



Caribbean: Planning for Adaptation to Global Climate Change (CPACC)

***J. Lee Chapin, Regional Network Advisor (chapin_1@msn.com)
Organization of American States
Unit for Sustainable Development & Environment***

Origin

At the Global Conference on Sustainable Development of Small Island Developing States (SIDS, 1994), CARICOM countries approached the OAS for assistance with potential impacts of climate change.

The OAS with own resources and resources from the GEF Project Development Facility supported project preparation.

Legal Framework

UN Framework Convention on Climate Change (UNFCCC, 1991) was established for responding to global climate change. Within it, are three stages for climate change adaptation:

1. Planning, studying possible impacts, capacity building and policy options (enabling activity). CPACC is a Stage 1 project.
2. Measures for further capacity building to prepare for adaptation (enabling activity).
3. Measures to facilitate adaptation.

All CARICOM countries have signed the UNFCCC. The Global Environment Facility (GEF) is the interim financial mechanism to meet agreed costs.

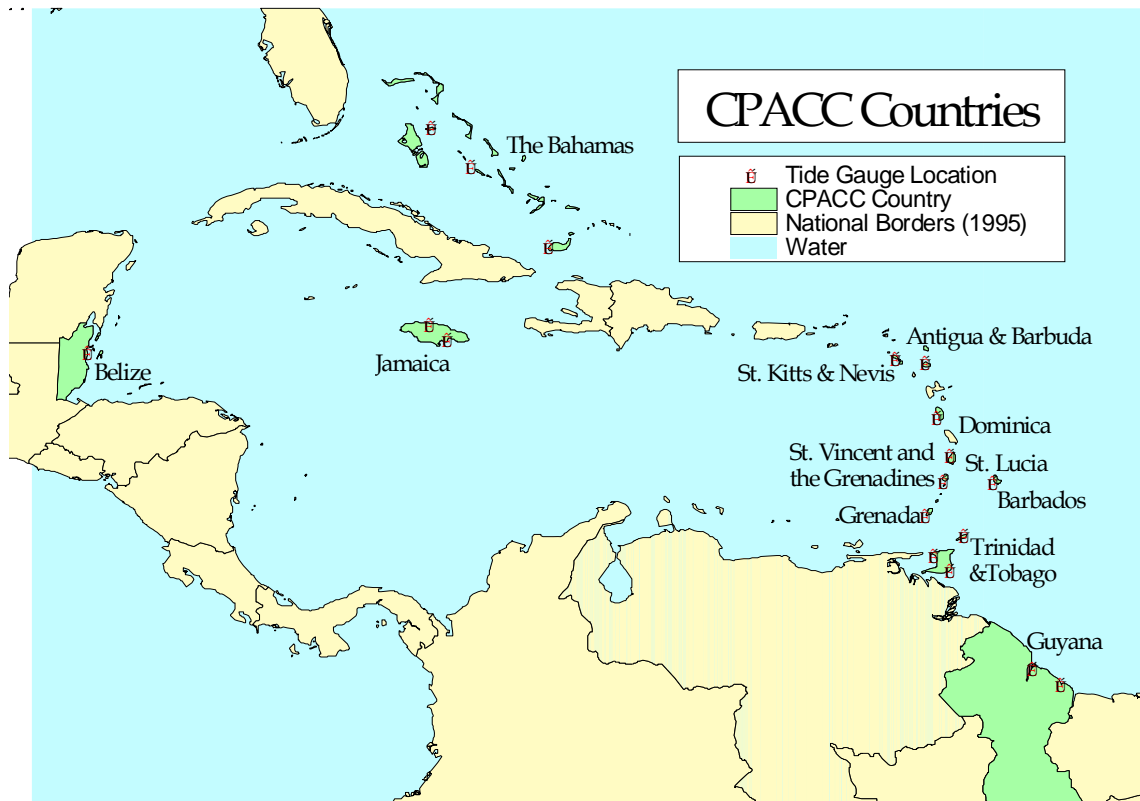
Preparatory Process

At the request of CARICOM, the OAS applied for and received a GEF Project Development Facility (PDF) Grant in August of 1995. The OAS then undertook Regional Consultation Workshops in; Barbados, Sept. 1995, Dominica, January 1996 and St. Kitts, May 1996. Intensive consultations were carried out in each participating country between Oct. 95 and February 96. The participating institutions were; CARICOM, the University of the West Indies, Caribbean Meteorological Institute, Institute of Marine Affairs, OECS-NRMU, The World Bank, Caribbean Development Bank, IOCARIBE, US NOAA, UNDP & UNEP/CEP.

