Environment and Climate Change Canada | Environnement et Changement climatique Canada

Country Profile:

Belize

World Meteorological Organization
Weather • Climate • Water

CIMH
Caribbean Institute for Meteorology and Hydrology

1. PHYSICAL GEOGRAPHY

Belize is located on the Central American mainland, forming part of the Yucatan Peninsula and lying between 15.75°N and 18.5°N Latitude, and 87.5°W and 89.25°W Longitude (UNFCCC 2011; http://www.hydromet.gov.bz/). The Country is bounded to the north by Mexico, to the west and south by Guatemala and to the east by the Caribbean Sea. The total land area is 22,960 sq km (8,867 square miles) of which 95% is located on the mainland and five per cent is distributed over more than 1060 islands. Total national territory (including territorial sea) is 46,620 sq km (approximately 18,000 square miles) (UNFCCC 2011; http://www.hydromet.gov.bz/).

Belize has a very diverse physical geography because it lies at the boundary of two sharply contrasting geologies (UNFCCC 2011). The Northern region of Belize is an extension of the Yucatan Platform; the Yucatan Platform consists of hard, dense limestone over red shale that results in a topography consisting of low (approximately 250 m), rolling limestone hills and escarpments (UNFCCC 2011). By contrast, southern Belize shares the mountainous geology of eastern Guatemala (UNFCCC 2011). The dominant physiographic feature of the country is the Maya Mountains, which rise steeply from the coastal lowlands to a maximum elevation of 1124 m above sea level. The country is well known as the home of the longest barrier reef in the Western Hemisphere. This 220 km reef stretches the entire coastline and is recognized by the United Nations as a World Heritage Site (UNFCCC 2011).

Figure 1 Map of Belize. (Credit: Wiki Commons)

The mean annual temperature range is 26° C – 27° C http://rcc.cimh.edu.bb/). Rainfall averaging about 1300 mm in the extreme northwest and up to 3700 mm in the south is more variable (than temperature) with distinct wet and dry seasons. Across the country, the Wet season spans May to December during which monthly generally rainfall averages 100 mm to more than 600 mm (in the

extreme south). During the dry season (January/February –April) most of the country receives less than 100m per month ((http://rcc.cimh.edu.bb/). Rainfall supports a natural vegetation of lush rainforest in the south and dry forest in the north.

2. CLIMATOLOGY

The Belize National Meteorological Service (http://www.hydromet.gov.bz) is located at the Philip Goldson International Airport. Summary statistics of rainfall data from two locations, namely the Philip Goldson International Airport (PGIA) (1971-2015) and Punta Gorda (1979-2015) of the 10[1] locations maintained by the Services are summarized in table 1 below. The selection of these two stations was motivated by the length of the time series (45 years) for the former, and the very high rainfall totals for the latter. The sites are also located in different parts of the country, and so provide some insight into spatial difference of rainfall across Belize.

The rainfall and temperature climatology at PGIA (1981-2010) are presented in Figure 2, with summary statistics for PGIA and Punta Gorda presented in Table 1. As a mainland area with diverse topography, ranging from coral cays on the barrier reef to coastal and inland flood plains to mountains, the hydrology of Belize can hardly be summarized in a few sentences. However, plenty of moisture is advected into Belize and trapped by the mountains. This leads to large discharge volumes of the rivers, especially in the south where flooding during the wet season is very common. As is the case for the Yucatán Peninsula in general, the more north-west, the drier.

The rainy season occasionally starts in June rather than May, and ends as early as October or as late as January, rather than in December. Both averages and variability are low in the peak of the dry season between February and April, but variability increases markedly in June and remains high until October or November (with the 10th percentile and 90th percentile both mostly being 150 mm away from the mean for each of the 5 or 6 months). The annual temperature range at PGIA is between 24°C in January and 28.4°C in June. Besides a slightly amplified seasonal temperature cycle as compared to most of the Caribbean, variability is also larger, with a range of at least 2°C between the 10th and the 90th percentile during the dry season. This relates to the incursion of cold fronts from North America, which varies substantially from year to year.

