

**PROCEEDINGS OF THE GIS EXPERTS
MEETING**
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EXECUTIVE SUMMARY

The two day meeting of Caribbean GIS practitioners reviewed the status of GIS development and application in the region, and was based on the report, *Review of GIS Capability and Needs in CPACC Partner Institutions* prepared by Ian. King of the CPACC RPIU. The meeting identified training as an important issue of GIS development and application and reviewed general training needs in the region.

The focus of the meeting then shifted to the CPACC Project and in particular, the component addressing *Inventory of Coastal Resources and Uses*. It was noted that CPACC recommended a GIS data repository for each country through the previously mentioned report. The meeting reinforced this recommendation by specifying key characteristics and criteria for data repositories. The agency which functions as the data repository should have at least:

- A related function and/or related data base
- The capacity to administer data - availability of personnel & experience
- Basic hardware/software including Internet connectivity
- Financial resources for upgrade of hardware/software, supporting physical structure and general maintenance.

Training needs and approaches to support data repositories were also identified. The former consisted of nineteen points including database design, development and integration as well as the adaptation of interfaces to user specifications. Establishing training guidelines with core courses and the development of manuals and self paced courses were among the training approaches noted.

The meeting concluded with specific recommendations for the CPACC project to facilitate the effective and efficient application of GIS technology in the region, particularly within the project's activities. These recommendations included:

1. Capacity building in the collection and management of geographic information - training & technical support, meta data, advocacy, standards workshop, acquisition and production of base data
2. Utilisation of remote sensing along with training
3. Addressing data gaps, including seeking better rates from data/information gathering services.
4. Ensuring that data meets target organisation's objectives, including through the use of appropriate technology.
5. Purchase the most efficient package when buying satellite services even if it extends beyond the pilot area
6. CPACC to point out that regional resource people must be utilised to facilitate technology transfer. The national focal points should be informed of the expertise sought for particular activities to support this goal.

OBJECTIVE

To identify an effective and efficient intervention for the CPACC project in capacity building for GIS and spatial information management and dissemination.

ATTENDANCE

The meeting was attended by Caribbean participants who were both experienced in the application of GIS technology and informed of the status of GIS use in the CPACC Countries. The participants are listed in [Annex 1](#).

MEETING CONTEXT AND OBJECTIVES - Ian King, RPIU

Mr. King gave an overview of the context and objectives of the meeting (see [Annex 2](#)). He noted that the meeting would assist CPACC in finding the most efficient and effective way to manage the GIS portion of the project using the experience and input of the participants, all of whom had worked with the technology and/or had responsibility for its implementation.

The RPIU Technical Report TR98001, would be used as a basis for reviewing the status and of GIS application in the region and specifying appropriate strategies which would address these needs. The report, *Review of GIS Capability and Needs in CPACC Partner Institutions*, was prepared following Mr. King's visits to each country. The report also made reference to a similar study prepared by Elizabeth Charles-Soomer of St. Lucia and Colin Campbell of St. Vincent and the Grenadines for the OECS Natural Resources Management Unit.

It was also noted that the recommendations from the meeting would inform the RPIU's strategies and also the consultants who would be selected to undertake the development of inventories of coastal resources and uses for the countries (see [Annex 3](#) for Scope of Works). The consultants would also be undertaking training in the development of these inventories and would therefore benefit from the collective experience of the participants.

The outcome of the meeting was expected to be a document summarising the views of the attendees as to the status of GIS activities in region, the vision for GIS in the future and the steps needed to achieve this vision.

Mr. King also gave an overview of the CPACC Project. Marc Rammelaere commented that Jamaica was undertaking another OAS project, the Caribbean Disaster Mitigation Project, which also has a coastal vulnerability component.

ASSESSMENT OF COUNTRIES AND CPACC PROJECT GIS NEEDS IN THE CONTEXT OF ONGOING AND PLANNED INITIATIVES

Participants were asked to comment on the RPIU Technical Report TR98001- *Review of GIS Capability and Needs in CPACC Partner Institutions* - in order to point out any major misrepresentations or omissions. It was agreed that factual details would to be communicated in writing to Ian King.

