



**GEF-IWCAM Regional Geographic Information Systems (GIS)
Workshop**
*Strategic Approaches to Application of GIS tools in Support of Planning for
Watershed and Coastal Areas Management*

5 – 6 July 2007

Roseau, Commonwealth of Dominica

Workshop Report



July 12, 2007

GEF-IWCAM Regional Geographic Information Systems (GIS) Workshop

Strategic Approaches to Application of GIS tools in Support of Planning for Watershed and Coastal Areas Management

Workshop Report

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GEF-IWCAM Regional Geographic Information Systems (GIS) Workshop

Strategic Approaches to Application of GIS tools in Support of Planning for Watershed and Coastal Areas Management

1.0 Introduction

The GEF-funded Integrating Watershed and Coastal Areas Management in Caribbean Small Island Developing States (IWCAM) Project has as its overall objective strengthening the commitment and capacity of all participating countries to implement an integrated approach to the management of watersheds and coastal areas.

The Project recognizes the important role of Geographic Information Systems (GIS) technology as a tool for integrated data analysis and management. It also recognizes the need to incorporate GIS technology in various components of the project and aims to expand and improve GIS capacity and use in all participating countries. In February 2006, the Project commissioned the conduct of a detailed capacity needs assessment which provides the basis for the conceptual design of a Road Map. This Road Map will guide the effective development and management of GIS resources which can be used to plan and manage the region's aquatic resources on a sustainable basis.

The objective of the workshop is to seek regional consensus among GIS implementers and users in the Caribbean on developing the Road Map mentioned above and effectively mainstreaming the use of GIS for integrated watershed and coastal area management in the region.

At the end of the workshop, the following should be achieved:

- Revision of the draft Road Map based upon the inputs of workshop participants.
- A regional consensus for mainstreaming GIS would be built among key stakeholders.
- The network of key stakeholders would be strengthened.

2. Modality of the Workshop

Based on the workshop agenda (Appendix 1), the workshop began with a short opening ceremony chaired by Ms. Donna Spencer, the Communications, Networking, and Information Specialist at the IWCAM PCU. Ms. Spencer welcomed all the workshop participants and thanked them for accepting the invitation to participate in the workshop. She explained that Invitations had been extended to the National Focal Points in each Participating Country to nominate a suitable person, as well as to persons from each PC who had responded to the questionnaire. Among those participating were GIS generators and users as well as decision-makers. This should be a good combination for discussion of the way forward.

The opening remarks were made by Mr. Vincent Sweeney, the GEF-IWCAM Regional Project Coordinator who welcomed the participants and gave a brief background to the Project. Following the opening ceremony, Dr. Jacob Opadeyi made a presentation on the technical components of the draft GIS Roadmap. He was followed by Mr. Emil Cherrington who presented the institutional components of the draft GIS roadmap. The two presentations were well received and followed by a question and answer session.

At the end of the formal presentations, Ms. Spencer introduced the working group sessions to the participants. The participants were divided into three groups: A, B, and C and the working group guidelines (Appendix 2) were explained to all participants.

The working groups worked on two topics: 1) review and modification of the draft roadmap and; 2) the review of how GIS could be used in the Demonstration Projects. The reports of the working groups on each of these topics were presented in the plenary sessions and are to be found in Appendices 3 and 4 respectively.

After receiving and discussing the reports of the working groups, participants went into a session aimed at charting the way forward. The workshop participants made a number of recommendations provided in section 3 of this report. The workshop ended on a high note with participants feeling productive and pleased to have contributed to the IWCAM project. The list of workshop participants is in Appendix 5.