[1] The stations are namely: Belmopan, Central Farm, Libertad, Melinda, Middlesex, Philip Goldson Airport, Punta Gorda, Savannah, Spanish Lookout, and Tower Hill. Details of these stations are available at: http://rcc.cimh.edu.bb/

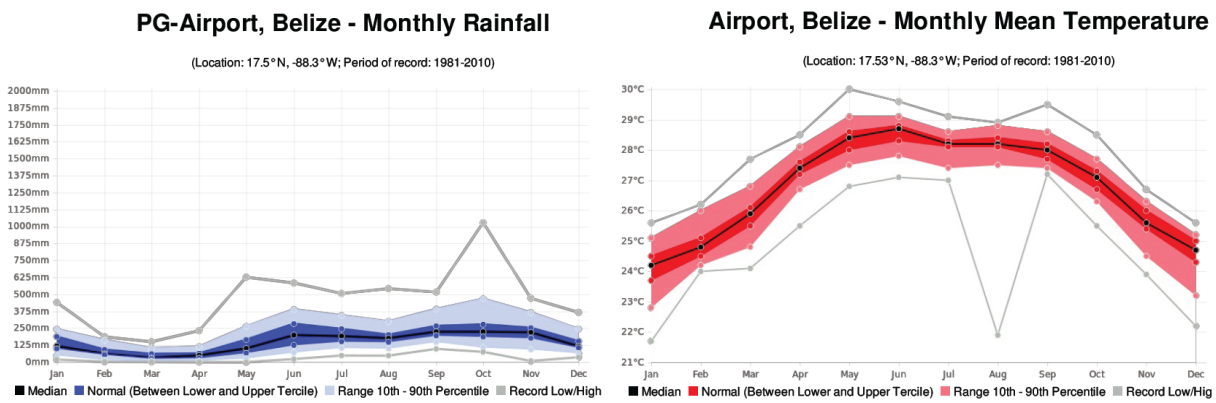

Figure 2 1981-2010 reference climatology of monthly rainfall totals (left) and mean near-surface air temperature (right) at the Philip Goldson airport station. Source: rcc.cimh.edu.bb (data from Belize National Meteorological Service). *Note: the record low monthly mean temperature reported for August is most probably an artefact.*

Table 1. Summary statistics of rainfall and temperature for the Philip Goldson Int'l Airport and Punta Gorda

Station Name	Philip Goldson Int'l Airport (Period/Year/Month of Occurrence)	Punta Gorda (Period/Year/Month of Occurrence)
Mean Annual Rainfall	1966.5 mm (1971 – 2015)	3862.9 mm (1979 – 2015)
Wettest Year / Month / three-month period	2879 mm (2006) / 1028 mm (Oct. 2000) / 1795 mm (Aug. to Oct. 2000)	5657.4 mm (2013) / 1522 mm (Jul. 2013) / 3328 mm (Jun. to Aug. 2013)
Driest Year / Month / three-month period	205 mm (2013) / 0 mm (May. 1975, 1995) / 13 mm (Apr. to Jun. 1975)	2465 mm (1991) / 0 mm (Feb. 1998, Mar. & Apr. 2013) / 35 mm (Feb. to Apr. 2013)
Mean Annual Temperature	26.7 °C	25.9 °C (1979 – 2015)
Warmest Year / Month / three-month period	27.4 °C (2015) / 30 °C (May 1995) / 29.2 °C (Apr. to Jun. 1995)	26.5 °C (2004) / 30.1 °C (Apr. 2013) / 29.3 °C (Mar. to May 2013)
Coldest Year / Month / three-month period	26 °C (2012) / 21.7 °C (Jan. 1981) / 22.9 °C (Dec. 1980 to Feb. 1981)	25.5 °C (1986) / 21.8 °C (Jan. 1981) / 22.7 °C (Dec. 1980 to Feb. 1981)

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

3. SOCIO-ECONOMIC LANDSCAPE

Belize had a (2014) population of 351,700 (http://data.worldbank.org/country/Belize) The UNDP (2014) Human Development Index (HDI) for Belize was 0.715- which puts the country in the high HDI category and positions it at 101 out of 188 countries and territories (UNDP 2015). The (2014) GDP was estimated by the World Bank at USD 1.66 billion (USD 4,830/ capita). Agriculture remains a major sector for the economy, but tourism has become the largest contributor to GDP and the largest source of foreign exchange for Belize (UNFCCC 2011). Belize has slowly diversified its economy over time, with substantial

aquaculture and manufacturing industries, and more recently, a small but lucrative petroleum industry (UNFCCC 2011).

