Environment and Climate Change Canada | Environnement et Changement climatique Canada

Country Profile:

Jamaica

World Meteorological Organization
Weather • Climate • Water

CIMH
Caribbean Institute for Meteorology and Hydrology

1. PHYSICAL GEOGRAPHY

Jamaica, which is centred on latitude 18°N and 77°W, is the third largest island in the Caribbean and forms part of the set of islands known as the Greater Antilles. The island is approximately 230 km long, oriented along an east-west axis and is approximately 80 km at its widest point. The land area is 10,990 sq. km, of which about 160 sq. km is water and the coastline is approximately 1,022 km (UNFCCC 1994, 2011). The terrain is characterised by a mountainous region along the island's east-west axis and narrow coastal plains. The highest elevation is the Blue Mountain Peak which is 2,256 m above sea level. Most major towns and cities are located on the coast, with its chief towns and cities being the capital Kingston, Montego Bay (its second city), Mandeville, Spanish Town, Ocho Rios, and Port Antonio. Only two major parish capitals are located inland (UNFCCC 1994, 2011).

Figure 1. Map of Jamaica. Credit: Wiki Commons

The climate is marine tropical, with coastal areas having hot and humid weather and inland, elevated areas experiencing cooler temperatures. Annual rainfall ranges from below 900 mm in drier, south coast areas sheltered from moist winds (such as Kingston) up to more than 4000 mm in the high elevations. The wet season runs from May to November, with a pronounced, drier interval in July (commonly referred to as 'mid-summer drought'). The annual mean temperature is around 27°C, with January and February being around 3.5°C cooler than July and August in coastal areas.

2. CLIMATOLOGY

The Meteorological Service, Jamaica (MSJ) has maintained a composite of manual and automated stations in its island-wide network of climate observing stations (http://www.metservice.gov.jm/; http://www.jamaicaclimate.net/). As at 2015, the network has about 226 stations (see Table 1 and Figure 2). This number comprises 46 automatic weather stations (AWS), and 180 other stations (rain gauges, rainfall data loggers and climatological stations). The climatological stations monitor the basic elements - sunshine hours, precipitation amounts, temperatures, evaporation to name a few, but are primarily manual in nature and hence relying on a cadre of trained observers.

Table 1. Composition of Network of Meteorological Stations in Jamaica

Type of Station	Number of Stations	Daily Data Measured (Units)
Rainfall and Climatological Stations	180	Manual rain gauge (172), rainfall data loggers (4) and climatological Stations (4)
Automatic Weather Stations	46	Multiple Parameters at hourly (or less) time intervals
Agromet Stations	38	Committed by Ja-REEACH Project, to be installed in 1st Quarter of 2016

Source: Meteorological Service, Jamaica

Note: Please note, the *Microcomm* stations (about 7 in total) listed on the map provided are no longer functional.

