Rainy Season Predictors and Interpretation and Management

Workshop Report

June 15th - 19th 2010

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Contents

I. INTRODUCTION

The Rainy Season Predictors and Interpretation and Management Workshop took place at the offices of the Caribbean Institute for Meteorology and Hydrology from June 15th to 19th 2010.

The purpose of the workshop was to assist the National Meteorological and Hydrological Services (NMHS) of the ten Caribbean countries involved in this Action to develop predictors of the rainy season potential in different countries applicable to agriculture. CARDI also took part in this training. This training, which involves the proposed statistical approach, was conducted by Dr. Roger Stern of the Statistical Services Centre of the University of Reading, globally recognized for his statistical applications in climatology.

The training was focused heavily on hands-on training.

The full agenda is attached at **Annex 1**.

II. REPRESENTATION

Attendees included representatives from the National Meteorological Offices of the ten participating countries along with officers from the Ministries of Agriculture.

(See full list of attendees at **Annex 2)**.

III. WELCOME AND INTRODUCTION - Mr. Adrian Trotman – CIMH

The participants were welcomed to Barbados and CIMH by the CAMI Project Co-ordinator, Mr. Adrian Trotman. He emphasised the importance of the training and the translation of the training into meaningful, productive activity once the participants returned to their offices. Mr Trotman told the participants that it would be a very intense week of exercises. He also highlighted the importance of the Regional Climate Outlook Forum (RCOF) workshop in the second week, as being a crucial part of the outcome of CAMI. The RCOF meeting was being convened by CIMH, Caribbean Community Climate Change Centre (5Cs), the National Oceanic and Atmospheric Administration (NOAA), the US Geological Survey (USGS), the US Agency for International Development (USAID) and the International Research Institute for Climate and Society (IRI). The CAMI has collaborated on the RCOF since seasonal rainfall prediction for agriculture is one of the proposed areas of interest for CAMI and this was being dealt with under the RCOF workshop, so CAMI sponsored personnel for the rainfall analysis workshop stayed on for the workshop.

IV. FROM STRATEGIC PLAN TO IMPLEMENTATION – Mr. Adrian Trotman – CIMH

Mr. Trotman provided a background of the development of the CAMI through a strategic plan for agrometeorology. He indicated that CAMI was developed by CIMH and the World Meteorological Organzation (WMO) during a WMO/FAO (Food and Agricultural organization of the United Nations) Seminar on the Application of Climate Data for Desertification Control, Drought Preparedness and Management of Sustainable Agriculture in the Caribbean Region held in 2004 in Antigua. CAMI was presented as one of the three initiatives satisfying the CIMH Strategic Plan for Agrometeorology, the other two being the Caribbean Drought and Precipitation Monitoring Network and the Caribbean Agrometeorology Network.

Mr. Trotman emphasised the overarching object of the CAMI, which is:

To increase and sustain agricultural productivity at the farm level in the Caribbean region through improved applications of weather and climate information using an integrated and coordinated approach.

The partners of this EU funded project include CIMH (the applicant), WMO, the Caribbean Agricultural Research and Development Institute (CARDI) and the governments of ten Caribbean Meteorological Organisation (CMO) territories (Antigua and Barbuda, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, St. Lucia, St. Vincent and the Grenadines and Trinidad and Tobago,) as represented by their Meteorological and Hydrological Services. The project runs for three years until November 2012.

Mr. Trotman proceeded to highlight the specific activities within the project for the next three years:

- Development of predictors of the rainy season potential characteristics through analysis of long-term climatic data and use of seasonal to inter-annual climate prediction models.
- Interpretation of the climate predictor and near-real time weather information to support management decisions, especially irrigation scheduling.
- Working with the agricultural research and extension agencies in developing an effective pest and disease forecasting system.
- Preparation and wide diffusion of a user-friendly weather and climate information newsletter for the farming community.
- Organization of regular forums with the farming community and agricultural extension agencies to promote a better understanding of the applications of weather and climate information.
- Building capacity of the Meteorological and Agricultural Services and research institutions.
- Data Rescue.

