

**Caribbean Water Initiative (CARIWIN)
Project number S61268-583
McGill University
Caribbean Institute for Meteorology and Hydrology**



**CARIWIN Annual Progress Report
for the period April 1, 2009 to March 31, 2010**

Prepared jointly by McGill University and CIMH

Presented to AUCC, UPCD Tier 2 Program

May 31, 2010

List of acronyms

AUCC – Association of Universities and Colleges of Canada
CAFRA – Caribbean Institute for Feminist Research and Action
CARDI – Caribbean Agricultural Research and Development Institute
CARICOM – Caribbean Commonwealth
CARIWAND – Caribbean Water and Gender Network
CARIWIN – Caribbean Water Initiative
CDB – Caribbean Development Bank
CDEMA – Caribbean Disaster and Emergency Management Agency
CDPMN – Caribbean Drought and Precipitation Monitoring Network
CEHI – Caribbean Environmental Health Institute
CI – Canadian Institution
CIDA – Canadian International Development Agency
CIMH – Caribbean Institute of Meteorology and Hydrology
CWS – Community Water Strategies
DCETO – Developing Country Educational and Training Organization
FAO – Food and Agriculture Organization of the United Nations
GE – Gender Equality
GIS – Geographic Information System
GWA – Gender and Water Alliance
IWRM – Integrated Water Resources Management
LFA – Logical Framework Analysis
NWIS – National Water Information System
RBM – Results Based Management
RTC – Regional Training Center
SPI – Standard Precipitation Index
UNIFEM – United Nations Development Fund for Women
UPCD – University Partnerships in Cooperation and Development
UWI – University of the West Indies
WIS – Water Information System
WMO – World Meteorological Organisation
WRA – Water Resources Authority of Jamaica

1) Project profile

Lead Canadian partner	Lead developing country partner
<p>McGill University Canadian project director: Dr. Chandra Madramootoo, Dean, Faculty of Agricultural and Environmental Sciences Phone number: (514) 398-7707 E-mail address: chandra.madramootoo@mcgill.ca</p>	<p>Caribbean Institute for Meteorology and Hydrology, Barbados Developing country project director: Dr. David Farrell, Principal Phone number: 011-246-425-1362 E-mail address: dfarrell@cimh.edu.bb</p>

Other partners

Ministry of Agriculture (Grenada)

Ministry of Agriculture (Guyana)

Water Resources Authority (Jamaica)

Link to regional and national development priorities

Difficult access to water contributes significantly to the risks people face in caring for their families and ensuring their livelihoods. The Caribbean Disaster Emergency Response Agency notes that the past catastrophic effects of hurricanes and floods were compounded by a lack of hydrologic data, a shortage of skilled water resources specialists, and inadequate institutional capacity in Commonwealth Caribbean (CARICOM) countries. To help governments ensure sustainable development and alleviate poverty, the project will help establish an integrated, participatory, gender-sensitive and environmentally sound approach to the management of water resources at the national and community levels in Jamaica, Grenada and Guyana. The project also addresses the regional priority of strengthening the regional integration process, through the upgrading of a regional training and technical services institution (CIMH), and ensuring the environmental sustainability of the Caribbean region. As a result, the project is consistent with the Outputs and Outcomes of the Comprehensive Disaster Management (CDM) Strategy developed by CDEMA and approved by the Governments of the Caribbean.

Project purpose

The purpose of the project is to support the training and extend the analytical capacity of the Caribbean Institute for Meteorology and Hydrology (CIMH) as it pertains to the management of water resources. The project will allow the Institute to expand its training of regional water resources management personnel so that they are able to manage regional water resources in a cost effective and sustainable manner that will minimize costs to all stakeholders, particularly the most vulnerable.

Expected outcomes

The main expected outcomes include: the emergence of CIMH as a strengthened regional training institution and information centre of excellence in equitable and sustainable integrated

water resources management (IWRM); an increase in the number of skilled water specialists and decision-makers who are qualified to develop IWRM policies in Jamaica, Grenada and Guyana; the establishment of partnerships among national agencies and community water users associations to adopt these standard practices to address the needs of the poor and reinforce women's participation at all levels of planning and decision-making.

Beneficiaries

The main beneficiaries include national and local government authorities, national women's affairs departments, staff, faculty members and students from the collaborating institutions, water specialists, farmers, community water user groups, ethnic minorities and other marginalized groups from the targeted regions.

Key activities

Key project activities include the development of IWRM programs and the training of national policy-makers, senior water specialists and technicians; the implementation of a computer hardware and software data system used for the analysis and presentation of water data; and the development of a community water strategy governance model in each country that will be documented and disseminated to other CARICOM member states through workshops and publications.

Key results to date

CARIWIN has provided training to CIMH personnel in principles of IWRM and has made improvements to the CIMH library and laboratory which have strengthened the capacity of CIMH as a training and information centre. CIMH personnel have successfully co-delivered five targeted IWRM short-courses in collaboration with McGill to key representatives from the three CARIWIN partner countries. The Caribbean Drought and Precipitation Monitoring Network was launched and currently permits CIMH to provide new information products which support decision-making. The Grenada National Water Information System was developed and implemented in collaboration with CIMH - it has served as a catalyst to modernize data management at CIMH and is a model for the region. Synergies have been created between CIMH and five major regional stakeholders in water management including the FAO, CEHI, UWI, CDEMA and UNIFEM helping the institution emerge as a regional reference in IWRM. To date, 112 project documents related to best practices in IWRM have been made available on the CARIWIN website. Project results and learning were disseminated regionally at the 7th Caribbean Islands Water Resources Congress; the 4th Caribbean Environmental Forum; the 2nd CARIWIN Senior Administrators Workshop; and the CARIWIN Regional Seminar.

CIDA priorities addressed

Official development assistance area(s):

Water and sanitation (primary)

Environmental conservation (secondary)

Sector(s):

Water resources policy and administrative management (primary)

Education and training in water supply and sanitation (secondary)

Policy priorities:

Environmental sustainability (primary)

Project value

Original CIDA commitment: \$1,000,000

Partners' commitments: \$1,293,000

Project duration

October 2006 - July 2012

2) Key team members and stakeholders

Name	Institution	Project Role
Dr. Chandra Madramootoo	McGill, Dean of Faculty of Agricultural and Environmental Sciences	CI Project Director
Dr. Edward McKyes	McGill Professor in Water Resources	Internal Advisory Committee for CARIWIN
Dr. Van-Thanh-Van Nguyen	McGill Professor in Water Management	Internal Advisory Committee for CARIWIN
Ms. Catherine Senecal	McGill Professional Associate	CI Project Coordinator, Gender Specialist
Mr. Apurva Gollamudi	McGill Professional Associate	Water Institutions and Hydrology Specialist
Ms. Marie-Claire St-Jacques	McGill Research Assistant	Community Water Strategies
Dr. David Farrell	CIMH Principal	DCETO Project Director
Mr. Kailas Narayan	CIMH Chief Hydrologist	Hydrologist and IWRM Specialist
Ms. Kathy-Ann Caesar	CIMH Meteorologist	Gender Equality Programming and Coordination, Meteorological Specialist
Mr. Adrian Trotman	CIMH Chief of Meteorology and Climatology	DCETO Project Coordinator, Computer Modeller and Data Management Specialist
Mr. Shawn Boyce	CIMH Hydrologist	Hydrological Specialist, hydrological modeling
Ms. Kim Whitehall	CIMH Climatologist	Climate Specialist, climate modeling
Ms Judy Padmore	CIMH Technical Officer	Logistics Specialist
Ms. Cherie Pounder	CIMH Hydrologist	GE Focal Point
Mr. Herbert Thomas	Jamaica WRA Director	Jamaica Coordinator
Mr. Trevor Thompson	Grenada Land and Water Division Director, Ministry of Agriculture	Grenada Coordinator
Ms. Bhaleka Seullal	Guyana Hydrometeorological Service Director	Guyana Coordinator

3) Status of results template

UPCD Tier 2 annual progress report Status of results

Reporting period September 19, 2006 to March 31, 2007	Canadian lead institution McGill University	Country Grenada, Guyana, Jamaica, Barbados
Project number S61268-583	Project title Caribbean Water Initiative (CARIWIN)	
Intended results	Indicators	Cumulative outcome and outputs achieved (use indicators)
Outcome 1 Emergence of CIMH as a strengthened regional training institution and information centre of excellence in equitable and sustainable IWRM.	Outcome indicators 1 1a. % and # (M/F) of trainees at CIMH before/after project. 1b. Level of satisfaction among CIMH member states for services and resources.	CIMH's role in CARIWIN has already strengthened its capacity as a training and information centre and CIMH is emerging as a regional reference in IWRM. Partner country participants have expressed high levels of satisfaction after attending training sessions. CARIWIN has set precedence in National Water Information Systems (Grenada) and this allowed CIMH to attract international donors to contribute to the modernization of CIMH's hosting of national data from its member states.
Output 1.1 Ten (7 M / 3 F) CIMH faculty prepared to deliver training for different levels of water management stakeholders in IWRM policies and practices that address gender equality, cultural diversity, environmental sustainability and participatory approaches by Year 1 (2007).	Output indicators 1.1 Number of CIMH faculty (M/F) trained in Barbados and in Canada. Evidence of appropriate attention to social/cultural/gender, economic, political, legal, environmental, technical aspects of water sector management in training	1.1 Twelve (6 M / 6 F) faculty were trained. Delivery of educational programming at CIMH has expanded to include IWRM. New curricula and training materials were developed for twelve short courses and workshops CIMH is now enhancing training to government representatives from its member countries and replicating the CARIWIN courses and workshops under other initiatives.
Output 1.2 One new nine-month IWRM certificate program to be offered by CIMH developed by Year 1 (2007).	Output indicators 1.2 Approval for certificate by CIMH Board of Directors. Start date of courses offered.	1.2 This will not be implemented at CIMH. The intended certificate program has become redundant since the UWI Cave Hill Campus in Barbados launched a Specialisation option in Water Resources Management which includes learning in IWRM. CIMH and UWI are collaborating in the delivery of this new program. The CARIWIN DC Project Director Dr. David Farrell, Mr. Kailas Narayan and Mr. Shawn Boyce are lecturers in this program. Professor Cashman of UWI has incorporated information on IWRM and GE from CARIWIN into the course material. A new Post-graduate Certificate in Water Resources Management has been developed with the University of Guyana. The agreement between McGill University, Guyana Ministry of Agriculture, and the University of Guyana was signed on January 28, 2010. Delivery of courses scheduled to begin April 2010. McGill is also investigating to possibility of offering an on-line Certification in IWRM.
Output 1.3 Upgraded information systems (six software packages) and library resources (60 new books) for IWRM learning at CIMH by Year 6 (2012).	Output indicators 1.3 Number of new software packages and number of new books. Staff feedback on upgrades.	1.3 GIS software and laptop were purchased for the computer lab. Thirty-six text books were purchased, with titles related to hydrology and the environmental aspects of water management. Water quality monitoring equipment was purchased for the hydrology laboratory. These upgrades are serving as teaching resources and they have enhanced the research infrastructure by providing a means of data collection which was previously unavailable.