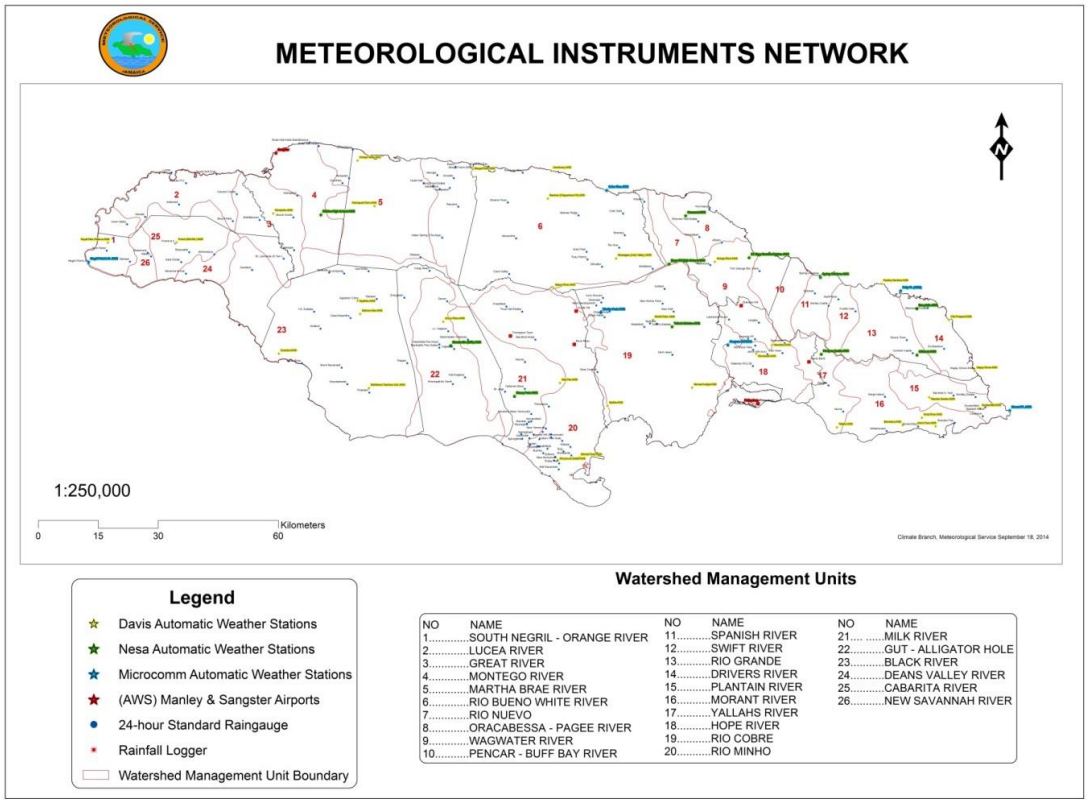

Figure 2. Network of Climate Observing Stations in Jamaica

Since 2000, there has been a concerted effort to phase out the manual stations in preference for AWS, to avoid the over reliance on ageing observers. Most of the AWS units have been donated through projects and other initiatives funded mainly (though not exclusively) by European Union Banana Support Programme (EUBSP) and the United States Agency for International Development (USAID). Most recently, the MSJ, in collaboration with the Jamaica Rural Economy and Ecosystems Adapting to Climate cHange (Ja-REEACH), USAID funded Project, would have been installing an additional 36 agro-meteorological stations across the island and these were slated to have been commissioned into operation within the first quarter of 2016. The rainfall climatology (1971-2015) for the two international airports is presented in Table 2.

Table 2. Summary statistics of rainfall and temperature for Sangster International Airport and rainfall for Norman Manley International Airport

Station Name	Sangster Int'l Airport (Period/Year/Month of Occurrence)	Norman Manley Int'l Airport (Period/Year/Month of Occurrence)
Mean Annual Rainfall	1127.8 mm (1971-2015)	815.7mm (1971 -2015)
Wettest Year / Month / three-month period	1685 mm (2010) / 464 mm (Oct. 2005) / 803 mm (Oct. to Dec. 2005)	1735 mm (2005) / 664 mm (Sep. 2002) / 1071 mm (Aug. to Oct. 2007)
Driest Year / Month / three-month period	637mm (1997) / 0 mm (Mar. 2006) / 12 mm (Jan. to Mar. 1975)	306.3 mm (2014) / 0 mm (on multiple occasions) / 2 mm (Dec. 2007 to Feb. 2008)
Mean Annual Temperature	27.1 °C (1973 – 2015)	
Warmest Year / Month / three-month period	28.3 °C (2015) / 30.2 °C (Aug. 2015) / 29.8 °C (Jun. to Aug. 2015)	
Coldest Year / Month / three-month period	26 °C (1985) / 23.5 °C (Jan. 1985) / 24.1 °C (Dec. 1984 to Feb. 1985)	

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

The rainfall and temperature climatology at Sangster International Airport (1981-2010) are presented in Figure 3, with summary statistics for Sangster, as well as, rainfall summary statistics for Norman Manley International Airport presented in Table 2. As a relatively large island with diverse topography, with narrow coastal plains, hilly and mountainous inland areas, the hydrology of Jamaica can hardly be summarized in a few sentences. However, plenty of moisture is advected into Jamaica along the easterly tradewinds, primarily from May till November, as well as on several occasions per year from the northwest through the passage of (remnants of) cold fronts coming in from North America in the northwest. The topography – the Blue Mountains in particular – shields part of the moisture from reaching the southern low-lying areas, which tend to be (much) drier than the north. At times, Jamaica gets hit by tropical cyclones, dumping prodigious amounts of rain to the island. Those storms are fueled by sea surface temperatures which, usually, are highest in the western part of the Caribbean Sea. By contrast, in some years and across many areas, months can go by without rain.