3.0 List of Recommendations made at the workshop

The following are the recommendations made by participants of the workshop:

- There is a need to document the GIS success stories / best practices in the Caribbean
- "Spatially enabling data collection – the demonstration projects should ensure all data collected are geo-referenced using GPS receivers;
- There is a need to develop formal protocol for data collection throughout the IWCAM project so as to facilitate regional analysis and enable GIS
- Training in use of GPS and the integration of such data with GIS should be considered; thus there is a need to acquire GPS receivers for demo projects.
- The relevance of GIS to the application of indicators / baselines should be investigated; IWCAM already has a consultancy for the development of a framework for indicators
- There is a need for regional coordination of GIS activities across the Caribbean
- The need to embed GIS into national activities – leveraging?
- The role of private sector and educational institutions in supporting GIS development should be enhanced.
- Regional collaboration in leveraging GIS resources should be explored (e.g. acquisition of new data)
- A regional data integration mechanism should be explored (e.g. common Caribbean datum?) and the responsibility assigned to a regional focal institution(s).
- Various regional projects to support GIS mainstreaming should be leveraged (e.g. through use of the IWCAM demo projects in countries with demo projects)
- There is a need to involve various national stakeholders in the GIS mainstreaming process
- The IWCAM Steering Committee should consider how funding resources might be allocated to GIS activities
- There a need to identify a specialist group which can work with country demos to ensure that GIS is being integrated into projects?
- Awareness of GIS should be created at CARICOM Ministerial level (designating person); the development of a concept paper would be useful
- The IWCAM Project's informal GIS working group should be strengthened as a regional advisory body.
- The possibility of a likely follow-up meeting to be held in Cuba in September should be explored.
- Demonstration projects should have plans for sustainability / replicability
- There is a need to design and develop a common digital database for watershed management in the Caribbean
- There is a need for a homogenized land cover / land use dataset for demonstration projects / PCs
- Opportunities for project networking and expert exchanges should be encouraged.
- IWCAM support for capacity-building activities, particularly in the area of environmental monitoring should be considered – can a few people be trained at Master's degree level in IWRM?
- The process needs to be guided by priorities identified by the national focal points
- Efforts should be made to obtain lists of groups of experts involved in GIS in the Caribbean (URISA, IWCAM, etc.)

Training courses in areas listed below would also be useful:

- Use of GPS
- Training on metadata standards

- Groundwater / surface water modeling / monitoring
- GIS application development
- Integrated water resource management

Appendix 1: Workshop Agenda

AGENDA

Thursday 5 July - Day I:

Time	Activity	Responsibility
08:30-9:00	Registration	PCU Administration
09:00-09:15	Opening Remarks	Vincent Sweeney, Regional Project Coordinator, IWCAM; Ministry of Agriculture, Forestry and Fisheries, Dominica; Donna Spencer, CNIS, IWCAM
09:15-10:15	The Road Map: Technical Components	Jacob Opadeyi, Consultant
10:15-10:45	The Road Map: Institutional Components	Emil Cherrington, Consultant
10:45-11:15	BREAK	
11:15-12:45	Working Group Sessions	
12:45-13:45	LUNCH	
13:45-14:45	Working Group Sessions	
14:45-15:00	BREAK	
15:00-16:30	Working Group Sessions	

Friday 6 July - Day II:

Time	Activity	Responsibility
08:30-09:30	Presentation of Working Group A Report and Discussion	Group A Rapporteur
09:30-10:30	Presentation of Working Group B Report and Discussion	Group B Rapporteur
10:30-11:00	BREAK	
11:00-12:00	Presentation of Working Group C Report and Discussion	Group C Rapporteur
12:00-13:00	LUNCH	
13:00-15:00	Plenary and Recommendations	Emil Cherrington and Jacob Opadeyi
15:00-15:15	BREAK	
15:15-15:45	Way Forward Jacob Opadeyi and PCU	
15:45-16:00	Closing Vincent Sweeney	

Appendix 2:
Working Group Guidelines

Working Group Guidelines

The intention of this two-day regional workshop and consultation is to bring together key stakeholders in GIS and watershed management in the Caribbean to gain consensus on the development, use, and management of GIS in the region. The workshop has been structured to include plenary discussions and working group sessions in an effort to encourage dialogue among participants. Three working group sessions are proposed. Each would handle at least one of the seven elements of road map as indicated below:

Working Group	Discussion Topics
A	1. Comprehensive needs assessment
	2. Acquisition and management of data and databases
	6. Development and management of institutional environment
B	3. Acquisition and management of technological resources
	4. Development and management of human capacity
C	5. Development of products and services
	7. Continuous monitoring and evaluation of the system

The first task for each of the working group sessions is to assign a **Facilitator** and a **Rapporteur**. The facilitator manages the working group discussions to ensure that the discussion focuses around relevant themes and key issues, stimulates participants through provocative questions and searches for consensus on conclusions and recommendations. The facilitator should also actively encourage participation by all participants. The Rapporteur will take notes on the findings of the working group session and present a report to all workshop participants in the plenary session.