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<p>Output 1.4 Synergies created with 4 regional water stakeholders by Year 2 (2008).</p>	<p>Output indicators 1.4 1.4 Number and importance of regional stakeholders collaborating with CIMH through CARIWIN.</p>	<p>1.4 Five regional stakeholders of major importance (FAO Caribbean; UWI; CEHI; CDEMA and UNIFEM) have synergies with CARIWIN. FAO is collaborating on the development and implementation of the WIS for Grenada. UWI is collaborating in the delivery of IWRM training to national partners. CEHI is collaborating in the human health aspects of IWRM and linking CARIWIN with the GEF-IWCAM project. CDEMA is collaborating with the expansion of the CDPMN and replication of NWIS. UNIFEM is collaborating on aspects related to GE.</p>
<p>Outcome 2 CIMH national outreach program provides water specialists and decision-makers with tools for developing IWRM policies in three DC's (Grenada, Guyana, Jamaica) by Year 6 (2012).</p>	<p>Outcome indicators 2 2a. Number of DC's benefiting from outreach. 2b. Number of CIMH faculty (M/F) providing outreach services in IWRM.</p>	<p>All three partner DC's have benefited from CIMH's outreach by having representatives receive IWRM training. CIMH faculty providing training thus far include Dr. Farrell, Mr. Narayan, Ms. Caesar, Ms. Padmore, Ms. Ifill, Mr. Boyce, Mr. Forde, Mr. Trotman, Mr. Moore. (6 M / 3 F)</p>
<p>Output 2.1 National water sector data systems in three DC's made compatible with IWRM principles by Year 4 (2010).</p>	<p>Output indicators 2.1 Number of countries with updated systems. Evidence of changes in the content and timeliness of water sector reporting in line with IWRM principles.</p>	<p>2.1 Water quality monitoring and hydrometric equipment was purchased for the three countries. Training was provided for the collection of water quality data. To-date, hydrometric equipment installation was completed in Grenada and Guyana at new stations in the CARIWIN communities. Installation is planned in 2011 for Jamaica. Training was provided for national counterparts. A National Water Information System was developed and implemented in Grenada, providing the country with a powerful centralized on-line data storage and information management tool. A similar system was put in place by the government of Jamaica. A similar system is currently being developed for Guyana by JICA.</p>
<p>Output 2.2 Twelve (8 M / 4 F) specialists and six (5 M / 1 F) decision-makers from three DC's trained in IWRM by CIMH in collaboration with Canadian partners in each Year 1 and Year 2 (2007 and 2008).</p>	<p>Output indicators 2.2 Number of specialists (M/F) trained. Number of decision-makers (M/F) trained.</p>	<p>2.2 One hundred and thirty-eight specialists (92 M / 46 F) and thirty decision-makers (24 M / 6 F) from three DC's received intensive training in IWRM and subsequently reported feeling more prepared to manage the water resource in their countries.</p>
<p>Output 2.3 Models, best practices and learning from pilot initiatives in three DC's are documented and shared by Year 6 (2012).</p>	<p>Output indicators 2.3 Number of documents developed and disseminated.</p>	<p>2.3 Five publications co-written by McGill and CIMH staff titled: "Appropriate Technologies and Systems to Respond to Climate Change, Improved Water Resources Management, Waste Management and Sanitation"; "Drought and Precipitation Monitoring for Enhanced Integrated Water Resources Management in the Caribbean"; "A Proposed Approach to Monitoring and Assessing Drought in the Caribbean"; "Comparing 3 HWTS Options in St. Cuthbert's Mission, Guyana"; "The Caribbean Drought and Precipitation Monitoring Network : the concept and its progress" in Climate Sense.</p> <p>Eight reports were written, titled "Scaling up Domestic Rainwater Harvesting in St Cuthbert's Mission, Guyana"; Framework for the Development of a Community Water Strategy"; Country-specific CWS documents for each Grenada, Guyana, and Jamaica; "A Summary of IWRM and Its Potential in the Caribbean"; "Water, Gender, Development; Towards equity in the management of water resources in Barbados and the Caribbean"; and Geological survey and hydrological assessment of CARIWIN community watershed in Jamaica.</p> <p>One hundred and twelve documents and presentations from CARIWIN training sessions are made available on the website.</p>

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<p>Outcome 3 Partnerships between CIMH, national agencies, local government and community water-users associations to develop three Community Water Strategies (CWS) based on IWRM principles formed in three countries by Year 4 (2010).</p>	<p>Outcome indicators 3 3a. Number of countries where pilot partnerships have been established. 3b. Number of CWS developed.</p>	<p>Through CARIWIN activities, CIMH began building these partnerships. They are centered on the pilot communities in each of the three partner DC's. The MTE recommendation to cancel all further activities building towards Outcome 3 went into effect in February 2010.</p>
<p>Output 3.1 Upon completion of the CWS planning process, national workshops attended by five representatives from national government, five from local government and five from NGO's held in three countries by Year 4 (2010).</p>	<p>Output indicators 3.1 Number of workshops held. Number of participants (M/F) per country sorted by representation.</p>	<p>Meetings have been held with the pilot communities and the national partner government agencies to discuss the CARIWIN initiative and their role. A framework to guide the development of the CWS was developed as well as country-specific documents to support CWS in the three partner countries. A Regional Seminar was held in Guyana in January 2010 to provide tools and transfer knowledge on CWS to the national partners. Further activities will not be completed following the MTE recommendation.</p>
<p>Output 3.2 Local workshops attended by two representatives from national government, three from local government, five from NGO, ten from WUA, five from FHH held in three communities by Year 6 (2012).</p>	<p>Output indicators 3.2 Number of workshops held. Number of participants (M/F) per community sorted by representation.</p>	<p>Further activities will not be completed following MTE recommendation.</p>
<p>Output 3.3 Caribbean Water and Gender Network CARIWAND is operational and influencing participation of women (50% F WUA, 30% F specialists, 15% F decision-makers) in IWRM activities by Year 6 (2012).</p>	<p>Output indicators 3.3 Percentage increase in female participation from Year 1 to Year 6.</p>	<p>There is no formal network, however, female participation in CARIWIN activities meets the targets for specialists (30%) and for decision-makers (19%). Further activities will not be completed following MTE recommendation.</p>
<p>Additional results</p>	<p>Indicators</p>	<p>Cumulative outcome and outputs achieved (use indicators)</p>
<p>Output 1.5 Regional web-based drought and precipitation monitoring network hosted by CIMH operational by Year 5 (2011).</p>	<p>Output indicators 1.5 Number of training sessions incorporating drought monitoring. Number of countries model validated for. Number of stakeholders in network.</p>	<p>1.5 The Advanced IWRM Course; the IWRM Training in Canada; Grenada Hydromet Installation and Training Course; the Grenada NWIS Workshop; the 2nd CARIWIN Senior Administrators Workshop; the CARIWIN Regional Seminar all included sessions on climate change and drought monitoring. The Caribbean Drought and Precipitation Monitoring Network (CDPMN) was launched in January 2009. Drought Indices were developed for Barbados. Research is underway to develop indices for Jamaica. CIMH published, via its website, the first Caribbean basin SPI in March 2009. The region also benefits from monthly drought and rainfall maps and discussions. During the 2009-10 drought, alerts and updates for the region, and Barbados and Grenada more specifically, were made available on the CIMH/CDPMN web page.</p>
<p>Output 3.4 Baseline information on GE in domestic water use generated for the three pilot communities by Year 3 (2009).</p>	<p>Output indicator 3.4 Number of communities which information generated for.</p>	<p>3.4 Research was conducted with communities in Barbados. A refined survey was administered in Guyana. Further activities will not be completed due to MTE recommendation.</p>

4) Analysis of project results

Project context

Annual results

The table below contains a summary of the key activities carried out during the reporting period.

