

The Caribbean Regional Climate Outlook Forum (CariCOF) Dry Season 2016 Report

*St. Georges, Grenada
5-6 December 2016*

Introduction

Since 2012, the Caribbean Institute for Meteorology and Hydrology (CIMH) has been coordinating seasonal climate forecasting activities leading to a consistently growing body of Caribbean climate forecasters. The activities contribute to the monthly production of consensus-based seasonal climate outlooks, with engagement of the user community that allows awareness-building within sector communities that are sensitive to climate. During these sessions, users also get the opportunity to identify their climate information needs and how existing products can be interpreted to support decision-making. Equally important is the opportunity presented for meteorologists/climatologists and the user community to interface, and to build mutual understanding and trust.

In collaboration with hosts, The Grenada Meteorological Services, and our other partners - the World Meteorological Organization (WMO), the American People through the United States Agency for International Development (USAID), the Department of Environment and Climate Change Canada, the International Research Institute for Climate and Society (IRI) of Columbia University, and the University of Arizona, a training session for meteorologists and climatologists took place on December 1st to 3rd, prior to the forum on December 5th to 6th. This CariCOF focused on agriculture and food security, water, and health. Refer to [Appendix A](#) for a list of participants.

Opening Ceremony

The start of the 2016 Dry Season Caribbean Climate Outlook Forum (CariCOF) got on the way with an official start at the Rex Resort, Grenada. The key speaker for the opening ceremony was the Minister of Tourism and Aviation, the Honourable Dr. Clarice Modeste-Curwen. Minister Curwen emphasised

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the importance of such a meeting as the dangers of climate are seen regularly, especially in Grenada. She also noted that the response to climate change is not only increasing on a global and regional scale but also nationally. For the country of Grenada, the water sector is the most vulnerable although at times farmers experience livestock loss and decreased crop production. The Minister also stated that there is the need to better understand climate and climate variability for improved planning and the COF is heading in the right direction as it is providing information for all sectors and policy makers.

In his address, Mr. Hubert White, Head of the Grenada Meteorological Service expressed his anticipation for a fruitful deliberation and application of climate products to daily functions. He stated that weather is important and even more so during November and December as trough systems affect the Eastern Caribbean.

Dr. David Farrell, Principal of CIMH, thanked the Government of Grenada for hosting this year's Dry Season CariCOF as well as the donors of the operation. CariCOF is an extremely high mechanism for sectoral information and the better the predictions the better one would be able to plan. Dr. Farrell spoke on CIMH's journey to being designated as WMO's Regional Climate Centre (RCC) which came to reality in November 2016. He thanked the staff of CIMH and partners for making it a reality and looks forward to their continued support.

Presentations

Dry Season Climatology of the Caribbean and the 2015/16 Dry Season in Retrospect (Shontelle Stoute, CIMH)

The first presentation to the stakeholders gave an overview of the climatology of the dry season across the region as well as a review of the previous dry season (December 2015 through April 2016), as it is believed necessary that to interpret apply the forecasts appropriately an understanding of Caribbean Climate and being able to compare with what is "normal" is critical. The December to May dry season varies across territories; the dry season could start and end one month earlier in the north. The seasons in the Guianas and the ABC islands are markedly different. The Guianas has two

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distinct wet and dry seasons, whereas the ABC islands are dry for most of the year, only observing a wet period from October to January.

Mrs. Stoute informed the stakeholders of the triggers and characteristics of the region's dry season. The dry season is triggered by the southward migration of the inter-Tropical Convergent Zone (ITCZ) and sub-tropical high, which gives way to a more stable atmosphere and thus rain shower activity is reduced. The months of February, March and April mark the driest part of the season, with rainfall amounts for this period of about 150mm to 250mm across most of the region. With respect to temperatures, even though month to month variability is small, cooler temperatures are often experienced during the dry season.

The 2015 – 2016 dry season continued to be a challenging one for several territories as the region had already been facing drought conditions from the previous wet season and before (in some countries). Desalination use during this period of drought in Antigua and Barbuda exceeded 90 per cent. Impacts were felt across the region including, water rationing continued in Cuba; increased grass fires in Barbados; excessive heat killed chickens in Suriname; reduced crop yields in Haiti that led to inflation in food prices and reduced labour demand.

One very useful tool used to monitor the rainfall status across the region is the Standardized Precipitation Index (SPI), produced by the Caribbean Drought and Precipitation Monitoring Network ([CDPMN](#)). Monitoring can be done on time scales, for example, looking back at the last three, six or twelve months.