Up to the start of the meeting, no written comments had been received on the report with the exception of Ms. Carolann Albury of the Bahamas National GIS Project (see [Annex 4](#)). The following points were raised regarding the report:

1. The Belize Coastal Zone Management Project's GIS Specialist had subsequently left and was replaced by an individual with very limited GIS training and experience.
2. In the Jamaica Infrastructure section of the report, it should be noted that there is a lack of capacity to adequately describe the data. Also, on page 19, the search engine referred is free, the issue is the expense of the gateway.
3. The Jamaican Rural Physical Planning Unit (RPPU) is not mentioned in the report. RPPU was the first organization to acquire GIS capabilities and remained the leader in this field throughout the 80's. The organization gradually lost its edge in this field as it lost most of its trained staff to private sector where much better salaries are paid for trained people with Unix experience. GIS development stalled in the early 90's after a major system crash in which RPPU lost most of its data. They are reorganizing themselves but continue to rely on Unix based systems which is in Mr. Rammeleare's opinion is a wrong choice at least from an economical point of view.
4. There was agreement with the assessment of the EMA's capacity in Trinidad & Tobago section, page 26 of the report, as the organisation only had Arcview software. Given the lack of geospatial data in particular, it was suggested that the report should be a challenge to that agency to address these short comings.
5. Page 19 in Jamaica section mentions Metalite as a tool CEPNET is using but this does not capture the issue that an accepted standard is needed. The development of an international standard may cause changes to the Metalite software elements.
6. In the Bahamas section - some training has been done. Fisheries Division has very limited capability and training is needed by that organisation. It was noted that there is a project which has commenced and will generate/update a base map of the Bahamas.
7. Dr. Opadeyi commented that the report was weak on conclusions in terms of what the project means for the region and this should come out of this meeting.
8. It was noted that the report should also identify the training needs in the region.

Country Assessments

Antigua: *Keith Nichols*

- US\$200,000 was given to Antigua to set up GIS. This assistance is expected to be used exclusively for hardware and software with little if any investment in training and data development.

- Although no central repository has been identified, it appears that the Ministry of Environment will be selected, and Ms. Diane Black will be the lead person.
- Whereas Antigua and Barbuda are a part of one country, it was suggested that Barbuda needs special attention given its tremendous natural resources.

Barbados: *Yuri Chakalall & Althea Batson*

- There has been some building of human resource capacity within the GIS community, however there is a high turn over of personnel with limited examples of dedicated personnel to GIS.
- GIS development has been project driven, and primarily with IDB funding. The most extensive GIS data base was created during the Ministry of the Environment's Environmental Management and Land Use Project (EMLUP).
- The Town and Country Planning Department is also developing GIS capability through the EMLUP.
- The Coastal Zone Management Unit (CZMU) has received numerous requests for data coverage in the coastal zone from both the private and public sector.
- There has been no infrastructure determined for standards, copyright, ownership etc. and no strategy has been developed for GIS use, sharing and cost recovery.
- There are several projects going on where consultants are using the same information and spitting it back out and government is paying for it.
- Although a central repository makes the most sense, government is not easily convinced to form new departments or agencies.
- One idea put forward was to identify GIS champions in the relevant departments.
- Dr. Opadeyi commented that governments should be shown and convinced that the absence of departments with a specific GIS mandate is inefficient and actually wastes money.
- Mr Rammelaere commented that real data sets were necessary to convince government decision makers. Some agencies in Jamaica identified areas that were important to the electorate and tried to create data sets for those areas.

Belize: *Noreen Fairweather*

- All projects must go through the Ministry of Economic Development.
- Some agencies have experienced difficulty in keeping their GIS personnel.
- The Conservation Environmental Data System (CEDDS) is an important and functioning facility for coordination in terms of data sharing, standards and related issues. Even though there is no requirement for Coastal Zone Management Project (CZMP) to join CEDDS, the fact that the CZMP is not a part of this facility would be a problem if the CZMP were to be selected as a central repository for GIS data. Furthermore, the position of the CZMP is uncertain regarding whether they will be assimilated into Fisheries or go elsewhere.
- The Land Information Council's (LIC) parent Ministry is expanding, increasing the work of the LIC and therefore limiting its ability to offer GIS training and assistance to other agencies as it did in the past. The LIC's 5 and 10 year plans only have training for their staff.
- The LIC is attempting to arrange with the University College of Belize (UCB) to offer GIS training through a natural resource program which the latter are establishing.

- The UCB have some computers and Arcview software but no one to operate the equipment which has been idle for 18 months. The LIC has been asked for support and may assist in setting up and implementing the program.