Key Activities	Location	Date	Results
Research: Household Water Treatment Systems	McGill/St. Cuthbert's Mission, Guyana	ongoing	Research conducted on point-of-use water treatment systems: Biosand filters, ceramic filters, and chlorine addition
Research: drought and precipitation indices	McGill/CIMH	ongoing	Research conducted at both partner institutions contributing to the Caribbean drought and Precipitation Monitoring Network
Research: Analysis of international best practices in IWRM	McGill	to May 2009	Research resulted in report titled Framework for the development of a Community Water Strategy
Project monitoring	McGill	April 28, 2009	Internal Advisory Committee meeting
Deliver Presentation at UN Learning Event	UN Headquarters	May 11, 2009	CIMH brought CDPMN experience to global event on Enhancing Resiliency to Drought
Purchase books for CIMH library	McGill	June 2009	Provided 13 new titles for the CIMH library
Follow-up on equipment installation and training	Guyana	June 2009	Trained two staff from Guyana Hydromet Service on maintenance and trouble-shooting equipment malfunction
Delivery of training program for CIMH personnel	Quebec City and McGill	June 9 to 19, 2009	Trained two staff from CIMH in aspects of IWRM and afforded opportunity for them to attend the Canadian Water Resources Association's Annual Conference.
Incorporate drought monitoring into training for CIMH	McGill	June 15 to 19, 2009	Training included radar weather observation; soil moisture monitoring; modeling with Soil and Water Assessment Tool.
Signed contract with evaluator for the MTE	McGill	June 16, 2009	Agreement signed between McGill and Le Group Conseil Interlalia for the implementation of the CARIWIN Mid-Term Evaluation
JPSC meeting	Conference call	June 30, 2009	Community Water Strategy vision and direction
DCETO Director's visit	McGill	July 13, 2009	Project update and activity planning

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Publish article	CIMH	August 2009	Chapter in Climate Sense text book titled the Caribbean Drought and Precipitation Monitoring Network: the concept and its progress
MTE meeting	McGill	September 10, 2009	Agreement with evaluator re mission planning and data collection in Canada
MTE mission	Barbados and Grenada	September 20-26, 2009	Interviews led by the evaluator at CIMH, Barbados and at partner institutions in Grenada
Presentation of research results at international colloquium	Dublin, Ireland	September 21, 2009	Poster 'Comparing Three HWTS Options in St. Cuthbert's Mission, Guyana' presented at the International Research Colloquium of the Network to Promote Household Water Treatment and Safe Storage (HWTS)
MTE data collection in Canada	McGill	October 6-7, 2009	Interviews led by the evaluator at McGill
UPCD Workshop	Toronto	November 12, 2009	CARIWIN shared its 'Management Strategies to Encourage Local Ownership' at meeting of Project Directors
Develop materials on community governance models (county-specific CWS)	McGill	December 2009	Country-specific documents were produced for guiding CWS for each Grenada, Guyana and Jamaica
Delivered report on Rain Water Harvesting	McGill	December 2009	Report titled Scaling up domestic rainwater harvesting at St. Cuthbert's Mission, Guyana was delivered to GWI and the chief of the Amerindian community
Received MTE Final Report	McGill	January 2010	Recommendations towards project strengthening received
Delivered the CARIWIN Regional Seminar	Guyana	January 14-15, 2010	Exchanges with national, regional, and international stakeholders raised awareness and strengthened partnerships in CDPMN, NWIS and CWS.
Incorporate drought monitoring into training for national partners and stakeholders	Guyana	January 14-15, 2010	Content from Regional Seminar included the Caribbean Drought and Precipitation Monitoring Network; NWIS; Comprehensive Disaster Management; drought and flood plans; regional monitoring and forecasting; early warning systems.
Develop network of stakeholders for CDPMN	Guyana	January 14-15, 2010	Thirty-nine representatives from national governments and regional organizations were engaged as stakeholders in the CDPMN
JPSC meeting	Guyana	January 14	MTE recommendations addressed and post-evaluation action plan formulated

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Develop Certificate program	Guyana	January 2010	Signed Agreement with University of Guyana and Guyana Ministry of Agriculture: Post Graduate Certificate in Water Resources Management
UPCD Directors' Meeting	Ottawa	February 4, 2010	DCETO Project Director participated in meetings
Upgrade UG laboratories	Guyana	March 2010	Repaired and refurbished equipment in the soil and hydraulics laboratory
Maintain CARIWIN website	McGill	Continuous	Promotion of CARIWIN with comprehensive project details; over 112 IWRM documents available; links to partners and regional stakeholders in water management
Project Team meetings	McGill	2009: April 1, September 4, September 24, November 6 2010: January 25	Activity planning; financial and progress monitoring; research review and discussion

Capacity building at CIMH

An IWRM Training Session in Canada (see outline in Appendix) was offered to two CIMH personnel from June 9 – 19, 2009. CIMH Hydrologists, Cherie Pounder and Karl Payne attended The 62nd Canadian Water Resources Association Annual Conference in Quebec City and five days of targeted IWRM training at McGill. Topics included water quality and hydrometric monitoring; soil and water modeling tools; irrigation efficiency; IWRM discussions; climate change and drought monitoring; among others. The trainees were then guided on field tours of the Brace Centre for Water Resources Management ongoing research projects on constructed wetlands, agricultural water quality monitoring and water table management at sites located in Southern Quebec. The trainees also benefited from tours of the McGill campus research facilities and the library facilities, where they were able to retrieve journal articles relevant to their areas of interest. Presentations made during the training session are available on the CARIWIN website. The beneficiaries are applying the knowledge gained in their functions at CIMH. These results build toward Outcome 1.

The reference library at CIMH was updated through the purchase of thirteen books on topics within the sphere of IWRM (see list in Appendix). These books are available for teaching and research personnel at the Institute, as well as for students, who are largely government representatives from the CIMH member countries throughout the Caribbean. These results build toward Outcome 1.

Opportunity was provided for the CIMH Principal, Dr. David Farrell, to participate in the UPCD Project Director's Meeting hosted by AUCC, held at Ottawa, Ontario on February 4, 2010. The theme of the event was "Applied Research for Development" and reflections were made on how research strengthens development results; need for innovative research in the international context; and the contribution of higher education (see agenda in Appendix). Key outcomes of the participation were (i) elevation of the profile of the CARIWIN project as the benefits of the project to the region were highlighted including the value of the CDPMN to the issuance of drought alerts in the region, (ii) awareness of the work being funded by CIDA in other projects around the world, (iii) CARIWIN's awareness of the fact that CIDA will consider funding applied research and development projects in the future. These results build toward Outcome 1.

National water sector data systems and related training

The hydrometric equipment installed during the previous reporting period at the pilot sites in Grenada and Guyana have generated data for the countries' hydrologists and meteorologists. Continued support was provided to CIMH and the national partners with regards to the hydrometric pilot sites. One formal follow-up training session was held in the field at the Guyana site in June 2009 when CIMH Technical Officer Marvin Forde assisted staff from the Guyana Hydrometeorological Service with calibration and trouble-shooting in order to ensure the proper functioning and maintenance of the equipment. These results build towards Outcome 2.

The Grenada National Water Information System, implemented during the previous reporting period, has proven its usefulness and viability. The government of Grenada has found that it is a valuable tool for organizing data; it has made it easier for users to access data and to assess the country's water resources; and outputs from the system are being used successfully to present information to Ministers. The country has benefitted from having one system for all agencies with users accessing freely and remotely through internet access. CARIWIN has continued to support the Grenada NWIS with guidance. However, the government of Grenada is financially independent in the operation of the system, and has even devised a means of income generation from it by selling the maps it generates to private enterprises. The Grenada NWIS was presented to CARIWIN partner countries and regional stakeholders by Mr. Trevor Thompson during the CARIWIN Regional Seminar, held at the Ministry of Agriculture in Guyana on January 14-15, 2010 (see agenda and list of participants in Appendix). The expansion of NWIS to other countries in the region as well as the integration of this system into other regional initiatives was discussed in various panel and plenary discussions during the seminar. Thompson also presented the NWIS at CIMH to proponents of their latest project: the European Union funded Caribbean Agrometeorological Initiative (CAMI). CAMI aims to provide meaningful information to the farming and wider agricultural communities and the NWIS will be an integral tool used to do so. These results build towards Outcomes 1 and 2.

Capacity building at regional and national levels

The CARIWIN Regional Seminar was co-delivered by McGill and CIMH in Guyana from January 14-15, 2010 (see agenda and list of participants in Appendix). A total of 39 delegates participated in the highly successful workshop. Regional entities represented at the workshop included: Caribbean Institute for Meteorology and Hydrology, University of the West Indies, Caribbean Disaster and Emergency Management Agency, and the Global Environment Fund's Integrated Watersheds and Coastal Areas Management project. Representation from CARIWIN partner countries included: Grenada Ministry of Agriculture, Guyana Hydromet Service, Guyana National Drainage and Irrigation Authority, Guyana Environmental Protection Agency, Guyana Rice Development Board, Guysuco, Guyana Water Inc., Guyana Ministry of Indian Affairs, Guyana Ministry of Health, Guyana National Agricultural Research Institute, St. Cuthbert's Mission, University of Guyana, and Jamaica Water Resources Authority. Other entities represented included: the US National Oceanic and Atmospheric Administration, McGill University, Quebec Ministry of the Environment, and the Du Chene Watershed Organisation. The workshop achieved the following:

- built capacity in IWRM principles;
- promoted the leadership of CIMH, its institutional role and knowledge;

- conducted a capacity-building exercise with National Partners focused on addressing needs and priorities in water management in CARIWIN's pilot communities;
- provided a forum for discussion amongst collaborators and regional, national, and community level stakeholders;
- identified needs and priorities regarding a National Water Information System and Caribbean Drought and Precipitation Monitoring Network for Guyana; and
- engaged new stakeholders.

The Seminar Report and presentations made are available on the CARIWIN website. These results build toward Outcomes 1, 2 and 3.

Caribbean Drought and Precipitation Monitoring Network

Significant progress was made towards the intended outcome of CIMH to emerge as a strengthened regional training institution and information centre of excellence in equitable and sustainable IWRM. This was achieved by building on CIMH's capacity to provide its member countries with tools and information products for decision-making. The Caribbean Drought and Precipitation Monitoring Network (CDPMN), launched during the previous reporting period, has since been enhanced and begun contributing towards meeting the need for information products which facilitate the incorporation of climate risk management into decision-making.

