

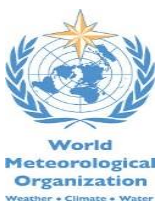


Environment and  
Climate Change Canada

Environnement et  
Changement climatique Canada

## Country Profile:

### Guyana



## 1. PHYSICAL GEOGRAPHY

Guyana is a tropical country located on the Northeastern coast of South America. It has a total territory of 214,970 square kilometers (total land mass of 21.5 million hectares) (UNFCCC 2012) and located generally between 2°N and 8°N Latitude and 57°W and 61.5°W Longitude . Guyana shares borders with Suriname on the east, Venezuela on the west, and Brazil on the west and south, and is bordered by the Atlantic Ocean along the entire length of its coastline on the north. This coast (that hosts over 90% of the population within 10 km of that coast) lies at 1.4 metres below mean high tide level of the Atlantic Ocean (UNFCCC 2012). For this reason the coastal areas are particularly vulnerable to flooding, erosion and salinization. Guyana has three main rivers, the Berbice, the Essequibo and the Demerara, all of which drain into the Atlantic Ocean. The country's three Counties are named after these three main rivers (Berbice, Essequibo and Demerara) (UNFCCC 2012).

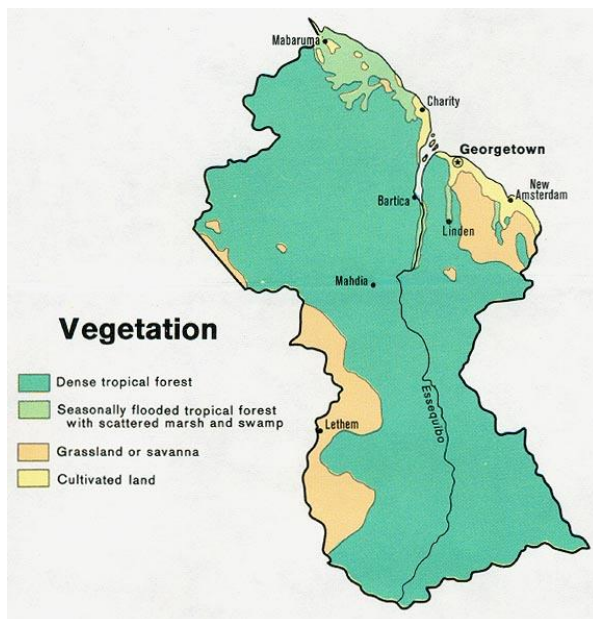


Figure 1 Map of Guyana. (Credit: Wiki Commons)

The country is considered a highly forested one, with 18.39 M hectares of tropical forest. Guyana has a wet-tropical climate, which is further classified into three categories (UNFCCC 2012):

- I. Very dry,
- II. Very wet, and
- III. Wet-dry.

In the coastal regions, rainfall is abundant with annual totals averaging more than 2000 mm. There are two wet seasons and two dry seasons per year (<http://rcc.cimh.edu.bb>, UNFCCC 2012; McSweeney et al. 2010b). In the south and southwest, rainfall occurs during 1 primary wet season from May to August, with totals being closer in the immediate vicinity of the border with Brazil (e.g. around 1450 mm in Lethem), where savannah an abrupt transition between rainforest and savannah naturally occurs. Rainfall (amount and variation) is highly modulated by the north/south movement of the Inter-Tropical Convergence Zone (ITCZ), which passes over the coastal areas twice a year, but only once in the south, explaining the two and one wet seasons, respectively. During the first wet season (May-July) most of the country receives 250-450mm per month. The second (main) wet season the northern coastal regions

which receive 150-300 mm per month from November to January (<http://rcc.cimh.edu.bb>). Mean air temperature ranges 25-27.5°C in most regions except in the upland regions in the west of the country, where mean temperatures are a cooler 20-23°C.

## 2. CLIMATOLOGY

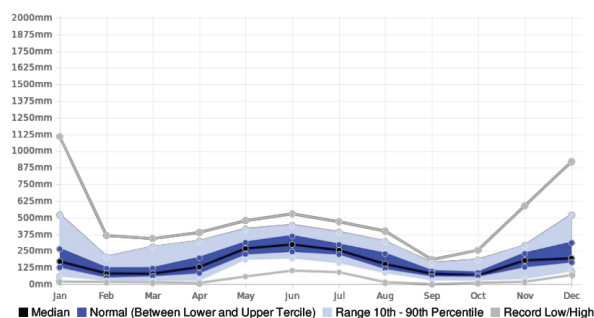
The Guyana Hydrometeorological Service (<http://www.hydromet.gov.gy/weather.html>) monitors 24 hydro meteorological Stations across the country. The mean rainfall and temperature (1971-2015) of the capital Georgetown is summarized in Table 1 below.