4. KEY NATIONAL STAKEHOLDERS AND THEIR NEEDS

A 2015-2016 survey of user climate information needs in the Caribbean captured responses from 31 sectoral users mainly representing the agriculture, water and energy sectors. Two representatives from the energy and tourism sectors participated in stakeholder interviews, while one stakeholder from the health sector participated in focus group discussions convened in May 2016. Belize also benefitted from the convening of an Environment Canada supported In-Country Workshop to map provider capacity and user needs for climate services on June 07, 2016.

Users of climate services obtain their seasonal forecasts from the Caribbean Institute for Meteorology and Hydrology and the National Meteorological and Hydrological Service. Users believe that climate services are of high value in their organisation's operations and planning and as such, they routinely try to integrate weather and climate information considerations into their professional decisions to inform day-to-day strategic planning in their organisations. One Agriculture stakeholder reports that knowledge of the precipitation/drought outlook aids in "deciding which crops to plant and when". Other agriculture stakeholders use climate information to inform "planting, fertilization and all other cultural practices in the agricultural field". Water stakeholders report that they use the drought outlook for resource allocation and climate information more generally to assist in "knowing changing turbidity in surface water" and to assist in purchasing chemicals to help in the processing of surface water". The energy sector uses climate information for water and power production management at the Chalillo dam.

Some identified barriers to climate information use were inappropriate spatial resolution, the need for information on integrated variables important to the sector, as well as, the temporal resolution of climate information: "…it needs to be more specific to our dam catchment area. It needs to provide us water inflows instead of precipitation. And it needs to be provided in a monthly, quarterly and six-month basis. And, if possible, up to a year…" (Energy stakeholder, Belize). The agriculture sector called for the "development of agriculture climate data collection system" to allow for better decisions to be taken at the ministry and farm levels.

5. RANGE OF CLIMATE SERVICES

As of September 2015, the Belize National Meteorological Service (BNMS) reports that it can be classified as a Category 2 climate services provider offering a basic range of climate services and products, as well as, climate predictions. The BNMS reports that it has been delivering climate information for over 10 years. The organisation tailors 5 of the 7 regional climate products for the national context. The organisation uses these products to feed into Drought and Precipitation Statements, as well as, precipitation outlooks at the national level.

The socio-economic sectors that benefit from climate services are the agriculture, water, disaster risk management, health, energy and tourism sectors. Specific organisations with which the BMS interacts[2] are:

[2] Information gleaned from the Workshop participant list of the Belize In-Country Workshop: Mapping Provider Capacity and User Needs for Climate Services, convened on 7th June 2016.

- The Chamber of Commerce;
- The Ministry of Health;
- The Belize Electricity Company Limited;
- Belize Water Services;
- Belize Agricultural Health Authority;
- The Fisheries Department;
- The Department of Co-operatives, Ministry of Agriculture and Fisheries;
- The Coastal Zone Management Institute;
- The Belize Tourism Board;
- The Belize City Council;
- The Belize Public Utilities Commission;
- The Belize National Emergency Management Organisation;
- The Ministry Of Forestry;
- The Sugar Industry Research & Development Institute;
- The Inter-American Institute for Cooperation on Agriculture, Delegation in Belize;
- The Belize Citrus Growers Association;
- The Ministry of Agriculture, Fisheries, Forestry, the Environment, and Sustainable Development;
- The Belize Agricultural Health Authority;
- The Belize Sugar Industries Limited;
- The Banana Gowers Association;
- The Ministry of Natural Resources and Immigration; and
- TexBel Farms Investments, LLC.

The fisheries sector has been identified as one sector that could potentially benefit from the provision of climate services going forward. The level of interaction between the BNMS and the users of climate information has been reported to be moderate, where users are engaged at the later stages of the climate service project. Although feedback is not routinely collected from users, the BNMS has convened five National Climate Outlook Forum as of 13 June 2017.

The BNMS reports that "the generation of products and services is largely limited by the staffing situation…having only one professionally trained individual to generate all the products". The key recommendation for improving its climate services capability is to increase and strengthen its staff complement with suitably qualified individuals.

6. REFERENCES

United Nations Framework Convention on Climate Change (UNFCCC). 2011. Belize' Second National Communication to the UNFCCC.

United Nations Development Programme (UNDP). 2015. Human Development Report 2015. Work for Human Development. Briefing note for countries on the 2015.

Web Sites

http://carogen.cimh.edu.bb/
http://rcc.cimh.edu.bb/
http://www.hydromet.gov.bz/

http://data.worldbank.org/country/Belize