To facilitate the expected outputs, the approach towards achieving these outputs including working toward the overarching goal; was outlined. This included:

- Training workshops for National Met Service and Agricultural Extension Service Personnel.

- Attachments to the region of experts on (i) DSS for pest management (ii) Crop-weather models and Irrigation Models.
- Attachment of CIMH and CARDI staff at international research institutes (mainly to finish/improve upon work begun at regional training workshop).
- Publication and Dissemination of Agromet Bulletins and other forms of weather and climatic information for farming and wider agricultural communities.

Some of the expected outcomes from CAMI as outlined by Mr. Trotman include:

- Improved ability of policy makers and extension agencies in exploiting the rainy season potential fully through strategic decisions and better preparedness strategies.
- Better informed farming community regarding the climate situation before and during the crop growing season.
- Improved capabilities in the farming community to make strategic and tactical decisions for soil and crop management and more efficient irrigation scheduling.
- Conservation-effective soil and crop management practices to reduce land degradation and improved long-term crop productivity.
- Greater farm incomes for small farmers due to improved crop quality and reduced use of insecticides through more effective pest and disease management.
- Enhanced incomes at the farm level for the small farmer through better applications of weather and climate information in soil and crop management.
- Enhanced linkages between meteorological services and agricultural research and extension agencies.
- Enhanced capacity of the farming community to understand and apply weather and climate information in their operational decisions.
- Enhanced capacity of Meteorological and Agricultural Services, CARDI and CIMH to perform the tasks relevant to the goals of the action.
- Increased interactions between the meteorological services, agricultural extension agencies and the farming community, resulting in the provision of better services to farmers.
- Availability of regular feedback to the meteorological services on the nature of services and products needed by farmers, resulting in the preparation of user-friendly products from the meteorological services.

V. INTRODUCTION TO STATISTICAL PROGRAMS - Dr. Roger Stern – University of Reading

Dr. Stern noted that before delving into the statistical programs, it was necessary to first determine what products can be developed to satisfy the needs of the user.

What are the questions the user would ask?

- When will/ do we have rain?
- How intense will the dry season be?
- How is rainfall distributed?
- How much rain is likely over a particular period?
- Where can we obtain agrometeorological information and at what cost?
- What are the most likely daily max & min temperatures (for climate change applications)
- What time of year is best for planting?
- What is the dependable rainfall during the dry season?

Dr. Roger Stern presented the data to be used. He emphasized the importance of making sure the data is correct and thoroughly checked for quality. He insisted there is nothing worse than having poor quality data. Dr. Stern also presented statistical programs which could be used to provide products for the end user. The tools to be used included CAST (Computer Assisted Statistical Textbooks), InStat and GenStat. The statistical program InStat can be used to answer some of the previously mentioned questions such as: when will/ do we have rain; how intense will the dry season be (dry spells), whereas, the GenStat program would be able to analyze temperatures and show trends.

CAST is a Computer Assisted Statistics Textbook with some design for climatic analysis. It is an electronic book with dynamic graphs and interactive exercises. CAST can be very useful in teaching and learning statistics.

InStat is a general, interactive statistics package developed by the Statistics Services Centre, University of Reading, UK. This package has a wide range of facilities - some of which include good data manipulation, descriptive statistics, plotting and simple and linear regression. The climatic guide of the InStat package is used by Meteorological Services in many countries, particularly for agro-climatic analyses. Within this type of analysis one can determine the start of rains, extreme events, spells (wet or dry) and evaporation of a particular location, amongst others.

GenStat is a very powerful statistics package also developed by VSN International Ltd. of Hempstead, UK. Like InStat, this package allows you to summarize, display and analyze data and is used for agricultural research. Despite the similarities between the two, GenStat is the more statistically advanced package.

Day 2

Introduction to InStat

The role of InStat and its link with the project

The aim of the project is to provide a tailored product which can provide information to be used by the farming community. This package would be able to provide information such as the start of rains and spells (wet and dry). The climatic menu of the InStat program is able to provide this information for these events for a specific location.