As such, the variability of rainfall is rather large. At Sangster and Norman Manley, the 10^{th} percentile lie well below 50 mm and near 0 mm, respectively, in all months (except September and October), while the 90^{th} percentile during May and from September to November is above 200 mm and above 400 mm at Norman Manley in September. Because of its erratic rainfall, especially in the south, Jamaica faces drought concerns relatively frequently, with the two driest years on record being 2014 and 2015, with only August 2014 and October 2015 experiencing more than 100 mm rainfall at Norman Manley, *versus* 16 months with less than 20 mm and 3 months without measurable rainfall.

The annual temperature range at Sangster is between 25.4°C in February and 28.6°C in August. The annual ambient temperature cycle closely follows the shape of the annual sea surface temperature cycle, explaining the low and high peaks.

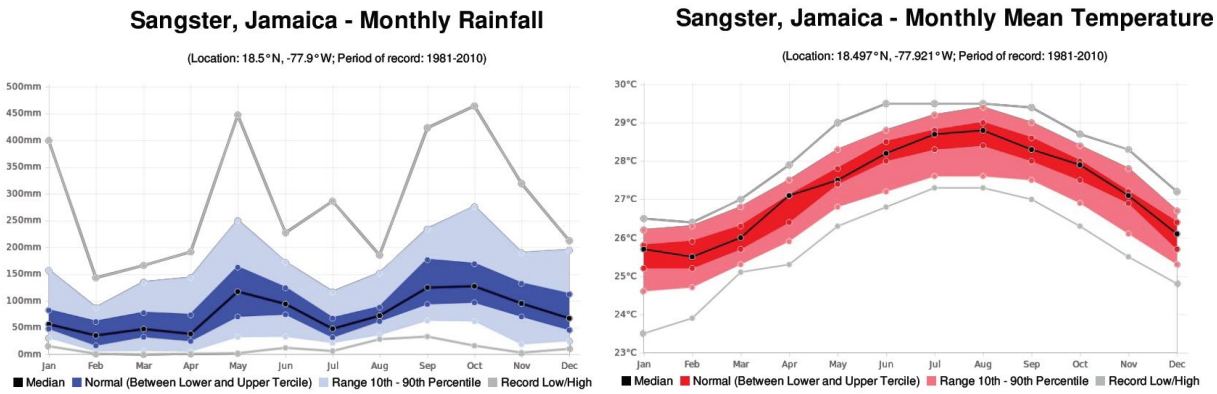

Figure 3. 1981-2010 reference climatology of monthly rainfall totals (left) and mean near-surface air temperature (right) at the Sangster airport station. Source: rcc.cimh.edu.bb (data from the Meteorological Service of Jamaica).

3. SOCIO-ECONOMIC LANDSCAPE

The population of Jamaica was estimated at 2.721 million in 2014 (http://data.worldbank.org/country/Jamaica). The UNDP (2012) Human Development Index (HDI) for Jamaica was 0.73, which is below the average of 0.758 for countries in the high human development group and below the average of 0.741 for countries in Latin America and the Caribbean- which puts the country in the medium HDI category and positions it at 85 out of 187 countries and territories (UNDP 2013). The (2014) GDP was estimated by the World Bank at USD 13.89 billion (USD 5104/ capita). The major socioeconomic sectors in Jamaica are bauxite, tourism, agriculture, and manufacturing, with tourism and mining being the leading foreign exchange earners (UNFCCC 1994, 2011).