The CDPMN, a regional network hosted at CIMH, seeks to develop a number of precipitation indices to monitor drought and wet episodes in the Caribbean, and to centralize data and indices for this purpose. In terms of information products, the CDPMN now provides a Drought Alert service for the region, posted on the CIMH website, which has already served to inform water managers and other socio-economic sectors of the severity of the dry spell that had gripped the region from October 2009 up to the end of the reporting period.

The work of the CDPMN was disseminated on a global scale when on May 11, 2009 Mr. Adrian Trotman, Chief of Applied Meteorology and Climatology at CIMH, brought the CDPMN experience to the UN Learning Event on Enhancing Resiliency to Drought, held at the UN Headquarters in New York (see agenda in Appendix). His expenses to attend this event were paid by Agriculture and Agri-Food Canada and the Inter-American Institute for Cooperation in Agriculture, Canada (\$ 2197 USD). In addition, authors Adrian Trotman, Anthony Moore and Shontelle Stoute published a chapter on the CDPMN titled *The Caribbean Drought and Precipitation Monitoring Network: the concept and its progress* in the book *Climate Sense*, a World Meteorological Organisation publication. A link to this publication can be found at <http://www.tudor-rose.co.uk/publishing/climatesense.html> (see outline in Appendix).

Drought monitoring was incorporated into training provided to two CIMH personnel in June 2009 at McGill University. Specifically, the training included radar weather observation, soil moisture monitoring, and modeling with the Soil and Water Assessment Tool: all skills which build capacities to support the CDPMN.

Drought monitoring was incorporated into training provided to 39 national partners and regional stakeholders in January 2010 during the CARIWIN Regional Seminar at Georgetown, Guyana. Content from the Regional Seminar included the science behind the CDPMN; the contribution of the NWIS to the CDPMN; Comprehensive Disaster Management; drought and flood plans; regional monitoring and forecasting; and early warning systems (see agenda in Appendix).

The CDPMN affords an opportunity for a participatory process, between CIMH, national and local governments and communities, to propose adaptation strategies and new Community Water Strategies which consider the extremes of drought and flood for water resource management in Jamaica, Grenada and Guyana. Although CARIWIN will not pursue activities at the community level, CIMH will carry on with these efforts within other programs such as the European Union funded Caribbean Agrometeorological Initiative that focuses on farming communities. These results build towards Outcomes 1, 2 and 3.

Community Water Strategies

CARIWIN produced a documented framework to guide the development and implementation of Community Water Strategies (CWS) in the Caribbean, based on IWRM principles. Research during the reporting period conducted by McGill Research Assistant Marie-Claire St-Jacques focused on synthesizing key components of IWRM at the community level, and lessons learned from case studies, into a manageable process to guide the development of CWS (see table of contents in Appendix). This was also expressed and refined within country-specific documents for each of the CARIWIN partner countries, i.e. Grenada, Guyana and Jamaica. These four reference documents, the framework plus the three country-specific documents, were made available on the CARIWIN website, and were used as the basis for discussion during the CARIWIN Regional Seminar held in Guyana, January 14-15, 2010. At this event, a capacity-building exercise conducted with national partners focussed on the prioritization of the pilot community needs; preliminary identification of key players; and the steps to implementation for each country to move forward with the CWS. Each partner country was thus trained in formulating a CWS for their pilot community and CARIWIN transferred the onus onto the individual countries to lead any further development. CARIWIN's involvement in the CWS was truncated after acceptance of the recommendation to do so from the MTE Report.

Research begun under Outcome 3 will nevertheless be completed so as to not jeopardize the students involved. Ongoing research during this reporting period which will contribute to the implementation of the CWS in Guyana included an investigation by McGill researcher Candice Young of point-of-use (POU) water treatment in the CARIWIN pilot community of St-Cuthbert's Mission, Guyana. The primary research question of this study looks at the acceptability and effectiveness of point-of-use water treatment systems in the community as it relates to the continued independent usage of the system once the implementing agency has left. The POU treatment systems selected for use in this study include Biosand filters, ceramic filters, and chlorine addition. Furthermore, McGill researcher Lauren Intven conducted a study in the same community on the feasibility of increasing potable water storage capacity with rain water harvesting technology. Her report titled "Scaling up domestic rain water harvesting at St Cuthbert's Mission, Guyana" was submitted to the community leader as well as to Guyana Water Inc to be considered in their planning for infrastructure expansion (see abstract in Appendix). This research was self financed in the amount of \$ 6000 CAD.

Dissemination

Information about the CARIWIN project was disseminated through a variety of mechanisms in order to raise awareness of the project among water resource managers, scientists, engineers and other stakeholders in the region, and globally. Notably,

- a poster presented at conference: Young-Rojanshi, C., Madramootoo, C.A., Intven, L., and Senecal, C., 2009. Comparing 3 HWTS Options in St. Cuthbert's

Mission, Guyana. International Research Colloquium of the Network to Promote Household Water Treatment and Safe Storage, 21-23 September, Ireland.

- publication of a chapter in a book: Trotman, A., Moore, A., and Stoute, S., 2009. "The Caribbean Drought and Precipitation Monitoring Network : the concept and its progress" in Climate Sense, Tudor Rose Publishing, p. 1726f.
- presentation at the "Enhanced Resiliency to Drought" UN Learning Event held at UN Headquarters, NY, USA, May 2009
- a press conference and TV broadcast with the Guyanese Minister of Agriculture during the CARIWIN Regional Seminar, Georgetown, Guyana, January 2010
- at Brace Research Day at McGill University in April 2009
- project information and results are also shared via email with the Informal Working Group, formed by the Global Environment Facility's Integrated Watersheds and Coastal Areas Management project, reaching a significant number of professionals in water management in the Caribbean region
- project personnel maintain a comprehensive website located at www.mcgill.ca/cariwin.

Planning and monitoring

Project planning and monitoring activities take place regularly on several levels:

- Regular interaction with CIMH project personnel
- Project team meetings are held monthly or on an as-needed basis for activity implementation planning, as well as overall financial and progress monitoring. Five such meetings were held during the last reporting period.
- The McGill CARIWIN team held its Internal Advisory Committee Meeting on April 28, 2009.
- Two Joint Project Steering Committee (JPSC) meetings were held during the reporting period. Madramootoo chaired one conference call in June 2009 and one meeting in Guyana in January 2010.
- The DCETO Project Director attended the UPCD Project Directors' meeting in Ottawa February 4, 2010 hosted by AUCC.

The project underwent its Mid-term Evaluation during this reporting period. The evaluator held interviews with project partners in Barbados and Grenada in September 2009; held interviews at McGill in October 2009; and submitted the Final Report in January 2010. The post-evaluation action plan was formulated at meetings in Barbados and Guyana in mid January (see action plan in Appendix). Overall, the evaluation process was much appreciated by all project proponents and there is a general consensus regarding the adoption of the evaluators recommendations as the best way to move forward for a stronger CARIWIN.

Canadian public engagement

Activities during this reporting period related to Canadian public engagement include the following:

- Canadian students from McGill's Macdonald campus have been involved in field research in a developing country; teaching in a developing country; providing guidance and support to developing country trainees in Canada; and public engagement activities for Canadians;
- Presentations were made by researchers contributing to components of CARIWIN to Canadian graduate students at McGill on several occasions, usually to groups of 7-10.

January 25, 2010, Johanna Richards presented “CARIWIN Jamaica: Current and future research”; February 23, 2010 Marie-Claire St-Jacques presented “Mission to Guyana”.

Thus far, the main benefits to Canada include an increased number of professionals experienced in international development; and the promotion of the country's high standard of education, research, and development cooperation through international exposure of McGill University.

Results variance

The results achieved to date surpass the results expected. In the fourth year of this six-year project, CARIWIN has made solid progress toward achieving two out of three outcomes. CIMH is emerging as a strengthened regional training institution and its national outreach program is providing water specialists and decision-makers with tools for developing IWRM policies. The Mid-term Evaluation Final Report included a recommendation to eliminate remaining activities under Outcome 3. This recommendation has been accepted by the partners.

Implementation variance

Although equipment installation and related training for the staff gauges, automatic water level recorders, tipping bucket rain gauges and data loggers was completed in the previous reporting period for Grenada and Guyana, Jamaica is not yet in a position to complete the installation. The installation of the automatic water level recorder is held up indefinitely due to necessary infrastructure works impeded by the current financial crisis gripping the country. This is a situation beyond the control of the CARIWIN project, though guidance in sourcing outside funds to complete these works has been offered.

Spin-off activities and unexpected results

A tri-partite agreement was signed between McGill University, the University of Guyana and the Guyana Ministry of Agriculture in January 2010 for the creation and delivery of a new Post-Graduate Certificate in Water Resource Management at the University of Guyana. McGill's services include curriculum development, laboratory refurbishment, and delivery of lectures and laboratory exercises. McGill will be compensated for these services in the amount of \$70,000 USD by the Ministry of Agriculture, through financing arranged with the Inter-American Development Bank. In this first year of delivery of the Certificate, twenty-four engineers from the government of Guyana will receive training in hydrology and water resources management; drainage and irrigation; and hydraulic structures and geotechnical investigations. The soil and water laboratory at the University of Guyana was completely overhauled and all equipment put into working order in March 2010. Classes begin in May 2010.

