Tobago also benefitted from the convening of an Environment Canada supported In-Country Workshop to map provider capacity and user needs for climate services in February 2016.

Users of climate services in Trinidad and Tobago obtain the majority of their information from the National Meteorological and Hydrological Services, government agencies and departments, followed by forecasts from research institutes and the Caribbean Institute for Meteorology and Hydrology. Users believe that climate services are of high value in their organisation's operations and planning and as such, many of them routinely try to integrate climate information considerations into their professional decisions to inform day-to-day strategic planning in their organisations. Users use climate information as follows:

- "The CariCOF Drought Outlook: This indicates a need for us to monitor our open water sources more often so that we will know of availability of water for firefighting…" (Fire Services representative).
- "Planning water consumption rates for cooling power plants" (Energy stakeholder).
- "My organisation carries out regular monitoring of coral reefs around Tobago. The Caribbean Coral Reef Watch is useful to aid in these endeavours and supplement reporting" (Environment stakeholder).
- "The Caribbean Drought Bulletin helps Trinidad to identify commodities that can be grown and exported to Caribbean countries who would not be able to produce due to drought conditions" (Agriculture stakeholder).
- "The Drought Bulletin will be used to plan for dry spells that impact on the water levels of the dams that is used as process water for refinery operations" (Energy stakeholder).
- "Precipitation influences both surface and groundwater resources. Hence, the Precipitation Outlook can be used to better manage water resources availability. During times of reduced rainfall, groundwater can be utilised for water supply in affected areas" (Water stakeholder).
- "Planning for vector-related operations in terms of equipment, manpower, control measures, etc." (Health stakeholder).

Users report that although more can be done with regard to the use and function of climate information in their organisations, this is generally hindered by a lack of knowledge of available climate data. Users called for full access to historical weather and climatological data from varying points throughout the country, as well as, for information regarding strong wind periods in the dry season to assist with bush and wild fire fighting.

5. RANGE OF CLIMATE SERVICES

As of August 2015, the Trinidad and Tobago Meteorological Service (TTMS) classifies itself as a Category 3 climate services provider offering a comprehensive range of climate data services and information products, as well as, essential climate data services and information products (**Error! Reference source not found.**).

Table 1 Climate Product Suite

Climate Products and Services	Source
Rainfall and temperature outlook	http://www.metoffice.gov.tt/taxonomy/term/21
Agro-meteorological Bulletin	http://rcc.cimh.edu.bb/files/2015/07/Trinidad-and-Tobago-Agromet-Forecast-July-21-31_-2015_7.pdf
Dry and Wet Spell Monitor	http:// http://www.metoffice.gov.tt/node/22

The TTMS has been delivering climate services for over 10 years.

The sectors that benefit from the provision of climate services in Trinidad and Tobago are the agriculture, water, disaster risk management, health, energy, tourism, the private sector and research institutions. Specific organisations with which the TTMS interacts[1] are:

- The Office of Disaster Preparedness and Management, Trinidad
- The Water and Sewerage Authority
- The Agricultural Society of Trinidad and Tobago
- The Inter-American Institute for Cooperation on Agriculture, Delegation in Trinidad and Tobago
- The Institute of Marine Affairs
- The Insect Vector Control Division
- The Ministry of Agriculture, Land & Fisheries
- The National Agricultural Marketing and Development Corporation
- The National Infrastructure Development Company Limited
- The Trinidad & Tobago Coast Guard
- The Trinidad & Tobago Fire Service
- Atlantic LNG
- The Ministry of Energy & Energy Industries
- Petrotrin
- The Trinidad & Tobago Electricity Commission

[1] Information gleaned from the Workshop participant list of the Trinidad & Tobago In-Country Workshop: Mapping Provider Capacity and User Needs for Climate Services, conducted on 12th February, 2016.

- The Trinidad and Tobago Civil Aviation Authority
- The North West Regional Health Authority
- The University of the West Indies
- The Drainage Division
- The Water Resources Agency
- Newsday
- CNMG

Other sectors reported by the TTMS that could potentially benefit from climate services in Trinidad and Tobago are the urban development and transport sectors.

The level of interaction between the TTMS and users of climate information is reported to be moderate, where users are engaged at the later stages of the climate service project. Feedback is routinely collected from users through mediums such as outreach workshops, email, interviews, face-to-face discussion and surveys. As of November 2017, six National Climate Outlook Forums (NCOF) have been hosted by the TTMS.

TTMS recommendations for improving its climate services capability include:

1. Standardisation of observation practices;
2. Improved observation infrastructure including a wider span of observations;
3. Integration of all climate observations into one national database including Memorandum of Understanding across gatekeepers of climate information;
4. Capacity development for staff through training;
5. Institutional strengthening through the development of policy frameworks and strategic plans;
6. The availability of socio-economic data;
7. Establishing official research partnerships with academia;
8. Upgrading communication infrastructure and systems to facilitate improved interactions with sectoral stakeholders.

6. REFERENCES

C. McSweeney, M. New, G. Lizcano. 2010b. The UNDP Climate Change Country Profiles: Trinidad and Tobago

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Web Sites
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