CPACC: Objective

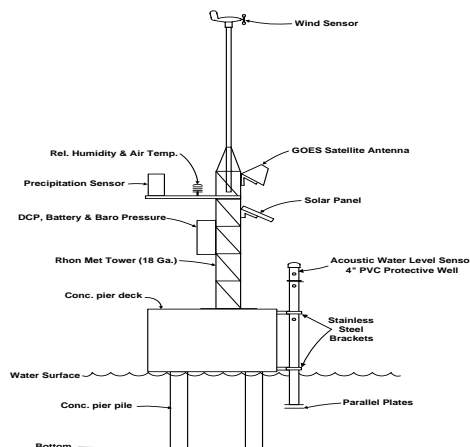
To support Caribbean countries, following a regional approach, in preparing to cope with the adverse effects of global climate change, particularly sea level rise, in coastal and marine areas through vulnerability assessment, adaptation planning, and capacity building in 12 Participating Countries;

Antigua & Barbuda, Dominica, St. Kitts & Nevis, The Bahamas, Grenada, St. Lucia, Barbados, Guyana, St. Vincent and the Grenadines, Belize, Jamaica and the Republic of Trinidad & Tobago.



CPACC – Component #1 - The Design & Establishment of Regional Sea-Level/Climate Monitoring Network

The initial activity was the establishment of a regional office in Barbados at the Caribbean Institute of Meteorological & Hydrology (CIMH) and conducting a workshop for all of the national technical officers, in spring of 1997. The second activity was a reconnaissance visit to each country, during which all participating ministries were consulted with and potential monitoring sites were visited. At the culmination of each country visit, sites were selected based on historic tidal observations, present suitability of the facility and the informational needs of the country. Prior to departing each country, detailed site designs were presented to the national coordinating office, for their approval, completed in 1997.



Procurement of Component #1 System

Following the completion of the reconnaissance phase, the equipment was selected following the criteria of the U.S. National Ocean Service/NOAA, who was a participating partner in this project. The procurement was awarded to Vitel, Inc. of Chantilly, Virginia, who manufactured the basic data collection platform and communications package. All equipment items are “off-the-shelf” and the system is totally automatic, battery (12v) powered with solar recharging. The communication of the data is via the U.S. NOAA satellite referred to as GOES “East”. Twenty identical systems were procured with the following sensors;

<u>Sensor</u>	<u>Manufacturer</u>	<u>Model/Type</u>
Data Collection Platform	Vitel	VX1100
Sea-level	Bartex	Air Acoustic, 3100
Sea Surface Temperature	YSI	Thermistor
Wind	RM Young	Wind Monitor, 05103
Barometric Pressure	RM Young	Atmospheric, 61201
Precipitation	Jarek	Tipping Bucket
Relative Humidity	Vaisala	Humicap, HMP45A
Air Temperature	Vaisala	Thermistor, HMP45A

The individual systems, as originally procured, delivered to the country, were approximately \$20K each. The two regional institutions, the Caribbean Meteorological Institute (CMI), in Barbados and the Regional Archiving Center (RAC) at the University of the West Indies, St. Augustine campus in Trinidad (UWI) were each provided equipment to support their CPACC activities. The CMI was provided equipment to check the operation and calibration of the sensors; RM Young wind test set, Bartex acoustic sensor calibration system, AIR Barometric Pressure Digital Unit, Jarek Tipping Bucket calibration test unit, a calibration computer, an office computer (record keeping) and an internet data archiving computer. In addition to the test equipment, a complete set of spare sensors was provided to CIMH to support the entire network. Total delivered cost was approximately \$39K. The RAC-UWI was provided a Direct Readout Ground Station (DRGS) for receiving the GOES satellite transmitted data, an office computer (record keeping) and an internet data archiving computer. Total delivered cost was approximately \$55K.