The Caribbean Disaster Management (CADM) Phase II, funded by Japan International Cooperation Agency (JICA) through an agreement with the Caribbean Disaster Emergency Management Agency (CDEMA) is developing an NWIS system for Guyana. The system will reflect the collected experiences gained from prior installations of the NWIS in Grenada, Jamaica and St. Lucia. The new system features upgrades which are being applied to previous installations in these countries. In addition, provision has been made under CADM Phase II for instantaneous duplication of the NWISs currently installed (such as Grenada and Jamaica) to a server housed at CIMH. This facilitates accessibility to national databases at all times. Based on the positive feedback

the NWIS has received, several national governments and regional organizations have expressed a willingness to adopt and fund the expansion of the NWIS.

5) Communication products

The following communication products were produced during the reporting period:

- Project website

The website, hosted at www.mcgill.ca/cariwin, is a comprehensive account of project activities and achievements and it is a valuable resource for materials on IWRM. The site promotes the project globally and allows for partners and stakeholders to easily access recent information. The site was updated with information spanning the 2009-2010 fiscal year.

6) Other information

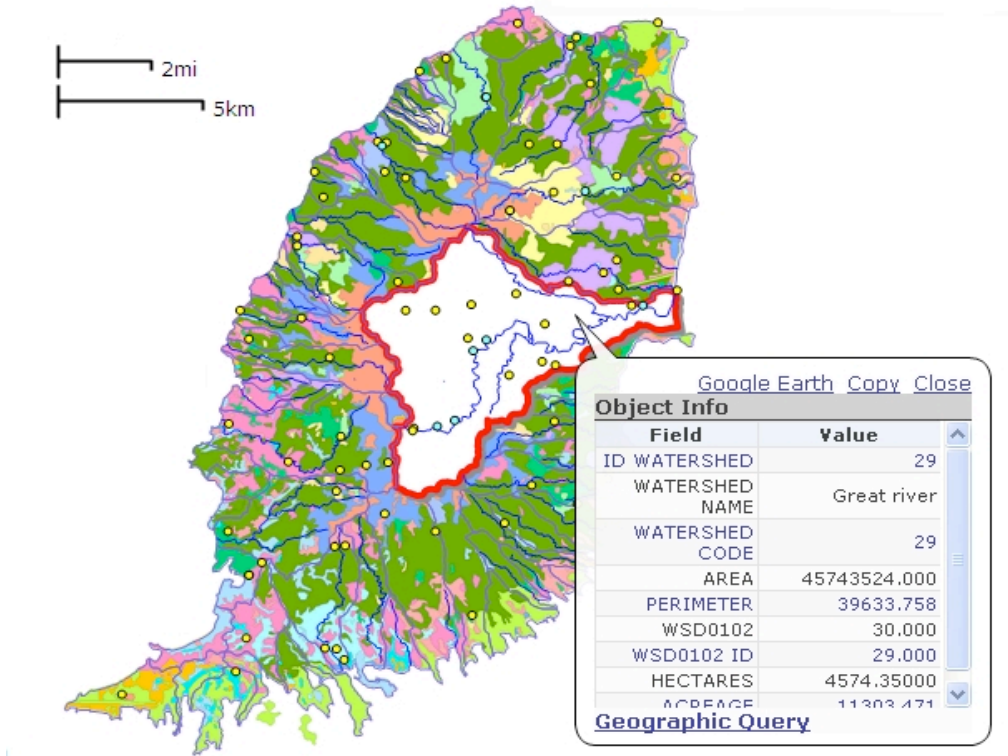
Success stories

The main success story is of course that the region's urgent need for skilled technicians and informed water managers and decision-makers is being met by CARIWIN. The strengthening of CIMH will ensure the sustainability of project results. The knowledge and experience gained by CIMH personnel enhances CIMH's ability to provide training to personnel from the governments of its member countries, one of the institutions primary functions. The momentum gained during the project life on establishing new water management tools for its member countries, such as the Caribbean Drought and Precipitation Monitoring Network, as well as the National Water Information Systems, will easily carry on well beyond the life of the project. This is guaranteed by the overwhelming regional support for these much-needed tools, as well as the commitments from the international donor community. The National Water Information System for Grenada developed through CARIWIN is a centralized, highly powerful decision-making tool for water management. This has been the catalyst for the modernization of services provided by CIMH to its member countries and it is the state-of-the-art and new standard for the region, to be replicated in all CARICOM countries.

Lessons learned

- The Caribbean region has a real need for hydrologic and climatic data to be available in a structured format.
- The partner countries, which are representative of the region, have an acute shortage of well-trained middle-level specialists and CARIWIN is making small strides toward remediation.
- Partnership in CARIWIN has already afforded learning at CIMH in terms of financial management, whereas areas such as RBM and GE could still be reinforced.
- Following communication protocol and respecting hierarchy within institutions are two critically important points in the smooth-running of a multi-party project.

Photo gallery



Snapshot of the Grenada NWIS, highlighting the Great River watershed and associated information



Typical housing in St Cuthbert's, Guyana with rain water harvesting technology.



CIMH personnel in classroom during IWRM Training session in Canada.



CIMH and Guyana Hydrometeorological Service personnel during field visit to verify rainfall and stream flow gauging equipment at pilot site January 2010.



Hon. Robert Persaud, Guyana Minister of Agriculture flanked by CARIWIN Directors Dr. David Farrell and Dr. Chandra Madramootoo at the Opening of the CARIWIN Regional Seminar, Guyana, January 14, 2010



Panel discussions during the CARIWIN Regional Seminar held in Guyana, January 14-15, 2010.

Appendices

1. **Annual Report from CIMH**
2. **Outline for Principles of IWRM Course, Canada, June 2009**
3. **List of books purchased for the CIMH library**
4. **Agenda for UPCD Tier 2 Project Director's Meeting, February 2010**
5. **Agenda for CARIWIN Regional Seminar, Guyana, January 2010**
6. **List of participants for CARIWIN Regional Seminar, Guyana, January 2010**
7. **Agenda for UN Learning Event on Enhancing Resiliency to Drought, UN Headquarters, May 2009**
8. **Table of Contents from Community Water Strategies: A Framework for Implementation, June 2009**
9. **Abstract for report titled "Scaling up Domestic Rain Water Harvesting at St. Cuthbert's Mission, Guyana", December 2009**
10. **Post-Evaluation Action Plan, February 2010**

Appendix 1 - Annual Report from CIMH

The Caribbean Water Initiative (CARIWIN): Its impact and significance during the period April 2009 to March 2010.

**Adrian Trotman
CARIWIN Coordinator (CIMH)**

The CARIWIN project continues to make its mark and leave a legacy in Integrated Water Resources Management (IWRM) in the Caribbean. During the reporting period, these impacts were particularly evident on their partner institution the Caribbean Institute for Meteorology and Hydrology (CIMH) and its three partner countries, Jamaica, Grenada and Guyana. During the period there were a number of notable developments: (1) The introduction of a framework for implementing Community Water Strategies in the region via a regional seminar in Guyana (2) initial discussion on a national drought and precipitation monitor for Guyana; and (3) the continued exposure and mimicking of the National Water Information System of Grenada (4). The purchase of 13 books related to varying aspects of water resources management. These developments continue to showcase CARIWIN as an important and relevant activity in the region. Greater visibility of CARIWIN within Guyana was facilitated through a television interview on one of the national stations. However, there has been one disappointment during the last financial year – the continued disruption of service of the Grenada station due to interruptions of the power source. There was also, early in the reporting period, some concern over the St. Cuthbert station. A mid-term evaluation of the CARIWIN was performed, outlining the strengths of the project and some ways of improving and refocusing the project for the second half.

Community Water Strategies

The Community Water Strategies was the main focus of the first day of the CARIWIN Regional Seminar held in Guyana in January 2010. The presentation of a generic framework synthesizing the key elements of IWRM relevant at the community level, along with tools for application was the binding presentation on that day. This and other presentations outlined the importance of participative governance. The day's presentations expressed communities as 1) collectors of data, 2) caretakers of instruments and equipment 3) interpreters of impacts from water related hazards, such as drought and flood, 4) water resources managers.

Such functions are linked to the other CARIWIN activities such as National Water Information Systems, where collected data from within communities will support the information provided. Apart from the data collected forming part of the data used in rainfall monitoring products, reporting the actual impacts, which form part of the information system in determining the onset, duration and intensity is an important role of the community.

The exposure of indigenous communities, such as St. Cuthbert, to simple technologies also allows for the day to day management of water to maintain quality and adequate potable

supplies. This was exemplified by the work of Candice Young in exposing that community to household water treatment systems.

National Drought Monitor of Guyana – Preliminary Discussions

The CDPMN was launched in January 2009 at the Second CARIWIN Senior Administrator's Workshop. Whereas the majority of work up until January 2010 was done on developing regional rainfall indices (Standardised Precipitation Index and Deciles) since the majority of the Caribbean surface is sea, the workshop in Guyana in January 2010 allowed preliminary discussions on the development of national rainfall monitors in CARIWIN partner countries with the potential use of other (non-rainfall) indices and indicators.

Other indices and indicators of soil moisture, streamflow, reservoir levels, groundwater and natural vegetation status can now be included in more focused rainfall monitoring at the national level. Rainfall deficit will be complemented by its impacts on these systems, thereby aiding in the provision of more robust drought monitoring that would allow for a more comprehensive determination the onset, duration and intensity of drought.

The launching of the CDPMN was timely in that it informed and alerted the region on the progression of the drought being experienced in the region. Even though CARIWIN has only three partner governments, the governments of the entire eastern Caribbean, in particular, benefited from this activity. Information was spread both via CIMH's drought and precipitation monitoring page (<http://www.cimh.edu.bb/precipindex.html>) and the media.

