

## **GUYANA TRAINING WORKSHOP**

A Training Workshop devoted to the use of biophysical models in climate change impact assessments on agriculture was held at the University of Guyana, Georgetown, Guyana during the period January 30<sup>th</sup> – February 9<sup>th</sup>, 2007. This Workshop was as a result of collaborative efforts between the Caribbean Community Climate Change Centre (CCCCC) in Belmopan, Belize and the Camagüey Meteorological Centre from the Cuban Institute of Meteorology (CIM) in Havana, Cuba.

This Workshop was made possible with funding provided by the CCCCC's Mainstreaming Adaptation to Climate Change Project (MACC), in close partnership with the Ministry of Agriculture's Hydro-Meteorological Service. It was attended by the Guyana Sugar Company (GUYSUCO), National Agriculture Research Institute (NARI), Institute for Applied Sciences and Technology (IAST), University of Guyana's Faculty of Agriculture and Forestry, Hydro-Meteorological Service, Guyana Citizens' Initiative and other relevant Guyanese institutions. The workshop was officially opened by the Permanent Secretary in the Ministry of Agriculture on behalf of the Minister of Agriculture Honorable Robert Persuad.

This training effort devoted to the development of national capacity building was preceded by three previous workshops that were held in Belize, Havana and Kingston during the second half of 2006 in which joint climate change scenarios built by using the Hadley Centre Regional Climate Model PRECIS were presented to the Caribbean community.

Although the Workshop had as its main objective the training of specialists in the use of modern tools for Vulnerability and Adaptation to Climate Change in the field of agriculture, subjects addressed also included forests and natural ecosystems, water resources, livestock, integrated assessments and operational agrometeorology dealing with climate variability and related topics.

Participants at the workshop, including regional and national stakeholders, agreed that the work done in Guyana may be considered as part of a larger continuing regional effort to increase capabilities and preparedness of Caribbean countries to face an increasing frequency of extreme meteorological events such as droughts, hurricanes and flooding associated with intense precipitation events as well as rising sea levels at the regional level. In recent years and particularly since the beginning of this new century, such adverse meteorological and climate conditions had resulted in significant damages in this part of the world which has seriously affected national food security and farmers' livelihood as well as the region's economic development.

Roger E. Rivero Vega

INSAM Cuban correspondent

# **MAINSTREAMING ADAPTATION TO CLIMATE CHANGE PROJECT (MACC)**

## **CCCCC/INSMET TRAINING WORKSHOP**

### **BIOPHYSICAL MODELS AND CLIMATE CHANGE IMPACT ASSESSMENT ON AGRICULTURE**

**University of Guyana, Georgetown, Guyana  
January 30 to February 9<sup>th</sup>, 2007**

#### **WORKSHOP PROGRAM**

##### **Tuesday January 30**

###### **Morning Session: 8:00 - 12:00:**

1. Opening
2. Presentation of the workshop and objectives to be attained
3. General outlook of assessments procedures in agriculture and forests, including livestock
4. Climate change scenarios. Recommended procedures
5. The use of climatic and bioclimatic indexes
6. Simulation models

###### **Afternoon Session: 13:00 - 17:00**

1. Preliminary climate change scenarios for Guyana
2. The radiation and energy balances
3. The simple water balance equation
4. Discussion

##### **Wednesday January 31**

###### **Morning Session: 8:00 - 12:00**

1. Preliminary assessment of water resources for Guyana
2. Representative climatic and bioclimatic indexes for Guyana in actual climate
3. Representative future climatic and bioclimatic indexes for Guyana
4. Terrestrial Ecosystems Impact Model. Preliminary results for Guyana

###### **Afternoon Session: 13:00 - 17:00**

1. Practical exercises
2. Presentations by participants

##### **Thursday February 1**

###### **Morning Session: 8:00 - 12:00**

1. Agriculture: The meaning of potential and water limited yields
2. Discussion of main physiological processes simulated in biophysical models for the estimation of potential yield
  - Growth and development. Phenological processes. Duration of phenological stages and its dependence of daylength and temperature.