Dominica: *Keith Nichols*

- Dominica has received some GIS equipment and training but there is no one person responsible for GIS. The training was received from the French Government.
- Physical Planning is the obvious place for the central repository (refer to Dr. Joseph Bannis, PS; and Mr. Alvin Bernard, Senior Officer).
- Dominica may benefit next from the aerial photography project currently being undertaken for St. Vincent and the Grenadines.

Grenada: *Keith Nichols*

- Grenada has experienced difficulties in the application of GIS technology. Until 1998, the physical planning department had computer equipment in boxes for several months, but had no resource person who could set it up.
- A UN consultant was based in Grenada at the Physical Planning section for a year from early 1998 for the purpose of undertaking GIS training and data base development. Additionally, he also spent two weeks with Dr. Opadeyi at the land Survey Department at the UWI, St. Augustine campus in Trinidad. There were reported to be some fairly advanced users in Grenada.
- The Fisheries Department does not currently have the capacity but could be a possible repository for the GIS data. Physical Planning is the next best option, but the former is fully staffed, unlike the latter.
- Two staff members of the Physical Planning Unit received training through the OECS-NRMU in ArcView at the Cable and Wireless training facility in St. Lucia.

Jamaica: *Marc Rammelaere*

- Institutional Issues
 - The NRCA is to be merged with Town Planning Department, Warden Service and Land Development Utilisation Committee (LDUC) to become an executive agency. This is being done under the Public Sector Modernisation Program. This re-organisation will make it easier to access the spatial information being held by Town Planning Department, Warden Service and LDUC. Under this merger the IT department will see its staff increased from 4 to 9 people. Two of these 9 staff members will be entirely dedicated to the development and implementation in GIS within the organization.
 - The New Land Agency will be formed from the merger with the Survey Department, Land Evaluation and Estates Department and the Offices of Titles.
 - The NRCA considers itself both as a service department in terms of providing a product and as a repository of data. The agency is considered as one of the leading GIS departments of government, but an increasing number of government departments are implementing or plan to implement GIS.

- The NRCA plays a key roll in the water quality monitoring component of the Coastal Water Improvement Project and will be the repository of the water quality data created by this project.
 - Jamaica is currently preparing a Land Administration and Management Project (LAMP). The objective of the project is to promote the efficient administration and management of land resources in Jamaica in an integrated and sustainable manner. The project is organised around four components, Land Registration, Public Land Management, Land information Management and Land Use and Development. The project preparation is being coordinated out of the Office of the Prime Minister in collaboration with the Ministry of Environment (MOE&H) and a task force of government and statutory agencies. The project will be implemented by the MOE&H and its five sub-executing agencies.
- GIS and Information Systems
- The Natural Resources Conservation Authority (NRCA) is in the process of developing an institutional GIS system and is installing a organisation-wide local area network. It is the NRCA's objective to become fully computerised. The main short coming, the lack of databases to support the agencies activities is being addressed with the development of the Environmental Permit and Licence system database. This database will included data from the Permit and Licence systems (effluent, air emission and solid waste), the beach licensing system (beach encroachments), the Section 17 reports (info on pollution sources); the environmental incidence reports; and the enforcement notices.
 - Currently applications from developers are submitted in hard copy but the NRCA is considering requesting that the applications be also submitted in a digital form. To facilitate the entry of the data in a GIS system NRCA will also be requiring that the information in the applications is georeferenced.
 - Most of NRCA's GIS coverages are land based. The only marine coverages were produced for the coastal atlas which includes a bottom classification using satellite imagery interpretation (distribution of reefs, sea-grass etc.) and detailed description of the coastline. NRCA's land based coverages were produced to visualize the environmental issues in areas that are protected or are considered for protection. These are the John Crow & Blue Mountain National Park in the East of the country, the Negril Marine Park & Protected Area in the West, the proposed protected area of the Black River, St. Elizabeth and the Palisadoes.
 - The NRCA is trying to empower local management groups. The NRCA is not only trying to keep the public and the NGO fully informed but it is also seeking the support of the local communities group to gather information which the NRCA needs to become more effective and proactive. The NRCA has developed such working relationship with a few NGO but does not have the resources to implement and support this approach effectively on an islandwide basis.
 - The NRCA is looking for partners to provide GIS training to NGO's and local community groups.
 - The NRCA has an island wide land use map produced in 1997 by the University of Upsalla from 1984/85 Landsat TM images for the Coastal Atlas and one produced in 1991 by Nature Conservancy from 1989/1988 Landsat TM images. The Trees for Tomorrow/ CIDA project produced this year a island wide land use map for the Forestry Dept using 1996/98 Landsat TM images. Value of these landuse map is limited use

because the resolution of the satellite images is too coarse to capture the fragmented landuse of Jamaica.