2016/17 Dry Season Forecast (Trisha Miller, Grenada Meteorological Service)

In presenting the 2016/17 dry season forecast Ms. Trisha Miller gave an overview of the weather conditions of the last few months – very hot during August to October; drought conditions continued (and in some territories returned); and wet spells across some parts of the region. Currently, La Nina conditions had been realized however it was weak and expected to dissipate throughout the dry season; and heat ceased to be a major concerning factor for most.

The dry season forecast indicates the likelihood of no drought concern for most territories, except for in the west where the Cayman Islands and parts Cuba of Cuba were recommended for drought warning for both short and long term drought. Other countries for which there were drought concerns during the upcoming dry

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season were Puerto Rico, Haiti and Belize. With respect to precipitation, most of the region is expected to observe normal to above normal conditions (except for Cuba and The Bahamas) during the first half of the season (December to February). Temperatures (also for the first half of the season) are expected to be above to normal. However, there is more uncertainty on what is likely in across most of the region for the March to May 2017 with respect to rainfall and temperature.

Discussion about Forecast:

- Alex Ifill (Barbados Water Authority, BWA) asked about the rating of the 2015/16 drought to rainfall.
 - Dr. Cedric van Meerbeeck (CIMH): close to 1 in 50 but similar in intensity to the 2009/10 drought. The 2015/16 drought was more regionally encompassing.
- Elizabeth Johnson (Inter-American Institute for Cooperation on Agriculture, IICA): If we are expecting a wetter season what are our water resources personnel doing to harvest this water?
 - Dr. David Farrell (CIMH): the information provided does not factor in the intensity of the rainfall, which is a critical factor in recharge. In Barbados the infrastructure is not present for rainfall harvesting but should be considered.
- Glendell DeSouza (Caribbean Meteorological Council, CMO): what is the interaction between CariCOF and the National Climate Outlook Forum (NCOF)?
 - Mr. Adrian Trotman (CIMH): A series of training with Trinidad and Tobago and they are now able to take the CariCOF products and downscale them to local scale.
- Glendal DeSouza (CMO): Given the expectation of increasing temperatures would heat stress be a focus of CariCOF?
 - Dr Meerbeeck (CIMH): the intended focus of this CariCOF is heat stress
- Derek Charles (IICA): how do we compare 2009/10 drought to 2014/16 in terms of severity, intensity and lessons learnt?
 - Dr. Meerbeeck (CIMH): the 2009/10 drought was more impactful even though shorter.
 - Mr. Trotman (CIMH): Drought events express themselves differently both in terms of severity and duration.
- Elizabeth Johnson (IICA): How is the distribution of the expected above normal rainfall?

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- Dr Meerbeeck (CIMH): There is also the inclusion of the wet days and wet spells outlooks which look closer at the season.
- Mervin Engeliste (Water Resources, St. Lucia): currently the John Compton Dam is two-thirds filled with silt. Resource personnel intended to work on de-silting but based on the forecast it looks to be wetter than last season.
 - Dr Meerbeeck (CIMH): even though we forecast above to normal the amount would not be as much as what was received in the September to November period, as we are now forecasting for the dry season.

Breakout Groups

Participants were placed into groups representing (i) agriculture, (ii) water; and (iii) a mixed group of health, tourism and disaster management. They were asked to consider the implications of the forecast and state what recommendations would be made for your sector. See [Appendix B](#) for a summary of presentations.

Excessive Heat – what is the climatological norm and what is on forecast? (Dr. Cedric Van Meerbeeck, CIMH)

There is indeed heat stress in the Caribbean and it can be measured – this was the message from climatologist Dr. Van Meerbeeck in his presentation to the stakeholders. Research has shown that temperatures in the region are on the rise as well as the frequency of warm days and nights (that is, days and nights above the 90th percentile). Global models are predicting a rise in temperature of about 1 to 5 degrees Celsius. Heat stress in the Caribbean brings with it the heat challenges of edema, rash, cramps, fainting, hyponatremia, exhaustion and stroke.

Towards developing a heat early warning system, climate information can be used to address the problem of heat. It would involve having a response plan in the event that a heat alert is triggered; knowing the vulnerabilities; as well as knowing the thresholds for which to trigger the alerts.