- Gross photosynthesis. Photosynthesis intensity and its relationship with photosynthetic pathway of crops ( $C_3$  and  $C_4$ ), available photosynthetic radiation intensity, temperature and atmospheric  $CO_2$  concentration.
- Respiration rate. Its relationship with type of crop, temperature and phenological stage.
- Biomass balance equation. Net photosynthesis.
- Distribution of daily new generated biomass among different plant organs. Its relationship with phenological stage. Harvest Index. Logistic equations.

**Afternoon Session: 13:00 - 17:00**

1. FAO Agro-ecological Zones Model
2. Theoretical basis of the model. Accompanying Tables
3. Practical model exercises

**Friday February 2**

**Morning Session: 8:00 - 12:00**

1. Water availability in soils and its relationships with irrigated and rain-fed crop yields
2. Potential and actual evapotranspiration. Estimation methods
3. Soil water balance. Calculation procedures
4. Calculation of irrigated and rain-fed yields
  - Method of Doorenbos y Kassam (FAO)
  - Other available methods

**Afternoon Session: 13:00 - 17:00**

1. Calculation of potential evapotranspiration
  - Temperature based and other simple methods
  - Modified Penman method (FAO)
  - Penman-Monteith method
2. Estimation of terms in the water balance equation
  - Thornthwaite – Mather method
  - Budyko-Sellers method
  - Other methods
3. Practical exercises in the estimation of irrigated and rain-fed yields

**Monday February 5**

**Morning Session: 8:00 - 12:00**

1. Discussion of yesterday sessions
2. Theoretical basis and structure of the WOFOST dynamical crop model (both versions). General description of files.
3. Preparation of climatic data needed for running WOFOST model. CLIM41 data file.
4. Crop specific data used by WOFOST model. CROP41 data file
5. Soil hydro-physical parameters. SOIL41 data file
6. Calculation of crop potential yields
7. Calculation of crop water limited yields with or without groundwater. REALRD data file for daily precipitation data and for taking into account irrigation procedures
8. Crop yields limited by nutrients availability

**Afternoon Session: 13:00 - 17:00**

1. Introduction to the use of the model: WOFOST 4.1 and WOFOST 7.1.2
2. Practical exercises in calculation of crop potential yields
3. Practical exercises in calculation of water limited yields
4. Practical exercises in calculation of crop yields limited by nutrient availability
5. Adaptation of climate, crops and soil data files for sites, cultivars and soils not included by default in the original version of the model

## **Tuesday February 6**

### **Morning Session: 8:00 - 12:00**

1. Presentation and general discussion of the Decision Support System for Agro-technology Transfer (DSSAT)
2. Crops models included in different versions of the DSSAT system. Their evolution through time
3. DSSAT User's Manual

### **Afternoon Session: 13:00 - 17:00**

1. Presentation of the DSSAT system. External management of the system
2. Experimental simulation for crops and models included in the system
3. Interpretation of results and output files
4. Practical exercises

## **Wednesday February 7**

### **Morning Session: 8:00 - 12:00**

1. Discussion of yesterday sessions
2. Creation of agricultural experiments to be used in simulations with the DSSAT system
3. Creation of meteorological data files for DSSAT system
4. Seasonal and sequential options to be used with experimental data files

### **Afternoon Session: 13:00 - 17:00**

1. Practical exercises in the creation of meteorological data files for sites not included by default
2. Practical exercise in experiment design
3. Analysis of outputs and discussion of results obtained by workshop participants

## **Thursday February 8**

1. Vulnerability of livestock
2. Pastures and supplementary feeding
3. Bioclimatic indexes. The THI index
4. Expected impact of THI index on livestock

### **Afternoon Session: 13:00 - 17:00**

1. Practical exercises in supplementary feeding assessment in future climate conditions
2. Practical exercises in expected THI behavior during the 21<sup>st</sup> century

## **Friday February 9**

### **Morning Session: 8:00 - 12:00**

1. Integrated water resources / agriculture impact assessments
2. The MIIA 2.0 model
3. Practical examples calculations

### **Afternoon Session: 13:00 - 17:00**

This last session was planned as free for workshop concluding activities