- The Nature Conservancy is preparing a project proposal to carry out a land use classification project for the Wider Caribbean region. For that purpose they plan to use satellite images that are 10 years old. Because of the poor resolution of these satellite images, it can be expected that the output of this project would not be much more useful than the first landuse classification produced by The Nature Conservancy. CPACC should try influencing this project to use high-resolution satellite imagery.
- The NRCA has also put together an environmental framework document for Black River, St. Elizabeth. This document includes 18 different maps representing various environmental features, eg. pollution sources, conflicts of land use. This compilation is used to create an overview of the environmental management issues and will be the starting point for a community area management plan.
- The NRCA has a tracking map for their sea turtles from the Argos project which provided Jamaica with two transmitters.
- The availability of digital base-maps is a basic requirement to implement GIS. The production of digital base-maps is labour intensive and by consequence expensive. In Jamaica the survey department has produced a digital version of the 1:12,500 map. These products are sold quite expensively while requiring some editing. The information is also dated since the original maps were produced from 1968 aerial photography. When the NRCA needed a digital base-map for the Eastern part of the Island, it found that it was more beneficial to develop new digital maps from the 1:50,000 map series than to expend effort in correcting the existing 1:12,500 digital base maps. The 1:50,000 maps series were produced using 1991 aerial photography.
- In the short term, the NRCA plans to produce metadata only for GIS coverages and other digital information, but on the long run it would like to prepare metadata for all environmental impact assessments.
- The NRCA has a web server but it was not yet in operation. It is intended to implement WEB GIS using ESRI's Internet MapServer. Using this technology it plans to publish the Jamaica Coastal Atlas on the Internet.
- The NRCA does not charge for data because the department can gain from sharing information. NRCA requires the receiving agencies to give back the data if they are adding to it. This has resulted in conflicts if NRCA is given data and then they give it to other organisations, especially when it is given to NGOs which means that the data gets into the private sector.
- The Fisheries Department is doing interesting work in CFRAMP and has produced a marine resource atlas. The information is not geo-referenced but they were able to bring existing information together and they acquired new equipment and software. There has been some training but it is not clear if they started database development. The Document they produced would be a good start for data base development.
- The Forestry Department has their own GIS working over the last month.
- It is the government's policy that all information generated by consultants/firms on behalf of the government agencies becomes the property of the government and as such must be properly documented and handed over to the relevant agency. This includes GIS databases.

- Institutional Issues
 - Government’s policy states that all data created by government agencies is a corporate resource and therefore should be easily accessible and available to all agencies of government on request. However, this has not been adopted/implemented across all agencies as is required. This has largely been due to programmes that require agencies to become self sustaining and generate profit. The resulting situation is that agencies are asked to pay large sums for digital land information.
 - Issues involving standards and copyright are still to be resolved. The Land Information Council of Jamaica is responsible for resolving such issues. The work of the Council is executed through the voluntary participation of land and land related agencies through 11 sub-committees.
 - The government is presently designing a National GPS Action Plan and developing GPS capabilities to initially assist in the execution of LAMP cadastral surveying activities. It has been estimated that cadastral surveying costs will be significantly reduced using GPS. It is expected that other sectors/activities e.g. marine and data collection activities will benefit from the national GPS network that is proposed to be established
 - In order to gain maximum benefits from the GPS CORS station being installed by CPACC, the government of Jamaica will be extending the use of the station by providing “add-ons”. With the add-ons this station will become one of a three station GPS network for Jamaica. This option has allowed some cost savings.
- Training
 - The LICJ in association with MIND operates a GIS training laboratory. The objective is to offer Government agencies and the private sector GIS training. To optimally utilize the laboratory, plans are to undertake data conversion and other GIS related business in the lab outside of training time. This has not become a reality due to the scarcity of resources.
 - Approximately two courses are scheduled per month. Course fees are minimal, ranging from JA\$3,500 for a 3 day course to JA\$ 6,000 for a five day course. The courses are conducted by GIS MSc graduates and experienced GIS practitioners. Some of the courses conducted are Introduction to Arcview, Introduction to GIS, Data Automation etc. The laboratory is small and accommodates 12 persons at maximum. The Arcview courses are always heavily subscribed.
 - GIS training was developed after recognising the need to train technicians to become proficient in data capture and analysis.
 - There is also an executive GIS course offered to Heads of Departments and CEOs. This has been conducted twice.
 - The Council has decided to develop additional courses and improve existing courses
 - It was recognised that there is a need to develop/create Jamaican data sets for GIS exercises, as non familiar/foreign data sets are largely used.
 - There has been a demand for a new course which addresses the development, implementation and management of GIS.
 - There is also a need to develop GIS programming capabilities
 - The LIC has standardised on ESRI products. ESRI products are used by a large percentage of users in both the government and private sectors. They want to use Arcinfo