The rainfall and temperature climatology in Georgetown (1981-2010) are presented in Figure 2, with summary statistics for Georgetown and Lethem presented in Table 1. As a mainland area with diverse topography, ranging from coastal flood plains and river deltas, inland flood plains to mountains, the hydrology of Guyana can hardly be summarized in a few sentences. However, plenty of moisture is advected into Guyana from the equatorial Atlantic Ocean as well as locally sourced from the rainforests. Areas west of the mountains in the west and south lie on the leeward side and thus experience a rain shadow. Generally, large discharge volumes of major rivers provide plenty of freshwater to most of the country and commonly leads to flooding. Conversely, drought is a recurrent problem when (1) the second wet season in coastal regions fails because of an El Niño, causing acute, short-term drought; or (2) when the wet season is drier than normal in the southwest, where too little rain falls the remainder of the year to offset the dryness, causing long-term drought.

Though the wettest months are May through to July in Georgetown, heavy showers can occur throughout the year, with all months having totaled over 250 mm on at least one occasion, except September. Also, though more erratic than the primary wet season, the second wet season has seen larger totals in December and January (with the 90<sup>th</sup> percentile for both months being more than 500 mm each) as well as much lower totals (the 10<sup>th</sup> percentile being around 50 mm in January). By contrast, the 10<sup>th</sup> and 90<sup>th</sup> percentile for May through to July are around 150 mm and 400 mm, respectively). The annual temperature range in Georgetown is between 26.5°C in January and 28°C in October. Here, the warmest months are those towards the end of the dry seasons (especially the long dry season after the primary wet season) soon after the equinoxes. The latent heat of evapotranspiration and the cooling brought about by precipitation explains the lower ambient temperatures during the wet seasons.

### Georgetown, Guyana - Monthly Rainfall

(Location: 6.5°N, -58.1°W; Period of record: 1981-2010)



### Georgetown, Guyana - Monthly Mean Temperature

(Location: 6.5°N, -58.1°W; Period of record: 1981-2010)

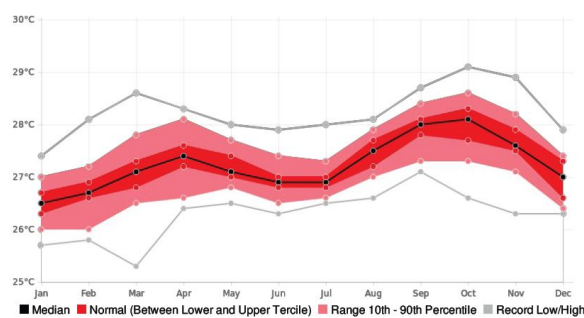


Figure 2 1981-2010 reference climatology of monthly rainfall totals (left) and mean near-surface air temperature (right) at the Georgetown station. Source: rcc.cimh.edu.bb (data from Guyana Hydrometeorological Service).

Table 1. Summary statistics of rainfall and temperature for Georgetown and Lethem

Station Name	Georgetown (Period/Year/Month of Occurrence)	Lethem (Period/Year/Month of Occurrence)
<b>Mean Annual Rainfall</b>	2318.3 mm (1971 – 2015)	1453.8 mm (1979 – 2015)
Wettest Year / Month / three-month period	3365.2 mm (2008) / 1108.2 mm (Jan. 2005) / 1716.5 mm (Dec. 2004 to Feb. 2005)	2522.2 mm (2011) / 604.7 mm (May 1980) / 1365.2 mm (May to Jul. 1980)
Driest Year / Month / three-month period	1592.2 mm (2001) / 2.7 mm (Sep. 1997) / 44.9 mm (Aug. to Oct. 1997)	719.3 mm (1983) / 0 mm (on 12 occasions) / 0.2 mm (Feb. to Apr. 1988)
<b>Mean Annual Temperature</b>	27.1 °C (1971 – 2015)	28.4 °C (1974 – 2015)
Warmest Year / Month / three-month period	28 °C (2015) / 29.1 °C (Oct. 1997) / 28.9 °C (Sep. to Nov. 1997)	29 °C (2015) / 30.9 °C (Oct. 1997) / 30.6 °C (Sep. to Nov. 1997)
Coldest Year / Month / three-month period	26.3 °C (1971) / 25.3 °C (Jan. 1976, Mar. 1993) / 25.5 °C (Dec. 1975 to Feb. 1976)	27.4 °C (1974) / 26 °C (Jul. 1974) / 26.6 °C (Jun. to Aug. 1975)

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

### 3. SOCIO-ECONOMIC LANDSCAPE

Guyana’s population was estimated at 763,900 in 2014 (<http://data.worldbank.org/country/Guyana>). The UNDP (2014) Human Development Index (HDI) for Guyana was 0.636- which puts the country in the medium HDI category and positions it at 124 out of 188 countries and territories (UNDP 2015). The (2014) GDP was estimated by the World Bank at USD 3.097 billion (USD 40547/ capita). Agriculture is the chief economic activity accounting for above 30% of GDP, followed by Travel and Tourism (which contribute 12% to GDP) (UNFCCC 2012).