Dr. Van Meerbeeck then presented proposed 2-day and 7-day heat wave outlooks for the region (December 2016 to February 2017). These outlooks showed a very low chance of heat waves for the period. The implications of such a forecast could mean very limited excess morbidity or mortality due to heat stress in human populations or livestock, and much less discomfort related to very warm temperatures than in recent months.

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In going forward the next steps should be centred around (i) improving climatological data quality; (ii) collect morbidity/mortality data related to heat stress; (iii) incorporate lessons learnt from previous studies; (iv) study the relationship between heat and excess morbidity/mortality to make heat early warning triggering more effective; and (v) improve the format of the early warning / alert information.

Discussion for further development of heat products

- Glendell DeSouza (CMO) – have you looked into heat indices related to cities (that is, those in urban areas which would lead to morbidity)?
 - Dr. Meerbeeck (CIMH) – measuring urban heat affect would require having meteorological stations within the cities. There are currently no stations with enough data for a robust effect.
- Elizabeth Johnson (IICA) – any system that can give prior warning would help managers in decision making; especially where information can be given for consecutive days of excessive temperature (that is, the duration of the heat stress).
- Dr. David Farrell (CIMH) –
 - The information is informative for planning policies. Shorter range assessments are necessary.
 - Persons more vulnerable to heat stress do not have the luxuries as going to supermarkets or the mall.
 - Are we creating more problems by the construction practices of homes? Is it now possible to work with engineering personnel to incorporate mechanisms?

CariCOF Theatre

The 6th installment of CariCOF theatre entitled “Destination sun, sea, sand, and spice” demonstrated how climate products can be tailored for the tourism sector. Practical applications of the proposed Tourism Climatic Bulletin were illustrated including some fantasy to demonstrate potential benefits. The play was set in a hotel in Grenada where Dr. Climo and his wife were secretly conducting an assessment for climate smart hotel certification.

Multih-hazard Tournament

For the second time CariCOF has included a tournament to engage persons to think about ways in which they could manage and prepare for hazardous situations. The last tournament held was that of the 2015 Dry Season CariCOF where the focus was on drought; this season’s focus was multi-hazard in nature. Participants were divided into six teams, given a budget and were encouraged to be as innovated as possible to enhance the island of Jabilisa given its current state. Thus the players decided on management options and developed innovative techniques of mitigation and response to natural hazards.

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Caribbean Society for Agricultural Meteorology, CariSAM (Adrian Trotman and Shamar Ward, CIMH)

Mr. Adrian Trotman gave an overview of the Caribbean Society for Agricultural Meteorology (CariSAM) portal and Mr. Shamar Ward gave a brief demonstration to the stakeholders.

CariSAM is an online platform designed for meteorologists and climatologists in the region to engage with the agricultural society. It was reported that once the platform, which was launched in October 2016, became operational for one year the CariSAM will be eligible to become a member of the International Federation of Agro-Meteorological Societies (IFAMS). The intended functions of CariSAM include:

- An information and data center
- Discussion forum
- A source for tailored climate products
- Online training center
- Links to international networks
- Publication hub

The current Caribbean Agro-Meteorological Initiative (CAMI) bulletin is currently being revamped and will be one of the bulletins tested at this CariCOF, and would be renamed the Agro-Climatic bulletin of the CariSAM.

Early Warning Information Systems for Climate Timescales, EWISACTS – Status Update (Shelly-Ann Cox, CIMH)

Climate products produced are readily available for information purposes; however they are generic in nature. Thus a consortium, chaired by CIMH partnered by regional organisations from five climate sensitive sectors (with the energy sector anticipated to be added later) seeks to support the enhancement of climate products tailored to each sector. Currently the tourism sector (represented by the Caribbean Tourism Organisation (CTO) and the Caribbean Hotel and Tourism Association (CHTA)) along with the water sector (represented by the Caribbean Water and Wastewater Association (CWWA)) have signed a Letter of Agreement to officially cement their commitment to the Early Warning Information System for Climate Timescales (EWISACTS).

To date, EWISACTS has conceptualized a Caribbean approach to tailoring climate information products that considers heat stress and vector proliferation information for health, tourism influence of climate on tourist demand, and thermal heat index for poultry, and seasonal crop water and irrigation requirements for select crops that would support to the agriculture sector. It was also reported that a participatory approach known as

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PICSA (Participatory Integrated Climate Services Approach) would be piloted to in Guyana to enhance climate services in the agriculture sector.

One of the goals of the EWISACTS program is to produce three new sector specific bulletins (health, tourism and water) and one enhanced (agriculture) bulletin.