Each working group should first review the elements of the draft road map assigned to them and comment on the appropriateness of the objective, issues, assumptions, and recommendations contained therein. This should then be followed by suggestion on how to improve the draft road map towards effective mainstreaming of GIS in the region. The working group may also suggest changes and propose a national implementation plan. Specific recommendations should be made for presentation at the plenary session.

Adequate time has been provided for the working group and plenary discussions; however, to make maximum use of the time available, participants are encouraged to:

- Review draft Mainstreaming Road Map prior to the workshop and identify refinements needed;
- Be considerate of other participants by not interrupting them or engaging in "side" conversations;
- Avoid "stories" when participating; be concise in providing comments, formulating questions, or when making recommendations to the group; and,
- If you can, turn off cell phones during the workshop.

At the **Plenary Working Technical Session**, each working group will present the summary of their discussion, recommendations, and seek consensus.

Appendix 3:
Working Group Reports: GIS Roadmap

Working Group Reports: GIS Roadmap

Working Group A: Components 1, 2, 6

Overview of Road Map:

Map is comprehensive and a number of key steps have been highlighted, however most of the members expressed difficulty in reading the points. Key points were there but not easy to follow. The group engaged in lengthy discussions on components 1, 2 and 6 and while a number of issues/concerns were raised, repeated reviews revealed that most of these elements were already covered in the document.

1. Comprehensive needs and requirements assessment (p. 11 – 14):

- Identification of critical success factors:
 - i. Comprehensive review of strategies implemented by similar countries/SIDS (Fiji islands) and analyse lesson learned.

2. Acquisition and Management of data and databases (p. 14 – 17):

- Section is well laid out.
- Suggestion to rephrase second line item ' availability of medium-resolution and large format scanner' to " Availability of specialized equipment" (Item is not a critical factor as institutions may be at various stages with respect to GIS)

3. Development of end-user applications, products and services (p.22 – 24):

- Activities, Methods and Options: (Add) - Develop user-friendly interface (recognizing that end users differ in term of needs i.e. decision- makers versus technical users so a user friendly interface would bridge the gap)
- Challenges in Developing GIS Applications: (Add) Availability of funds
- Outputs and Outcomes
 - Suggested list of GIS Applications-
 1. Coastal Water-Quality Modelling -
 2. Monitoring species abundance as it relates to the protection of important species in watershed areas.

Discussion:

The Group recognized a number of common issues among the various countries with respect to the implementation of GIS at a national level. These included:

- While GIS exists at the institutional level, there is a lack of overall national GIS strategies in Participating Countries Haiti and Cuba highlighted mechanisms employed in order to tackle this issue.
- Some countries also lack the resources to train people in GIS.
- There is also an overall lack of understanding of the uses of GIS for the management of critical resources.
- The project-approach mechanism has also resulted in the redundancy of GIS applications once the project is complete.

The suggestion therefore is to adopt a systematic approach to the implementation of GIS. Before conducting a needs assessment, there needs to a public education campaign where real examples are

used and a process of implementing GIS and its use is simulated. This would demonstrate that GIS can help in making decisions with respect to the management of the resource under review.

Working Group B: Components 3 and 4

I. Acquisition and management of technological resources (p. 17):

Goals and Objectives

Identify, acquire and manage available technologies that can adequately cater to the GIS needs of all stakeholders thereby enhancing the region's capacity.