4. KEY NATIONAL STAKEHOLDERS AND THEIR NEEDS

A 2015-2016 survey of user climate information needs in the Caribbean captured responses from 20 sectoral users representing a range of sectors including agriculture, water, tourism, fisheries, environment, fire, planning and education. Six representatives from the agriculture, water and tourism sectors participated in stakeholder interviews, while one stakeholder from the media participated in focus group discussions convened in May 2016. Jamaica also benefitted from the convening of an Environment Canada supported In-Country Workshop to map provider capacity and user needs for climate services in December 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 climate information considerations into their professional decisions to inform day-to-day strategic planning in their organisations. One Water stakeholder reports a potential benefit stating that "climatic data can assist with the water abstraction license process", while agriculture stakeholders report that they commonly use "the drought outlook/bulletin to advise farmers on the necessary field practices to put in place to reduce the effect of… [climate] conditions on banana production." Practices include crop planting and preparation, as well as disease control and forecasting. Moreover, cropping schedules are prepared based on the precipitation outlook for rain fed crops. Other agriculture

stakeholders reported that they are "developing an early warning system for coffee leaf rust" based on climate information.

Some identified barriers to climate information use were:

- Spatial resolution: "what the Met service had initially was that they had their weather stations set up across the island but they were not necessarily in the agricultural production areas. So the information that you would get may not necessarily have been the best for a particular area…" (Agriculture stakeholder, Jamaica)

- JMS reluctance to share raw data: "…The relationship needs to be improved on their end…because, they are not very keen on sharing data…" (Water stakeholder, Jamaica)

Users called for new climate information applications such as a reliable forecast regarding the start of the rains for farmers, as well as, forecast delivery through text messaging systems. Sectoral stakeholders also suggested that a collaborative MOU be signed with the Met Service.

5. RANGE OF CLIMATE SERVICES

As of August 2015, the Jamaica Meteorological Service (JMS) reports that it is a Category 2 climate services provider offering a basic range of climate services and products, as well as, climate predictions (Table 3**Error! Reference source not found.**).

Table 3: JMS Climate Product Suite

Climate Products and Services	Source
Monthly rainfall summary	http://www.jamaicaclimate.net/rainfall-summary/december-rainfall-summary/
Monthly Drought Monitoring	http://www.jamaicaclimate.net/rainfall-summary/december-rainfall-summary/
Seasonal Precipitation and Temperature Outlooks	http://jamaicaclimate.net/seasonal-forecast.html
Drought Forecast	http://jamaicaclimate.net/drought-forecast-map.html
Monthly Climate Impact Newsletter	http://www.jamaicaclimate.net/climate-impact-newsletter/march-climate-impact-newsletter/
National Agro-Met/Farmers Bulletin	http://jamaicaclimate.net/farmers-bulletin.html

The JMS reports that it has been delivering climate information that is tailored, packaged and delivered to meet specific user needs for 1 to 3 years.

Category 2 organisations like the JMS also participate in climate forums, interact with end-users from different sectors, and gather feedback on the information that end-users provide. As such, the level of interaction between the JMS and users of climate information is reported to be high. The agriculture (e.g., farmers), and disaster risk management sectors, the general public, government officials (public sector) and the private sector currently interact with and benefit from climate services in Jamaica. Specific organisations with which the JMS interacts[1] are:

[1] 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,

- The Rural Agricultural Development Authority;
- The Jeffrey Town Farmers Association;
- The Coffee Industry Board of Jamaica;
- The Water Resources Authority;
- The Jamaica Gleaner; and
- The Jamaica Rural Economy and Ecosystems Adapting to Climate Change Project team.

Sectors identified by the JMS that could potentially benefit from climate services in the future are the health, tourism, energy and financial sectors.

o National Climate Outlook Forums has yet been convened in Jamaica.

JMS recommendations for improving its climate services capability include:

1. Improving options for two-way communication between users and providers;
2. Capacity building and training of technical staff in new and emerging products/applications, as well as, dissemination media;
3. Financial resources for a denser network of automatic weather stations;
4. More resources for calibration, spare parts, and routine maintenance of stations;
5. Investment in the collection of wider climate parameters; and
6. Dedicated resources (human and financial) and strategies for applied research.

References

United Nations Framework Convention on Climate Change (UNFCCC). 1994. Jamaica's Initial National Communication to the UNFCCC.

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

Web Sites

http://carogen.cimh.edu.bb/
http://rcc.cimh.edu.bb/
http://www.metservice.gov.jm/
http://www.jamaicaclimate.net/
http://data.worldbank.org/country/Jamaica

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.