Installation & Training

During 1998 eighteen stations were installed in twelve countries. Each country received at least one system. The national agencies, Meteorology and Survey Offices provided technicians for the installations. The participants in each installation were; national technicians; J. Lee Chapin, Regional Network Advisor, OAS; Ron Leslie, Regional Network Coordinator, CIMH. Detailed “hands on” training was provided to all national technicians. Each country was provided with a palmtop computer for interfacing with the field units, a national office computer for record keeping and internet access, and an internet computer for technician communications with the RNC and RAC offices.

All stations were tested after installation was completed and enabled for GOES communications. The sea-level sensors were surveyed by differential leveling to at least three benchmarks and the initial “datum offset” was established as 10.000 meters. The national survey office personnel received training on the proper methods

for leveling the sea-level sensor and the local benchmark network. The national personnel will accomplish the annual differential leveling.

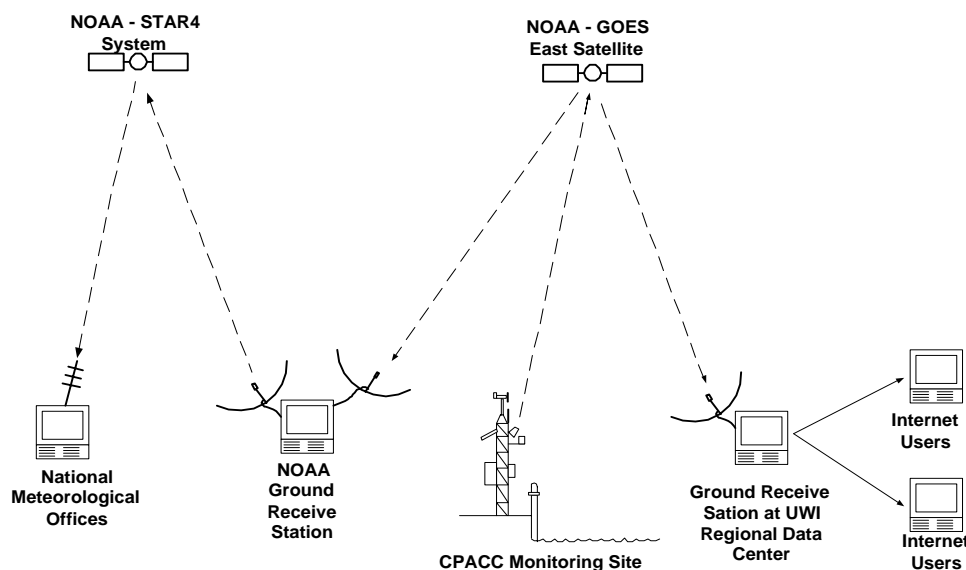
During installation each station was geocentrically fixed by GPS occupations. The GPS was conducted using first order NGS/NOAA methodology for five days of continuous observations collecting 30 second samples. The national survey offices provided personnel for GPS training and system operation. The future GPS occupations are to be carried out by the national survey offices, with GPS equipment provided by this project. The GPS data sets were processed by NGS/NOAA and results are available online from the RAC website; <http://www.cpaccrac.org> . Two permanent GPS sites were installed at Barbados and Jamaica.

Upon completion of each station a “Monitoring Station Report” was completed containing;

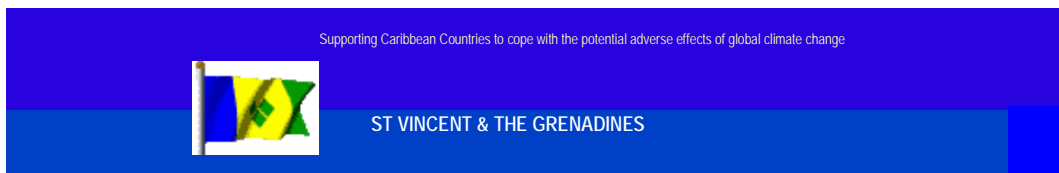
Physical Description; Names & Numbers, Model; Serial No & Set-ups; Survey Results; Bench Mark Drawing; Bench Mark Descriptions; Datum Computations; Sensor Measurement Drawing; GPS Survey Data. All of this data is available on the RAC website <http://www.cpaccrac.org> . National personnel were trained on providing this information. In the future and they were provided computers and software to accomplish this continued reporting responsibility.