The following are the objectives to be fulfilled:

- Allow for easy access to technological resources.
- Elimination of barriers to the transfer of data across national agencies and end-users.
- Facilitate a coordinated approach towards resource management and information dissemination.

Activities, Methods and Options

Explore free and open source GIS packaging

Outputs and Outcomes

- Data acquired through legal licence.
- Centralized institution created or identified for National GIS management (establish data securities, inform information policies, data integration, data dissemination)
- Established integrated network to support the center (database servers, IT requirements)
- Development of a national GIS policy or framework

Critical Success Factors

- Selection of applicable and adaptable technologies.
- Easy access and transfer of data
- Institutionalized funding mechanism.
- Increase awareness of GIS benefits to the public with the aim of applying pressure on the government to make it a priority

Component II: Development and Management of Human Capacity (p. 18 – 20):

The consultant provided adequate guidance on human capacity enhancement, however though priorities would be country specific the group identified several common areas of priority.

No.	Training Options	Low priority	Medium priority	High priority	Comments
1	E-training	✓			Separate e-training from classroom training. E-training is too individual dependent.
2	Regional Participation			✓	
3	Short courses: Thematic mapping, metadata stds, GIS principles			✓	Courses focused on understanding the principles, not necessarily end user applications alone
4	Technician level training & management training			✓	Should be done simultaneously
5	Retain Trained Staff		✓		Provide sense of accomplishment, keep the job challenging by creative thinking projects

Critical success factors

- Demonstrated avenue for money generation using GIS

Working Group C: Component 5 and 7

Component V: Development and management of institutional environment (p. 20-22)

- 4.5.1 Goals and objectives
 - To identify [...] for effective **inter-sectoral coordination of GIS**
- 4.5.2 Activities, Methods and Options
 - a. Identification of tools, **methods** and resources [...]
 - b. Development of action plans using any of the following **approaches as deemed applicable**

Political Support

- Awareness building seminars and pilot projects are complimentary (pilot projects utilized as a demonstrated application)
- Frame priority issues in a political context – speak the language of politicians
 - “Selling” GIS applications as means for national compliance and standardized reporting frameworks for international agreements

Managerial Support

- Workshops and seminars (including awareness building seminars)
- Newsletters and various online resources including user groups, discussion boards
- Establishment of a National coordination inter-sectoral committee or use of existing coordinating committee (dependant on the climate/culture in the individual countries)
- Committee must have decision-making capabilities

Regulatory and legislative support

- Establishment of department/clearing house/central repository for GIS (dependant on the level of development, use and need of various countries) with clearly defined roles for all participating entities
- Development of legislation for geospatial information management

Financial support

- Projection of sales and revenues - including self-sustaining mechanism for **cost-recovery**
- Capital budget for acquisition of data
- Recurrent budget for maintenance of data

Public support

- Fostering private sectors partnerships to create relevant applications for private and public sectors
- Introduction of GIS **from primary to tertiary** school curricula

4.5.3 Outputs and Outcomes

- List of critical [...] for **GIS development, implementation and use across the countries from project to national level domain**
- Typo “winning”

4.5.5 Identification of critical success factors

- **Demonstrated efficiency** instead of “doing more with less”

Component VII: Monitoring and evaluation (p.24-25)

4.7.1 Goals and objectives

- To develop [...] tools, **methods** and strategies that guide GIS implementation **and continued application**

4.7.2 Activities, Methods and Options

- Continuous monitoring and evaluation of the system **and its components**
 - Development [...] parameters **including milestones and benchmarks**
 - **Identification of corrective or remedial actions to allow for refocusing** were needed
- a. Currency, accuracy **and coverage** of data
- b. Development of monitoring tools, **timelines** ...