The format of the CARIWIN workshop in Guyana is being followed in two workshops (one in Barbados and the other in Trinidad and Tobago) developed under the Caribbean Water Monitor (CWM). The CWM is a collaboration between the Institute of Earth Sciences-University of Applied Sciences of Southern Switzerland (SUPSI-IST) and Caribbean Institute for Meteorology and Hydrology (CIMH) and funded by the Government of Switzerland. This is another example of where the CARIWIN experience is being transferred to other initiatives.

The Caribbean Drought and Precipitation Monitoring Network is being invited in April 2010 to a meeting in Ashville North Carolina to discuss involvement in a possible Global Drought Monitoring activity.

The National Water Information System (NWIS)

The Grenada NWIS continues to get exposure, and is seen as a major achievement of CARIWIN. This was the case in the Regional Seminar in Guyana in January 2010. Mr. Trevor Thompson was invited to make a presentation of the Grenada NWIS at a meeting in Barbados under the project the Caribbean Agrometeorological Initiative (CAMI). CAMI is an EU funded project under the ACP Science and Technology Programme to provide meaningful information to the farming and wider agricultural communities.

The Caribbean Disaster Management (CADM) Phase II, funded by Japan International Cooperation Agency (JICA) through an agreement with the Caribbean Disaster Emergency Response Agency (CDERA) is developing an NWIS system for Guyana. The system will reflect the collected experiences gained from prior installations of the NWIS in Grenada, Jamaica and St. Lucia. The new system features upgrades which are being applied to previous installations in these countries. In addition, provision has been made under CADM Phase II for instantaneous duplication of the NWISs currently installed to a server housed at CIMH. This facilitates accessibility to national databases at all times. Based on the positive feedback the NWIS has received, several national governments and regional organizations have expressed a willingness to adopt and fund the expansion of the NWIS.

It is expected that the Grenada NWIS and the replicas developed in other Caribbean countries would feed into regional activities, including the CDPMN and CAMI, which require ready and easy access to data and information.

Provision of Books to the CIMH library

During the reporting period, 13 books related to varying aspects of water resources management were donated to the CIMH library through the CARIWIN project. These books are vital reference sources in both the research and development programmes as well as the training programmes at CIMH.

Grenada and Guyana field Stations

During the reporting period, CIMH technical staff visited the Grenada station on 2 occasions to make repairs/adjustments to the system so that data could be acquired. The request for technical assistance was because no valid data was able to be downloaded from the system by the Grenada staff. After inspection it appears that the data loggers were designed to have a steady voltage supply. Once power is interrupted they ultimately stop logging. Since power outages appear to be frequent, the technical staff proposes that the power to the data loggers be buffered through the use of a battery and have the mains power charge the battery. It is expected that this situation will be resolved early in the next reporting year (2010-2011).

CIMH technical staff had, in June 2009, visited Guyana since data acquisition from the St. Cuthbert Station was a concern. It was found that a faulty serial cable and a laptop with only one functioning serial port were being used. The situation at the Guyana field station has been resolved.

Interview by the National Communications Network of Guyana

On 15 January, 2010 during the second day of the CARIWIN Regional Seminar held in Guyana in January 2010, participants from the CARIWIN workshop were interviewed on television by Mr. Mark Watson of the National Communications Network of Guyana. The interviewees included Dr. Chandra Madramootoo (CARIWIN McGill University Director), Mr. Adrian Trotman (CARIWIN CIMH coordinator), Mr. Garvin Cummins (Guyana Hydrometeorological Service) and Mrs Angel McCoy (Climate Prediction Centre, USA). The main discussion points of the interview were 1) the

CARIWIN project and the benefits it brings to Guyana and the wider Caribbean 2) the main themes of the workshop that was ongoing at the time, viz. the development of Community Water Strategies and Drought and Precipitation Monitoring. The interview was subsequently aired on national television station Channel 11, allowing for even greater visibility of CARIWIN.

CARIWIN Mid-term Evaluation

Aided by interviews and data gathering exercises with staff of CIMH and the national partners and a visit to the Grenada field station, a report of The Mid-term Evaluation was submitted in January, 2010 by the consultant, Mr. Alain Boisvert. The report indicated that the project was already showing excellent results and is consistent with the general Poverty Reduction strategies of CARICOM's member states and with water management policies in the region. The evaluator was particularly pleased with the development of the National Water Information System for Grenada and suggested it be used as a model for other Caribbean countries. Earlier in this report, it was noted that the Grenada NWIS was already being replicated in other territories through other projects.

The evaluator, however, also identified some deficiencies and outlined how they can be rectified. These included:

- 1) The absence of a substantial high-level training program in IWRM for the personnel of the partner countries, since the graduate training proposed was abandoned with no replacement
- 2) The use of resources in search of results at the grassroots community level, which are beyond the scope of the project and expertise of the partners, particularly referring to the Community Water Strategy and its proposed action within the project
- 3) Activities related to Gender Strategy, and the development of the Caribbean Water and Gender Network (CARIWAND) which tend to duplication.
- 4) The lack of visibility and communications (particularly at CIMH)
- 5) The project being too centrally managed from McGill University.

The suggestions to rectify this situation included:

- 1) Pursuing the training of students from partner countries through the UWI CERMES MSc. programme in Water Resources Management and training of CIMH staff
- 2) The development of a communication strategy by CIMH, particularly on communicating best practices
- 3) Prioritising the establishment of National Water Information Systems
- 4) Cancelling future plans in CWS and CARIWAND and integrating gender information into the NWIS and the training in the MSc. Water Resources Management programme.
- 5) Formalising the decision-making structure more by holding a very formal annual meeting of the Management Committee, inclusive of CIMH and national partners.

CIMH views highly the recommendations of the evaluator and concludes that they were thoroughly thought out. Specific views on and responses to the recommendations follow:

- 1) CIMH also supports the placement of personnel from the national partners within the MSc CERMES, UWI programme. This would assist the partner governments with adequately trained personnel, making the activities more sustainable. Discussions are already ongoing on this matter, with faculty of CERMES.

- 2) Progress has already been made to improve the CIMH communication. This has begun with the upgrading of the CIMH web pages linked to CARIWIN (e.g. CDPMN page and the CIMH projects page). Further developments regarding the improvement in communication are being discussed.
- 3) Certainly, the replication of the Grenada NWIS within other projects and to the wider Caribbean Community is already a thrust of CIMH.
- 4) CIMH agrees that duplication of the gender activities are not necessary and CWS framework could be seen as one of the products of CARIWIN to left for the relevant groups in the national partner countries to move forward, rather than CIMH and Brace that are without the relevant expertise.
- 5) CIMH also supports a more transparent management approach to the project which includes all partners involved.

Appendix 2 - Outline for Principles of IWRM Course, Canada, June 2009

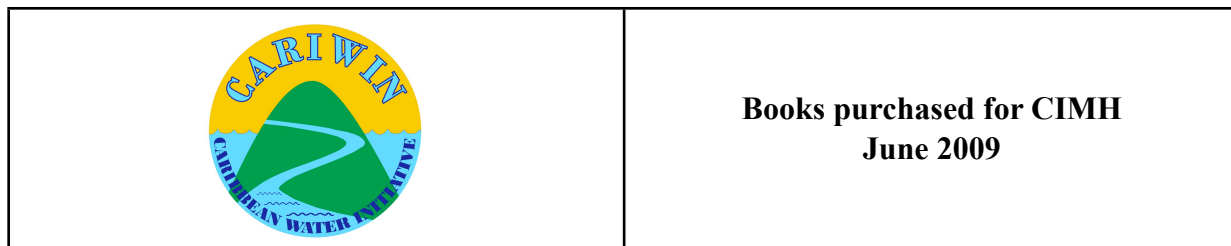


CARIWIN Training for CIMH personnel
 Brace Centre for Water Resources Management, Macdonald Campus of McGill University
 15 to 19 June 2009

Date	Agenda	Location	Speakers
15-Jun-08 Mon	9.30 AM: Introductions: Brace research presentations 11.00 AM: Presentation: A neuro-evolution approach to reconstructing missing precipitation data 11.30 AM: Welcome Lunch 1.30 PM: Field visit: Constructed wetland project 2.30 PM: Field visit: McGill radar observatory	MS2-084 MS2-084 Tadjia Hall Macdonald Campus	Several * Karl Payne Dr. Ramanbhai Patel Dr. Aldo Bellon
16-Jun-08 Tue	9.00 AM: Hands-on exercises: Setting up an automated water level and rainfall monitoring station using Campbell Scientific dataloggers 2.00 PM: Demonstration: Field installation of soil moisture and sap flow system	Brace Centre Coteau-du-lac, QC	Apurva Gollamudi Sajjad Ali Ajay Singh
17-Jun-08 Wed	9:00 AM: Field visit: Hydrometric and water quality monitoring of agricultural watersheds to quantify surface and subsurface nutrient losses	Bedford, Quebec	Apurva Gollamudi
18-Jun-08 Thu	9:00 AM: Discussion: Community water strategies: a framework for implementation 1.30 PM: Field visit: Water table management for improved water and nitrogen use efficiencies, and meteorological station	Brace Centre Coteau-du-lac, QC	Marie-Claire St-Jacques Ajay Singh and Kenton Ollivierre
19-Jun-08 Fri	9:00 AM: Hands-on exercises: Modeling with the Soil and Water Assessment Tool 1:30 PM: Discussion on IWRM barriers and constraints 3:00 PM: Library, Course Evaluation	Brace Centre	Colline Gombault Dr. Robert Bonnell

* Brace graduate students and staff presenting their research: Marie-Claire St-Jacques, Ajay Kumar Singh, Rufa Doria, Mohamed Chikhaoui, Frank Ferber, Felexce Ngwa. Research by Colline Gombault, Johanna Richards, and Felix Jaria will also be presented.