#### 4. KEY NATIONAL STAKEHOLDERS AND THEIR NEEDS

A 2015-2016 survey of user climate information needs in the Caribbean captured responses from 3 sectoral users representing the Agriculture, Water and DRM. There were no responses from the Energy, Health and Tourism sectors. Only one representative from the water sector participated in stakeholder interviews in 2016. This very small sample size may signal that a targeted future research intervention is needed to address this critical data gap.

Users of climate services in Guyana obtain their seasonal climate forecasts from government agencies and departments. Respondents reported that they routinely try to integrate climate information considerations to inform day-to-day operations and strategic planning. All respondents reported that climate services are of high value in their organisation's operation and planning. For example, one Agriculture user in Guyana reported that "cropping schedules are prepared based on the precipitation outlook for rain fed crops" while a Water stakeholder uses climate information to determine water levels from major sources. Barriers to the use of climate information in Guyana include a lack of in-house expertise to use the information and a lack of management buy-in.

#### 5. RANGE OF CLIMATE SERVICES

As of September 2015, the Hydro-Meteorological Service Department (HMSD) of Guyana categorised itself as a Category 1 climate services provider offering a basic range of climate data services and information products. The HMSD tailors 3 of the 7 regional climate products for the national context. These are the CariCOF Caribbean Outlook Newsletter, the CariCOF Precipitation Outlook and the CariCOF Temperature Outlook. They utilise these regional products to produce the monthly Agro-Met (Farmers Bulletin) at the national level.

The socio-economic sectors that currently benefit from climate services in Guyana are the agriculture (particularly farmers and extension officer sub-groups), water, disaster risk management, health and energy sectors. In addition, the HMSD also interacts with students, research institutions, as well as, with other private sector interests (eg. engineers). Specific organisations with which the HMSD interacts<sup>1</sup> are:

- Guyana Water Incorporated;
- The Ministry of Agriculture; and
- The University of Guyana.

Other sectors identified by the HMSD that could potentially benefit from the provision of climate services in Guyana are the mining, academia and financial sectors.

The level of interaction between the HMSD and users of climate information has been reported to be moderate. Feedback is routinely collected from users through mediums such as email, telephone hotline

---

<sup>1</sup> Information gleaned from participant lists from 6 regional meetings, namely: 1) the 2014 Wet Season CariCOF, May 2014; 2) the 2014 Dry Season CariCOF, November 2014; 3) the 2015 Wet Season CariCOF, May 2015; 4) the 2015 Dry Season CariCOF, November 2015; 5) the Workshop on Enhancing Climate Indices for Sector-specific applications in the Caribbean, 15-19 February, 2016; and 6) the 2016 Wet Season CariCOF, May 2016.

and face-to-face discussions. The HMS convened its first National Climate Outlook Forum (NCOF) in May 2016.

HMSD recommendations for improving its climate services capability include:

1. Improved access to financial resources (allocated government funding, as well as, project grant funding that have an agriculture research & development focus);
2. Expansion and renewal of network instruments (especially mercury based instruments);
3. General improvements to the organisational structure to address stakeholders' needs (eg. additional climatology staff to improve the ability to provide specialised products and information);
4. Advanced training and capacity building for staff in climatology, long range forecast production, and GIS mapping;
5. Formal establishment of a research division, as well as, formal collaboration with tertiary and other research institutions; and
6. Website improvement.

## 6. REFERENCES

C. McSweeney, M. New, G. Lizcano et al., 2010a. The UNDP Climate Change Country Profiles: improving the accessibility of observed and projected climate information for studies of climate change in developing countries. *Bulletin of the American Meteorological Society*, 91, 157–166

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

United Nations Framework Convention on Climate Change (UNFCCC). 2012. Guyana Second National Communication to the UNFCCC.

United Nations Development Programme (UNDP). 2015. Human Development Report 2014. Work for Human Development. Briefing note for countries on the 2015 Human Development Report - Guyana

### Web Sites

<http://carogen.cimh.edu.bb/>

<http://rcc.cimh.edu.bb/>

<http://www.hydromet.gov.gy/weather.htm>

<http://data.worldbank.org/country/Guyana>