Data Collection & Dissemination

The data is collected in the field on a 6 minute interval for sea-level and a 15 minute interval for all other parameters. It is transmitted every 3 hours via GOES satellite and downlinked at the RAC, at NOAA/NESDIS and soon at the RONMAC project RAC in Costa Rica. During the reconnaissance and installations the National Meteorological offices expressed a desire to have the data delivered to them via their existing STAR4 satellite systems, which is managed by the U.S. National Weather Service/NOAA. Arrangements were made with NWS to reformat the incoming GOES data into the STAR4 hourly synoptic format and retransmit it to the National met offices.



Training was provided by a series of workshops and individual training on the applications of the data. It is anticipated that most national offices will rely on the Regional Archiving Center (RAC) at UWI in Trinidad for derived products. All data is received, QA/QC'ed (via the Forman software) and archived at the RAC in Trinidad. The RAC manager is responsible for coordinating these activities and liaising with the national participants and the equipment repair facility in Barbados. The RAC operates a website which provides the data, post QA/QC, and all of the ancillary information.



890-0010

Station Name: *Kingstown, St Vincent*
 Station Number: *890-0010*
 Station Location: *13° 07' 00" N – 61° 12' 50" W*
 Time Meridian: *60W*
 Original Installation Date: *11/12/98*
 Description of Location: *Monitoring Station is located on the southwest end of the concrete pier located on the St. Vincent Coast Guard Base at Galliqua.*
 Facility Owner: *St. Vincent and the Grenadines Coast Guard*



CPACC Webpage Presentation
(each monitoring site has similar page)

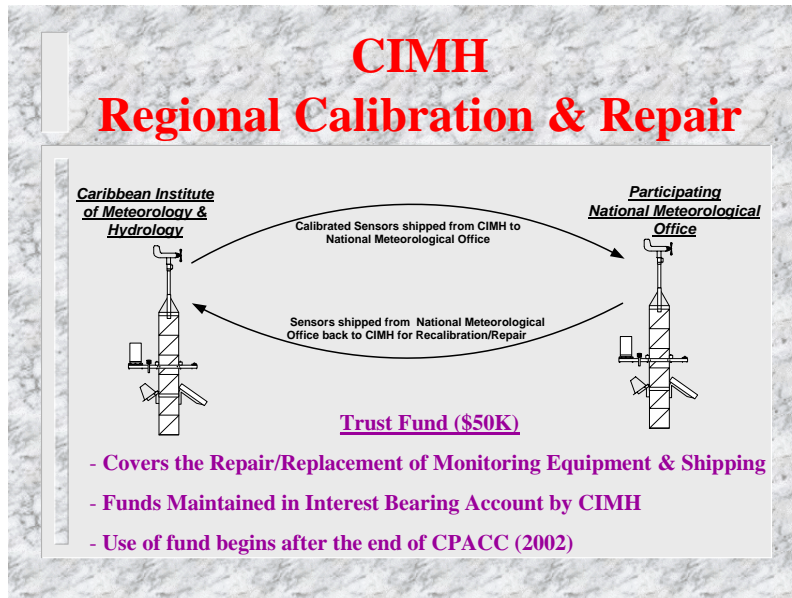


Daily data reviews are performed at the RAC and notifications of problems are made via email to national offices. The national technicians were provided PC's and connections to the internet for this purpose.