Appendix 3 - List of books purchased for the CIMH library



Hydrometry by W.Boiten, A.A. - Balkema (publisher)

Water Technology : An Introduction for Environmental Scientists And Engineers by N. F. Gray. - Elsevier Butterworth Heinemann (publisher)

Rainfall-Runoff Modelling In Gauged And Ungauged Catchments by Thorsten Wagener, Howard S. Wheatler, and Hoshin V. Gupta (Hardcover - Sep 30, 2004). - Imperial College Press (publisher).

Simulation Modeling for Watershed Management by James Westervelt
Numerical Methods for Shallow-Water Flow (Hardcover). - Springer (publisher)

Sustainable Use and Development of Watersheds (NATO Science for Peace and Security Series C: Environmental Security) [ILLUSTRATED] (Paperback)

Handbook of Weather, Climate and Water: Dynamics, Climate, Physical Meteorology, Weather Systems, and Measurements by Thomas D. Potter (Editor), Bradley R. Colman (Editor). - Wiley (publisher)

Hydroclimatology: Perspectives and Applications by Marlyn L. Shelton (Author). - Cambridge University Press (publisher).

Spatial Interpolation for Climate Data: The Use of GIS in Climatology and Meteorology (Geographical Information Systems series) (Hardcover) by Hartwig Dobesch (Editor), Pierre Dumolard (Editor), Izabela Dyras (Editor). - Wiley, John & Sons, Incorporated (publisher).

Climate Change Adaptation in the Water Sector by Fulco Ludwig (Editor), Pavel Kabat (Editor), Henk van Schaik (Editor), Michael van der Valk (Editor). STYLUS PUBLISHING

Water Resources and Climate Change (The Management of Water Resources, by Kenneth D. Frederick (Editor) – Springer (publisher)

Monitoring and Predicting Agricultural Drought: A Global Study by Vijendra K. Boken, A. P. Cracknell, Ronald L. Heathcote. Oxford University Press.

Drought and water crises: science, technology, and management issues By Donald A. Wilhite Edition: illustrated
Published by CRC Press, 2005 ISBN 0824727711, 9780824727710 406 pages

Beyond Drought People, Policy and Perspectives Bibliography, Index 248 pages, Publisher: CSIRO PUBLISHING
Publication date: 2003. edited by Linda Courtenay Botterill and Melanie Fisher.

Appendix 4 - Agenda for UPCD Tier 2 Project Director's Meeting, February 2010

Draft agenda UPCD Project Directors' meeting

Applied research for development

February 4, 2010

Crowne Plaza Hotel, Ottawa, 101 Lyon Street
Richelieu and Frontenac Rooms, Convention Level

Moderator: Margaux Béland, Director, Partnership Programs
Corporate Services Branch, AUCC

8:00-8:30 a.m.

Registration and check-in
Continental breakfast

8:30 a.m. Welcome, AUCC update and research for development introduction

Participants will be welcomed by Margaux Béland, AUCC Director of Partnership Programs who will provide an update on AUCC's international activities and the renewal process of the university partnership program. She will also introduce the *Research for development* topic, including how some other countries are applying research to development. Questions and answers will follow.

9:00 a.m.

CIDA presentation

Michael Jay, Director General of the Human Development Directorate at CIDA, will provide an update on CIDA and the Canadian Partnership Branch. Questions and answers will follow.

9:30 a.m. Refreshment break

10:00 a.m. Panel discussion

Jen Avaz, AUCC's Manager of the UPCD Program will summarize some of what AUCC has learned about research in UPCD projects. A panel of Northern and Southern UPCD project representatives will then explain how research has strengthened their project development results. Panellists will address what research has been done in their UPCD project, including innovative research developments that are important in the international development context. They will also consider the implications for the distinct role of higher education, especially Canadian universities, in international development. Questions and answers will follow.

Noon

Luncheon speaker

Professor Goolam Mohamedbhai, Secretary-General of the Association of African Universities, former President of the International Association of Universities, and former Vice-Chancellor of the University of Mauritius, will address issues about research for development in the African context.

1:30 p.m.

Sectoral discussion groups

Participants will be invited to join concurrent small group discussions to share how their UPCD research has strengthened their project development results, for example, in terms of increased effectiveness, reach, ownership, policy impact, etc. They will also reflect on the unique contribution of higher education to international development.

2:45 p.m. Refreshment break

3:15 – 4:00 p.m.

Plenary

Small groups will report back to the plenary, sharing the key ideas that surfaced in their discussions.

4:00 – 4:15 p.m.

Closing

Margaux Béland will offer closing comments on the way forward and how to strengthen the role of Canadian universities in development.

Appendix 5 - Agenda for CARIWIN Regional Seminar, Guyana, January 2010

Day 1: Community Water Strategies (CWS)		
Time	Topic	Speaker
8:30-9:00	Opening Ceremony	
	Welcome remarks	Dr. Chandra Madramootoo/Dr. David Farrell
	Opening speech	Hon. Robert M. Persaud, Minister of Agriculture, Guyana
9:00-9:05 Break		
9:05-9:20	CARIWIN project update	Ms. Catherine Senecal, McGill University
9:20-9:40	The Caribbean Drought and Precipitation Monitoring Network	Mr. Adrian Trotman, CIMH
9:40-10:00	Water Safety Plans/National Programme of Action in the context of communities	Ms. Savitri Jetoo, Guyana Water Inc.
10:00-10:20 Break		
10:20-10:40	The National Water Information System: potential at the local level	Mr. Trevor Thompson, Ministry of Agriculture, Grenada
10:40-11:00	Experiences in watershed management and stakeholder engagement	Ms. Sandrine Desaulniers, CDUC
11:00-11:20	Objectives and approaches for Community Water Strategies	Ms. Marie-Claire St-Jacques, McGill University
11:20-12:00	<i>Discussants:</i> Ms. Nicole Alleyne, Ms. Savitri Jetoo, Dr. Adrian Cashman	
	followed by a plenary discussion moderated by Mr. Vincent Sweeney	
12:00-1:00 Lunch		
1:00-1:45	Panel discussion: national perspectives on CWS, moderated by Mr. Vincent Sweeney	Mr. Ernest Dundas – St. Cuthbert’s Mission Mr. Trevor Thompson – Grenada Mr. Garvin Cummings – Guyana Mr. Andreas Haiduk – Jamaica
1:45-2:45	3 break-out sessions to discuss priorities, key players and steps to implementation for each pilot	Led by Mr. Trevor Thompson, Mr. Garvin Cummings and Mr. Andreas Haiduk
2:45-3:00 Break		
3:00-4:15	Verbal report of the main outcomes from the 3 break-out sessions followed by a plenary discussion, moderated by Dr. Adrian Cashman	
4:15- 4:30	Closing comments	Dr. David Farrell, CIMH
Day 2: Caribbean Drought and Precipitation Monitoring Network (CDPMN)		
Time	Topic	Speaker
8:30-9:00	Welcome and Day 2 objectives with CDPMN overview	Mr. Adrian Trotman, CIMH

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9:00-9:20	CDPMN and Comprehensive Disaster Management	Ms. Nicole Alleyne, CDEMA
9:20-9:40	CDPMN: enhancing existing drought and flood plans	Mr. Adrian Trotman, CIMH
9:40-10:10	Regional monitoring and forecasting under the CDPMN	Mr. Anthony Moore, CIMH
10:00-10:20 Break		
10:20-10:40	CARIWIN Jamaica: current and future research	Ms. Johanna Richards, McGill University
10:40-11:00	The Weather Research and Forecasting (WRF) Model	Dr. Y.V. Rama Rao, India Meteorological Department
11:00-11:20	The benefits and the development of an early warning system	Ms. Angel McCoy, NOAA
11:20-12:00	Plenary discussion	Moderated by Mr. Adrian Trotman, CIMH
12:00-1:00 Lunch		
1:00-1:20	National Monitoring-SUPSI collaboration	Mr. Anthony Moore, CIMH
1:20-1:40	Creating the North American Drought Monitor	Ms. Angel McCoy, NOAA
1:40-2:00	National Monitor of Guyana: role and approach	Mr. Adrian Trotman, CIMH
2:00-2:40	Panel discussion: Need for improved drought and precipitation information for Guyana <i>Panelists: Representatives from Hydromet Service, NARI, Guysuco, NDIA, Guyana Water Inc.</i>	
2:40-3:00 Break		
3:00-4:00	Plenary discussion: Developing a National drought and precipitation monitor for Guyana – The way forward	Moderated by Mr. Adrian Trotman, CIMH
4:00-4:30	Concluding remarks	Dr. David Farrell, CIMH Dr. Chandra Madramootoo, McGill University

Appendix 6 - List of participants for CARIWIN Regional Seminar, Guyana, January 2010

Country	Organization	Name
Barbados	CDEMA	Ms. Nicole Alleyne
	Caribbean Institute for Meteorology and Hydrology (CIMH)	Dr. David Farrell
		Mr. Adrian Trotman
		Mr. Anthony Moore
	CERMES, UWI	Dr. Adrian Cashman
Canada	Du Chêne Watershed Organization	Ms. Sandrine Desaulniers
	McGill University	Dr. Chandra Madramootoo
		Ms. Catherine Senecal
		Ms. Marie-Claire St-Jacques
		Ms. Johanna Richards
Ministry of Environment, Quebec	Mr. Daniel Blais	
Grenada	Ministry of Agriculture, Land Use Division	Mr. Trevor Thompson
Guyana	Environmental Protection Agency	Ms. Karen Alleyne
		Mr. Colis Primo
	Guyana Rice Development Board (GRDB)	Mr. Satanand Narain
	Guyana Water Inc.	Ms. Savitri Jetoo
		Mr. Marlon Daniels
	Guysuco	Mr. Ashley Adams
		Mr. Omadat Persaud
	Hydrometeorological Service	Ms. Bhaleka Seullal
		Mr. Garvin Cummings
		Mr. Antonio Peters
		Ms. Courtney Crandon
		Ms. Abigail Edghilo
		Ms. Thaeshwari Pooran
		Ms. Rushell Keno Galloway
		Ms. Subrina Patterson
	Mr. Kelvin Samaroo	
	Ministry of Agriculture	Ms. Colleen Bascom
	Ministry of Amerindian Affairs	Ms. Sharon Austin
	Ministry of Health	Dr. Ashok Sookdeo
	National Agricultural Research Institute (NARI)	Mr. Bissasar Chintamanie
National Drainage & Irrigation Authority (NDIA)	Mr. Timothy Inniss	
St. Cuthbert's Mission	Mr. Ernest Dundas	