Following Ms. Cox's presentation stakeholders came together to critique draft bulletins as well as make suggestions for improvements.

Signing of the EWISACTs Letter of Agreement

One important aspect of this forum was the signing of the multi-sectoral Letter of Agreement (LoA) by the Caribbean Agricultural Research and Development Institute (CARDI) and the Caribbean Disaster Emergency Management Agency (CDEMA). These two are now officially part of a multi-sectoral partnership between climate-sensitive sectors and the regional climate services provider (CIMH) to build climate resilience through the provision and tailoring of early warning information. Also on board this partnership to co-design, co-develop and co-deliver sector-specific climate products and services are the Caribbean Tourism Organisation (CTO), the Caribbean Hotel and Tourism Association (CHTA), who signed on in September 2016, and the Caribbean Water and Wastewater Association (CWWA), who signed on in October 2016.

Social Science Improving Climate Services (Zackry Guido, University of Arizona)

In his presentation Dr. Zackry Guido outlined the characteristics of a climate service. A climate service is characterized by the timely production and delivery of useful climate data and knowledge for decision makers. It is also the transformation of climate-related data together with relevant information into customized products such as projections, economic analyses, assessments, best practices, and other services that may be of good use for society at large.

There are questions that must be addressed in creating an effective climate service which include:

- Needs assessment:
 - o What information is needed?
 - o At what time is the information needed and in what forms?
- Vulnerability assessment:
 - o What risks are people exposed to? What is their sensitivity, can they adapt?
 - o Who is more vulnerable and why?

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- Does the information contradict or support people's beliefs? It is important to understand people's perception of the information.
- Evaluation and Valuation:
 - What do people find useful or not and why?
 - Who benefited from the information and who did not?
 - What is the value of the information/service?

Assessment of Climate Change and Health Vulnerability and Adaptation in Grenada (Dr. Francis Martin, Ministry of Health, Grenada)

Grenada's climate change and health vulnerability assessment was funded by the German Society for International Cooperation (GIZ). The rationale behind the study was Grenada's vulnerability to climate change which affects the economy, human health and welfare and the economy's natural resources.

The assessment approach was both exploratory and qualitative. It involved literature review, conducting expert interviews, stakeholder workshops, vulnerability and risk analysis, and identification of adaptation options.

Results of Assessment

The direct impacts in health due to weather events and natural hazards were identified to be physical injury or death; heat stress and heat-related illness; loss of livelihoods, displacement, psychological trauma; water, sanitation and hygiene related issues; and food insecurity. Infectious diseases such as vector-borne, water-borne and rodent-borne were among the indirect health impacts due to rising temperatures and changing rainfall patterns. Chronic respiratory diseases and acute respiratory infections were identified as other indirect health impacts but due to air borne particulates from Saharan dust.

The adaptation needs identified in the health sector are listed below:

1. General Needs:
 - Conduct more research on the complex inter-relationship between climate, vector ecology, and human health
 - Link data on epidemiology of diseases with climate data (including historical climate data)
 - Evaluate effectiveness of vector control
 - Implement an electronic health information system for improved disease surveillance, monitoring and control

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- Implement a national information center (linked to relevant regional centers) containing detailed information on temporal, environmental and climatological data
- Solidify the institutionalized collaboration and cooperation at both inter-and intra-sectoral levels
- Strengthen the capacity of the Ministry of Health and Social Security for evidence-based planning and budgeting

2. Specific Needs:

- Direct effects (extreme weather events):
 - Disaster preparedness and mitigation
 - Disaster protection measures
 - Health infrastructure resilience
- Indirect effects (infectious diseases):
 - Early warning systems
 - Improved surveillance of diseases and vector populations
 - Integrated vector management

Outcomes of the Assessment

- Climate change aspects have been integrated into new health policies, plans and risk communication strategy
- Climate sensitive surveillance integrated into Grenada's National Action Plan as a priority program of action
- Health and Climate Change Action Plan 2016-2020 outlined
- Climate-resilient clinical waste management proposal drafted
- Grenada's climate and health activities presented at COP21 in Paris, 2015
- National workshop on linking epidemiological and climate data held in 2015, together with CARPHA (Caribbean Public Health Agency), PAHO (Pan-American Health Organization) and CIMH
- Proposal to implement the District Health Information System in Grenada as a new health information and surveillance system.