Continued Maintenance

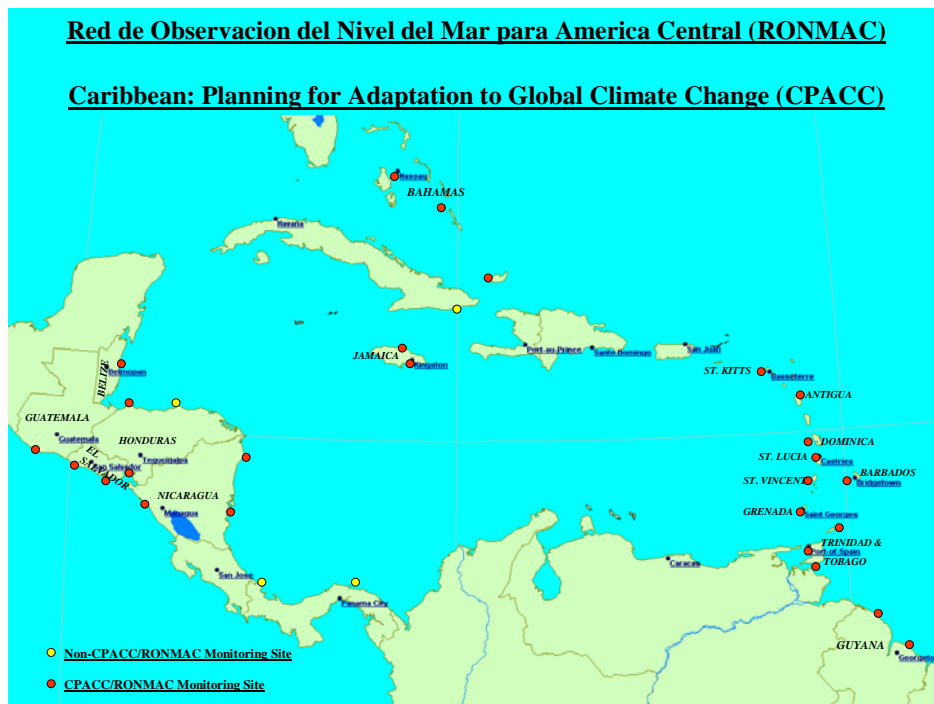
The Caribbean Institute of Meteorology & Hydrology (CIMH) in Barbados. The technical offices at CIMH participated in all of the reconnaissance activities, workshops, installations and follow-up activities. The CIMH was provided equipment to check the calibration of the sensors used at all of the monitoring sites. This equipment was integrated into the existing CIMH calibration lab. The project procured spare sensors which are maintained at CIMH. On an annual basis, sensors are sent to each national participant for the purpose of exchanging all of the sensors at each site. The plan is to exchange the sensors at each site, with calibrated sensors, every year. In the past, this type of plan has not succeeded because funding was not available for the basic shipping costs. To correct this problem, CPACC provided \$50K (USD) in a trust fund maintained by CIMH. This maintenance trust fund provides for the shipping of

sensors, repair of sensors and procurement of new sensors. The countries are expected to provide their technicians to perform the exchanges and repairs, however if they feel that they need assistance, then a CIMH technical officer can perform the work, with travel funding provided by the requesting country.



Continuing Programs

In 2000 the National Ocean Service/NOAA requested the OAS/USDE to participate in developing a project, identical to the CPACC monitoring component, for countries in Central America.



This project is the “Red de Observacion del Nivel del Mar para America Central” RONMAC, was begun in 2000. The installations were started in December 2000 with

all stations to be completed by the end of 2001. The stations and the programs are identical, except that the monitoring equipment has several enhancements that have been developed since the CPACC equipment was procured. This includes automatic system time correction via GPS, line-of-site radio communications for local real-time data delivery and tsunami monitoring via software enhancements. The regional data center or RAC for RONMAC is located at the International Ocean Institute (IOI) at the Universidad Nacional in San Jose, Costa Rica. The RONMAC-RAC Manager is Jim A. Navarro jnavarro@samara.una.ac.cr , the director of the IOI is Alejandro Guttérrez gechever@una.ac.cr . There will be a website maintained to disseminate the data from a GOES direct readout ground station. This project is ongoing.