Practical Session

- Statistical analysis of rainfall (monthly summaries, start of rains and spells)

VI. GROUP DISCUSSION: What are the concerns of the met personnel?

A discussion ensued on the concerns of Meteorological Services in the Caribbean with respect to providing information for the agricultural community.

- There needs to be a lot of collaboration between met personnel and extension officers so that they can be useful.
- What analyses are being done by the extension officers/ farming community?
- What is the definition of drought for non-meteorological personnel
- How can partnerships with the meteorological service be established?
- There is a need for an understanding of what affects our climate (e.g. ENSO, NAO etc) and also that forecasters be more open about their skill (i.e. accuracy of forecasts).
- It is suggested that the means of communication (between met personnel and user) be based on risks. For example - if there is a 20% chance that there would be a dry spell lasting 10 days or more in June, rather than tell the farmer that there is a 20% risk, tell him that he has a 1 in 5 chance if he plants during that time.

Day 3

Introduction to GenStat

- The role of GenStat and its link with the project

GenStat is able to perform climatic analysis that can detect trends in data, therefore making it useful for climate change studies. A regression analysis can determine whether temperature tends to be on the increase.

Practical session

- Evidence of temperature change (i.e. determining whether there is an increase in the minimum temperatures)

Day 4

Presentations to the agricultural personnel by the meteorological service

For the final 1½ days, meteorologist and CARDI personnel were joined by extension officers from the CAMI countries. Unfortunately, due to a strike by a regional airline three potential participants were unable to make it to the training workshop. The Extension Officers were there to see the type of products possible for the farmers they serve, as well as to discuss rainfall products needed by the farming community.

Presentations of the work done and the potential work were made to the extension officers. These presentations provided information to the agricultural personnel regarding products which can be obtained via the statistical programs. These products would answer questions that agricultural personnel would ask:

- When will rains start?
- What is the longest dry spell during the planting season?
- What is the best time to begin planting?
- Are there trends in rainfall and temperature?

VII. COLLABORATION BETWEEN METEOROLOGICAL SERVICE PERSONNEL AND EXTENSION OFFICERS

Participants were divided into smaller working groups in order to discuss the needs of the farmers as from the eyes of the extension officers that serve them. It allowed for the

meteorological services personnel to hear these needs and for the extension officers to understand what can be provided within the limitations of the meteorological services.

Discussion points included:

Discussions between the Meteorological Service personnel and the Extension Officers highlighted:

- The main crop(s) grown in the various countries
- What the Met Service currently provides to the farming community and also what products/ services they can provide in the future.
- What information the farming community can provide to the Met Service that can be useful as well as what information they need from the Met Service.
- Future plans/the way forward

GROUP PRESENTATIONS

Group 1. Dale Destin (Antigua), Brent Georges (Antigua), Anthony Moore (CIMH)

- It was noted that there are other persons collecting data that the Meteorological Service is unaware of. There is a need for collaboration between the meteorological and agricultural services.

Products/information needed from meteorological services

- Precipitation and temperature outlooks (monthly and seasonally; some work is being done on monthly precipitation and temperature)
- Explore possibility of 7-10 day forecasts (current forecast is 4 days)
- Analysis of rainy days (dry spells and time to plant)
- Develop pest outbreak alerts with collaboration between meteorology and agriculture
- Creation of model similar to Mac Donalds Almanac: regarding possible “best days” to plant

- Issuing drought and precipitation statements as well as temperature trends.

The key to the success of these products would be to visit farmers and train extension officers in data collection. There should be more collaboration between the meteorological services and farmers and other partners in establishment of meteorological stations.

Group 2. Jacqueline Spence (Jamaica), Winston Shaw (Jamaica), Arlene Aaron (Trinidad &Tobago)

Objectives:

- Crop calendar

  There are 21 rain stations across the island, however, this is inadequate. A 30 year mean rainfall will be needed to develop a crop calendar.