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	University of Guyana (School of Earth and Environmental Sciences)	Ms. Denise Simmons
India	India Meteorological Department, New Delhi	Dr. Y.V. Rama Rao
Jamaica	Water Resources Authority	Mr. Andreas Haiduk
St. Lucia	GEF-IWCAM	Mr. Vincent Sweeney
United States	NOAA	Ms. Angel McCoy

Appendix 7 - Agenda for UN Learning Event on Enhancing Resiliency to Drought, UN Headquarters, May 2009

ENHANCING RESILIENCY TO DROUGHT LEARNING EVENT

DATE: Monday, May 11 Morning Session (10 am to 1pm)
ROOM: Conference Room C, First Basement (meeting rooms level), Secretariat Building
CAPACITY: 40

Hosts: Government of Canada – Agriculture and Agri-Food Canada,
Government of Mexico – National Weather Service of Mexico,
Caribbean Institute for Meteorology and Hydrology

Drought costs many sectors billions of dollars. Agriculture, transportation, urban water suppliers, recreation, and power generation are all affected. And, in today's global economy, the costs and impacts of drought often extend beyond international borders. The organizers hope the course will:

- Enhance international development opportunities by sharing data, science expertise and experience;
- Open an opportunity to lay the foundation for a global drought monitoring network and early warning system
- Encourage collaboration and partnerships to build capacity in:
 - Drought research and data sharing; and
 - Analysis of drought impacts that will ultimately assist in enhancing adaptation to drought
- Propose joint activities to advance drought monitoring and response capacity on the landscape.

In the first hour of the course, Trevor Hadwen, Agriculture and Agri-Food Canada and Dr. Valentina Davydova, National Weather Service of Mexico will present information on how the North American Drought Monitor; a Canada-Mexico-United States partnership, developed and its current drought monitoring activities. Next, Adrian Trotman, Caribbean Institute for Meteorology and Hydrology will discuss the current development of the Caribbean Drought and Precipitation Monitoring Network.

In the remainder of the course, the Harvey Hill, Agriculture and Agri-Food Canada will join the instructors to facilitate group exercises where participants get a chance to explore drought monitoring and reporting, adaptation successes and challenges and potential future adaptation options to enhance preparedness and on-the-ground resiliency to drought.

For more information, contact:

Harvey Hill (Harvey.Hill@agr.gc.ca)



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Agri-Food Canada

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Agroalimentaire Canada



Appendix 8 - Table of Contents from Community Water Strategies: A Framework for Implementation, June 2009

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Appendix 9 - Abstract for report titled “Scaling up Domestic Rain Water Harvesting at St. Cuthbert’s Mission, Guyana”, December 2009

ABSTRACT

Guyana Water Inc (GWI), Guyana’s state water utility, is currently pursuing a Hinterland Water Strategy with the goal of ensuring clean water for 80% of rural areas. Under the new national water strategy the Amerindian community of St. Cuthbert’s Mission has been receiving increased government attention and support to develop their community water infrastructure. In St. Cuthbert’s Mission, much like many rural communities, household water security is achieved through the combined use of a number of different water sources. This report argues that facilitating the installation of formal DRWH systems will have a large impact on household water security, and can be supported in conjuncture with the Guyanese government’s current plans for improving the efficiency and reliability of piped water in the community. Despite the fact that rainwater was not shown to have a better, or worse, impact on water quality than other sources, DRWH systems were shown to be a relatively low cost option for universally improving a households’ geographical and temporal access to a water source, increasing convenience, decreasing collection times and overall increasing a households’ ‘felt’ water security.

Appendix 10 - Post-Evaluation Action Plan, February 2010

CARIWIN Post-Evaluation Action Plan

February 18, 2010



Presented to Nancy Ferlatte, Program Officer UPCD, AUCC

Main objectives of the Post-Evaluation Action Plan

- Respond to the evaluator's report and recommendations;
- Indicate how and when recommendations can be incorporated;
- Revise budget to reflect changes to the project.

General Response to CARIWIN Mid-Term Evaluation Report:

Parties are generally in agreement with the evaluator's findings. All appreciate his assistance in refocusing the project and his praise of accomplishments to date. Parties met in Guyana, January 2010 and project direction was discussed with recommendations taken into consideration.

Response to Recommendations:

1) Introduce a new Outcome to support the water management specialization of the Master's program in Natural Resources Management offered by UWI in Barbados and adapt it (curriculum, requirements, etc.) to enable young specialists from CARICOM small States: a) to complete this degree program, and b) through the research required for this degree, to contribute to the progress of knowledge and its application to integrated water management information systems in their respective countries.

The parties agreed that this is a valid recommendation and its implementation would greatly advance the National WIS and strengthen the national partners.

- a) The parties were not able to find a feasible solution to support the UWI program given the institutional limitations and the time constraints of the project at this point.
- b) A Memorandum of Understanding was signed in January 2010 with the University of Guyana and the Guyana Ministry of Agriculture for the joint McGill University /University of Guyana delivery of a Post-Graduate Certificate in Water Resources Management. Classes begin in April 2010. The Ministry of Agriculture will provide financial assistance for 24 engineers from several departments to attend.
- c) McGill is investigating the possibility of offering an on-line Certification in IWRM.

2) Introduce a new Output in the project with the aim of the establishment and implementation of a communication strategy by the CIMH ("best practices" in IWRM, the NWIS, the results obtained by the partners, current research, the latest references to know, IWRM news, etc.) in the Caribbean so as to increase CIMH's profile and leadership in this matter.

The parties agreed to adopt this recommendation with the main media for communication being the CIMH website and the focus being the dissemination of information products and advancements developed through CARIWIN.

- a) The Project Coordinators will work collaboratively on the communication strategy. Emphasis will be placed on migrating relevant information from the CARIWIN website to the CIMH website and making selected additions/changes to the CIMH website in order to make IWRM information more readily available to its member states and to specifically promote results re the CDPMN and the NWIS.

<i>Phases</i>	<i>Action and Resources</i>	<i>Timeframe</i>
Background research	Initial discussions McGill/CIMH to set guidelines. One personnel at McGill to prepare draft strategy document for CIMH review.	March 2010
Implement	One personnel from McGill to work at CIMH for period of one week. \$2,400	April 2010
Follow-up	Discussions at 6 month intervals to review and update	October 2010; April 2011; October 2011; April 2012.

3) Establish that the project's basic priority in the CARIWIN review process, is the development and establishment of integrated water information management systems (at the national and regional levels) and allocate the necessary resources for this purpose.

The parties agree to adopt this recommendation.

a) publish paper on the NWIS in Grenada at the next CEF, Jamaica June 2010.

<i>Phases</i>	<i>Action and Resources</i>	<i>Timeframe</i>
abstract	TT, AT, CS to submit abstract	Due April 12, 2010
paper	TT, AT, CS to write full paper	Due June 2010
presentation	TT to present at conference \$1,800	June 21-25, 2010

b) encourage training national partner to national partner on NWIS. Discussions are underway to share experience of NWIS established in Grenada with Guyana and Barbados, with additional financial support from GEF-IWCAM.

<i>Phases</i>	<i>Action and Resources</i>	<i>Timeframe</i>
formal request	TT to submit request	February 2010
planning	TT, AT, CS to work out logistics with GEF-IWCAM and partner countries	March 2010
implementation	TT to host in Grenada	?

c) support development of interactive portal on CIMH website for CDPMN.

<i>Phases</i>	<i>Action and Resources</i>	<i>Timeframe</i>
Internship description	AT to prepare internship description	February 2010

research	UWI student to work with CIMH \$1,600	April to September 2010
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4) Transfer the responsibility of community development to national authorities, cancel all the activities of Outcome 3 related to the development of CWS in 3 grassroots communities, and reallocate the resources to other project's priorities.

The parties agreed to adopt this recommendation. The transfer of responsibility to national authorities was completed in January 2010 during the CARIWIN Regional Seminar. Community Water Strategies were discussed; a capacity-building exercise was conducted with national partners and regional entities; tools to develop and implement CWS were delivered.

5) Cancel the Output regarding the establishment of an NGO network specifically dedicated to the problem of Gender in IWRM in the Caribbean (CARIWAND) and apply greater efforts to production and insertion of data of interest to women into the integrated water management information systems (national and regional levels) and to women's access and involvement as users of these systems.

The parties agreed to adopt this recommendation with regard to canceling the output. No further specific action will be taken with respect to incorporating gender equality issues.

6) Optimize use of the project's financial resources in the CARIWIN review process to support local capacity building, particularly in human resources at the CIMH or at the local partners.

The parties agreed to adopt this recommendation. Capacity-building activities which CARIWIN will engage in are as follows:

<i>Phases</i>	<i>Action and Resources</i>	<i>Timeframe</i>
Host CIMH personnel in Canada for SWAT training	\$4,000	May 3-7, 2010
Presentation of JA research	JR to present paper on drought indices at CEF \$2000	June 21-25, 2010
Publish procedures manual for installation/ calibration/ download/data management	AG/AT/MF to co-write \$100	April-July 2010