Recommended next steps:

- Drafting of Terms of Reference for an inter-sectoral and inter-ministerial climate and health working group (CHWG) who will lead all future climate and health related efforts
- Finalize the Health and Climate Change Action Plan with concrete adaptation actions
- Develop a National Climate Change and Health Strategy based on the outcomes of the study

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BRCCC PROGRAMME

Programme for Building Regional Climate Capacity in the Caribbean

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Climate Change Canada

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Changement climatique Canada



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- Strengthen disease surveillance and health information system
- Collect, prepare and digitize available health datasets, including case data on climate-sensitive diseases and vector populations
- Modify content in the health chapters of Grenada's Second National Communication to the United Nations Framework Convention on Climate Change
- Explore the opportunities for external funding for climate change and health related activities in Grenada.

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Appendix B: Break-Out Group Responses – Implications of the forecast and Recommendations

Agriculture

General Management Practices to prepare Agricultural sectors:

- All farmers should be managing drainage systems in all sectors which will reduce impact of flooding as well as facilitate run off of water to reduce humidity in fields thus reduce fungal and bacterial diseases.
- Municipalities maintaining repair of farm access roads as wetter conditions is resulting in landslides and municipal drainage systems.
- Repair and maintenance to on-farm rainwater harvesting systems.
- Use of berms and swales to manage the flow of water to crops. Slow it, spread it, sink it.
- Constantly monitor forecasts from Jan to make decisions for Mar-Apr-May

Implications and Recommendations for specific Agricultural sectors

Crops

- Protected agriculture - explosions of Botris diseases: cool nights and high humidity due to wetter days which cause flower drop and loss of yield. Heaviest tomato and pepper production.
- Need for IPM with fungicide application, timely application
- Affect on fruit tree set.
- Reduce cost of production for irrigation water as can use rain-fed
- Improve post-harvest practices for onions and potatoes where shelf-life is reduced by high humidity

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Livestock

- Farmers need to be alert for the potential of flash flooding.

Aquaculture

- Low temps will affect fish growth so covering ponds.

Agro Processing

- Lack of crops no processing

Apiculture

- Higher cost of honey due to lack of flowers. Artificial feeding of hives with sugar which could cause crystallization of honey. Long-term could include planting different plants flowering at different times. Fewer mites due to wet conditions which means more production of honey. Dry conditions increase mite populations.

Water

Recommendations from forecast:

- Detailed forecasts (for example a detailed forecast in the central area of St. Lucia by the John Compton Dam; erosion during heavy rains increases silting in the Dam)
- The use of the Martinique and Guadeloupe satellite Doppler radar to reference and calibrate rainfall data
- Understand the recharge rate in the dry season both temporally and spatially
- Downscale the regional climate forecasts
- Include a return period with forecasts

Mixed Group – Health, Tourism, Disaster Management

Tourism

Generally the implications will be:

- Fewer interruptions of outdoor activities – the dry season coincides with the high season. Fewer rainfall spells will result in fewer disruptions of outdoor activities.

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- Drier period increases pressure on water resources – less rainfall will mean a diminished water resource and will place pressure on those services that are water intensive – laundry services, pool maintenance, will increase energy usage in relation to the hotter temperatures.

Recommendations:

- Intensify the existing water conservation efforts within the hotel industry
- Train and educate staff
- Promote the use of green technology e.g. key cards etc.

Health

Implications:

- Increase in diarrhoeal diseases (cryptosporidiosis, e-coli, fecal)
- Increase in respiratory diseases – asthma, molds (with increase in moisture) and allergens (fungus and spores)
- Increase in vector borne diseases
- Increase in leptospirosis (especially if flooding occurs)
- Food safety issues with both flooding and hot temperatures
- Water quality issues – could have contaminant at water storage areas or catchment areas

Recommendations

- Continued public education
- Equip medical staff to deal with the outcomes mentioned above – this will include increased surveillance which will provide early warning and adequate response to health related emergencies/disasters.

Disaster management

Implications

- Negative: increase cases of flash flooding and landslides (should there be above normal rainfall and there are cases of flash flooding)
- Positive: with increased rainfall it will keep the soil saturated and therefore reduce the likelihood of bush fires.

Recommendations

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Grenada Meteorological Service



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- Increased monitoring of areas prone to flooding and landslides – this should be accompanied with proper documentation of events and mapping of the same
- Increased public education of the likely occurrence of the events – this should also be supported by targeted training for the first responder agencies who are also affected by these events in terms of personnel availability.

Co-host:



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