Information needed from meteorological services:

- Average daily rainfall
- Dry and wet spell forecasts for irrigation and drainage
- Mapped image of analyses for entire country showing rainfall patterns and expectations

Information needed from agriculture:

- Crop water requirements
- Location of production areas
- Traditional crop season

Problems identified and possible solutions:

- Drought
  - Predicting drought / dry spells. This knowledge would enhance agricultural practices and influence the type of crops to plant.
- Wet spells
  - Knowledge would help to improve drainage and control pests

The way forward

- Integrating farmers into the community

- Establish an effective method of communicating information
- Collaboration of stakeholders should be maintained

Group 3. David Robertson (Grenada), Antonio Joyette (St. Vincent) and Cephus Toney (St. Vincent)

Information needed from meteorological services:

- Rainfall, temperature and wind analyses
- Start of rains
- Rainfall distribution and intensity over short periods
- Length of dry spells
- Wind direction and speeds (1 week)
- Temperature outlook (weekly/monthly)

Future plans

- Share experiences, knowledge and build capacity
- Raise awareness
- Pursue initiatives to foster data sharing and productive development

Group 4. Sheryl Etienne-LeBlanc (Dominica) and Clem Williams (Barbados)

Information needed from meteorological service

- Rainfall probabilities
- Temperature forecasts
- Wind (direction and speed)
- Seasonal outlooks
- Extremes (ENSO, droughts, floods)
- Seasonal outlook

- Forecast probabilities for planting and harvesting
- 5-7 day dry spell
- *Crop calendar*

Way forward

- Meteorological service to generate products using current data
- Meteorologcal services personnel to be encouraged to take the e-course in Statistics in Applied Climatology

Group 5. Carshena Gordon (Guyana), Lisa Kirton-Reed (CIMH), Lisa Agard (CIMH)

- Main crops in Guyana are sugar and rice

Products to be developed by meteorological service:

- Rainfall totals; no. of rain days
- Dry spells
- Evaporation

Way forward

- Possibility of conference with persons from farming community

Dissemination of meteorological information via;

- Weather bulletins
- TV programs
- Outreach programs
- Meeting with farming reps.

Group 6. Gary Ramirez (Belize), Venantius Descartes (St. Lucia) and Shontelle Stoute (CIMH)

Services provided to agriculture

Daily data is provided to the Engineering Division of the Ministry of Agriculture of St. Lucia on a monthly basis. All other data dissemination is done on upon request.

Services needed from meteorological service:

- Rainfall data analysis (Dry spells, First rain, Risk statements)
- Weather outlook (already on-going)
- Drought forecasting

The way forward:

- An expansion in the quantity and strategic location of weather stations
- Knowledge sharing
- Data organization and analysis
- Meetings/forums with extension officers and farmers
- Offer to assist Agriculture in providing tailored products to assist in deciding best planting times
- Development of a working group.

Day 5

Plenary Discussion of Analyses by Country

Participants made presentations providing information as a result of the collaboration between meteorological service personnel and agricultural extension officers on the previous day. The agricultural personnel made the presentations highlighting the main crop(s) grown in their country, the information which needs to be shared among the two entities as well as the way forward. The presentations that summarized the smaller groups discussions highlighted the following:

Information needed from met services

- Rainfall analysis
    - Average daily rainfall
    - Start of rains
    - Rainfall distribution and intensity over short periods
    - Length of dry spells

    - Dry and wet spell forecasts for irrigation and drainage
    - Mapped image of analyses for entire country showing rainfall patterns and expectations
    - Drought forecasting
- Temperature analysis
    - Temperature outlook (weekly/monthly)
- Wind analysis
    - Wind direction and speeds (weekly)
- Risk statements

Information needed from agricultural services:

- Crop water requirements
- Location of production areas
- Traditional crop season

The way forward

- Create a forum of exchange of information between the two stakeholders. This can be achieved by visits to farms by meteorological officials and training of extension officers/ farmers in data collection.
- Provide assistance to agriculture in providing tailored products to assist in deciding best planting times.
- Raise awareness
    - Sensitize farmers and extension officers as to potential use of meteorological information in their daily operations
- Determine a communication channel for distributing and interpreting information.
- Set up a national/ regional discussion board/ forum.