4.7.5 Identification of critical success factors

- Some of the measurable parameters should be outlined possibly in tabular format (types of benchmarks /indicators that can be utilized in M&E)

Recommendations: Workplan

- Need for a decision tree to outline the major components of the roadmap and the feedback mechanisms inherent in the process
- Addition of a section outlining "best practices"/success stories in the Caribbean region
- Need for common reporting methodologies especially for reporting under international agreements
- Bridging the gap between the roadmap and the next level of implementation for each country
- Need for a champion and leaders

Appendix 4:

Working Group Reports: Demonstration Project

Working Group Reports: Demonstration Project

Working Group A

Cuba's Demonstration Project: Application of IWCAM Concepts at Cienfuegos Bay and Watershed

Main environmental problems:

1. Pollution of freshwater systems (2 main rivers), domestic water supply and Bay area (tourist spot). These result from increased contamination by organic wastes from surrounding industrial areas, soil run-off and pesticide contamination.
2. Overfishing also affected the overall biodiversity of the watershed.

Stakeholders: Many institutions are associated with the bay and hold important data. The process of monitoring the movement of pollutants from the watershed area into the bay has been active for 20 years. 20 years of data are available in manual and digital formats. The important issue here is the format in which the data is stored and its capability for conversion.

Data types:

Land use, water quality indicators (pH, flora etc.), erosion, and sedimentation rates

Constraints/Challenges

1. Software and Hardware availability
2. Human Resource
3. Various stages of GIS development/use among stakeholder institutions.
4. Need for roadmap in order to implement GIS

Needs: (from IWCAM)

Overall needs are for IWCAM to facilitate technical cooperation (training, tools) with more advanced Caribbean countries and regional initiatives and provide technological support.

Working Group B:

I. Demonstration Project – Trinidad and Tobago

- ✚ Buccoo Reef Trust (NGO). Aim is coral reef preservation from contributing factors such as bleaching, human activities, nutrient loading, and sedimentation.
- 1. Wider concern is Ridge to Reef effect within the watershed and coastal zone.

II. Demonstration Project – Antigua and Barbuda

- ✚ Waste Water Management (Treatment Facility) needed for St. John's Harbor. Aim is to use the Best Available Technology (BAT) and build local capacity. GIS application in ambient water quality data collection, Socio-economic studies (demographic disruptions). Plan to hire a GIS consultant.

III Demonstration Project – Bahamas

- ✚ Two demo projects:

1. Exuma – One of the smaller islands. Introduction of a Wastewater Treatment Facility (partner with Clear Water Utilities) to treat demand from Regata activities. GIS application- ambient water quality baseline information
2. Andros – One of the larger islands, 80% wetlands. The development of Land Use and Zoning Plan.

IV Demonstration Project - Dominican Republic

🚧 Collaboration between the Ministry of Environment and the University of Santo Domingo to explore the levels of contamination in the watershed looking at the main contributors (Industrial Zone) of pollution. Aim is to educate the public as well as the industrial operators.

General Lessons Learnt for Positive Approach:

1. A clearly defined GIS strategy e.g. Research project personnel should make pollution source trace areas of research.
2. Incorporation of early learning (Secondary school level) and professional learning (Tertiary level) in the application of GIS to conserve the Reef system (Citizen Science)
3. Dissemination of results via website, newsletters, science journals.
4. Ensure you have the technological capacity for the job at hand.
5. Each Demo project PC should assist others e.g. georeferencing techniques using GPS, creation of data dictionaries, use of metadata standards such as ISO.
6. Obtain advice of how to collect data that can be imported successfully into a GIS

Working Group C:

Demo Projects: Recommendations

Vincent asked: **How can we (PCU) assist with meaningful GIS application in the projects?**

- Make sure data from baseline surveys is **GIS compatible** and that any modeling exercises can fit into GIS (take GIS beyond just mapping)
- Need for **technical exchange** with other countries
 - St. Kitts with Barbados & Jamaica in terms of groundwater monitoring and **modeling**
 - As an output of IWCAM, development of a common framework for groundwater monitoring and assessment for the region
- Need for **specialized** regional GIS training to overcome short-term capacity issues and to help build long-term capacity
- Long term objective – legislative reform and policy setting
- Use of GIS for public awareness initiatives and advocacy, especially above and beyond the IWCAM project

Appendix 5:
List of Participants

**GEF- IWCAM Regional GIS Workshop 5 – 6 July 2007,
Roseau, Commonwealth of Dominica**

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