VIII. ANNEXES

ANNEX 1

Agenda

Tuesday 15 June

Session 1	**9:00 – 10:30 am**
Welcome	Adrian Trotman
Introduction to CAMI the Project	Adrian Trotman
Introduction of the participants	Adrian Trotman
The general objectives	Roger Stern
Break	**10:30 – 10:45 am**
Session 2	**10:45 am – 12:15 pm**
Introduction to the data	
Skills and tools (CAST, Instat, Genstat,)	
The specific aims	
Discussion – "Questions farmers Ask"	
Lunch	**12:15 – 1:15 pm**
Session 3	**1:15 – 5:00**
Completion of topics from Session 2	
Importing and preparing the data (INSTAT/GENSTAT)	
Basic Statistical Approaches (exploration and risks)	

Wednesday 16 June

Session 4	**9:00 – 10:30 am**
Statistics in Agrometeorology	
Break	**10:30 – 10:45 am**
Session 5	**10:45 – 12:15**
Rainfall Analysis	
Lunch	**12:15 – 1:15 pm**
Session 6	**1:15 – 5:00 pm**
Statistics in Agrometeorology	
Rainfall Analysis	

Preparing a draft report

Thursday 17 June

Session 7 **9:00 – 10:30 am**
Discussion Information requirements of the Farming Community
Tailoring the product for the farmer

Break **10:30 – 10:45 am**
Tailoring the product for the farmer

Session 8 **10:45 – 12:15**
Tailoring the product for the farmer

Lunch **12:15 – 1:15 pm**

Session 9 **1:15 – 5:00 pm**
Preparing a Report
Climate Change reflected in rainfall and temperature records
Presentation prepared for the new participants

Friday 18 June

Session 10 **9:00 – 10:30 am**
Welcome Adrian Trotman
Introduction to CAMI the Project Adrian Trotman
Introduction of new participants Adrian Trotman
The general objectives Roger Stern
Issues and responses to farmers issues (workshop approach thus far)

Break **10:30 – 10:45 am**

Session 11 **10:45 – 12:15**
Breakout Groups
Presentation of work thus far to agriculturists
Discussion (routine and tailored products)
Discussion (what is needed)

Lunch **12:15 – 1:15 pm**

Session 12 **1:15 – 5:00 pm**
Analyses (based on discussions in Session 11)

Saturday 19 June

Session 13	**9:00 – 10:30 am**
Plenary presentation of analyses (by country)	
Break	**10:30 – 10:45 am**
Session 13	**10:45 – 12:30**
Plenary presentation of analyses (by country)	
The Way Forward	
Adjournment of Workshop	

ANNEX 2

LIST OF ATTENDEES

	LAST NAME	FIRST NAME	ORGANIZATION	CONTACT INFORMATION	COUNTRY
METEOROLOGICAL OFFICES					
1	Aaron	Arlene	Trinidad & Tobago Meteorological Services	arleneaaron@gmail.com/ dirmet@tstt.net.tt	Trinidad & Tobago
2	Descartes	Venantius	St. Lucia Meteorological Services	vdescartes@yahoo.com	St. Lucia
3	Destin	Dale	Antigua and Barbuda Meteorological Services	dale_destin@yahoo.com	Antigua
4	Etienne-LeBlanc	Sheryl	Dominica Meteorological Services	sheryl8568@hotmail.com/ met office@cwdom.dm	Dominica
5	Gordon	Carshena	Hydrometeorological Services of Guyana	carshenagordon18@yahoo.com	Guyana
6	Joyette	Antonio	Ministry of National Security	meteorart@yahoo.com	St. Vincent
7	Williams	Clem	Barbados Meteorological Office	cwilliams@barbados.gov.bb	Barbados
8	Robertson	David	Grenada Airport Authority	salaam77@hotmail.com	Grenada
9	Simpson	Leslie	CARDI	leslieasimpson2000@yahoo.co.uk	Jamaica
10	Spence	Jacqueline	Meteorological Service Jamaica	jamspence21@gmail.com	Jamaica
11	Stern	Roger	University of Reading		UK
AGRICULTURE MINISTRIES					
12	Georges	Brent		trini.brent@gmail.com	Antigua
13	Ramirez	Gary	Ministry of Agriculture	garyramirez_bz@hotmail.com	Belize
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