to the maximum benefit and recognise that there is a need to develop programming skills. West Indies Home Contractors has done some programming/customization in Arcview.

- In the long term the Land Information Council wishes to hand over the training portfolio to the Management Institute of National Development (MIND). The Council also wishes to have their courses certified and to forge links with other training institutions regionally and locally to share in course development and credit transfer among other issues.
- The LIC also wants to work with training institutions and build on training initiatives/programmes/materials etc. that already exist in region.

St. Kitts & Nevis: *Keith Nichols*

- The islands of St. Kitts and Nevis may have to be viewed separately in terms of technical assistance. The OECS regards the islands as one country but believes it would be necessary to treat them as two entities. It was noted that this may cause problems with human resources and computer resources in terms of maximising the efficiency.
- Public officers from both St. Kitts and Nevis received training in GIS. In the case of St. Kitts, the individual who was the focus of the GIS development activities has subsequently left for extended study. Others in government have limited experience, so there is limited capacity to progress with GIS in St. Kitts and Nevis.

St. Lucia: *Elizabeth Charles-Soomer*

- The Ministry of Planning tends to do too much work for other agencies and is therefore wary of adopting the entire GIS role but see themselves as the central repository.
- There was awareness since 1986 in the Land and Survey Department in St. Lucia but there was no demonstration of what money could be made from GIS.

St. Vincent: *Keith Nichols*

- St. Vincent has a GIS unit within the Physical Planning Department, but the unit has much wider activities.
- St. Vincent's GIS capacity has doubled recently with the purchase of new equipment.
- There is an aerial photography project currently being implemented through the OECS NRMU, but which has been delayed because of unsuitable weather. The benthic resources of the southern part of St. Vincent and all of the Grenadines will be mapped shortly.

GENERAL DISCUSSION:

Coastal Zone Definition

- CPACC will adopt a narrower definition. Ian King confirmed that CPACC has been asking countries to define their coastal zone since Guyana, St. Vincent, Bahamas are all different for example.
- Keith Nichols noted that the NRMU considered the whole island as a part of the coastal zone. He explained that the impacts on the coastal waters from inland sources have to be dealt with

in order to address the threats to the near-shore resources. Additionally, not many agencies in the OECS are charged with "coastal zone" concerns so a broader definition may be necessary eg. beach was seen only as a source of building aggregate, mangroves seen as forests.

- It was also argued that the whole island can not be termed a coastal zone from a practical management perspective. This broad definition may be considered relevant if consideration is given to the interaction among phenomena. In the context of the CPACC project it was largely agreed that the narrower definition was consistent using the broader issue of climate change and sea level rise.

GIS and Data Issues

- Ian King confirmed that new data collection for GIS in the project have to be area specific and theme specific but will be determined when consultants go into the field and determine what is the relevant area.
- It was suggested that the project may want to focus the pilot components on areas where there is little or no information, but the country will make that decision.
- CPACC has made recommendations for the location of the central repository but each country will decide where the repository will reside.
- Jacob Opadeyi suggested that it must be determined what are the criteria for a repository; what is the institutional structure and what is the attitude of organisation.
- Jacob Opadeyi also commented that in the Caribbean most GIS units developed out of someone being interested in GIS. As a result, there was often no GIS title, department or even portfolio and persons move from one department to another or leave altogether, resulting in the loss of capacity. He noted that it was dangerous to assign duties to a department with no specific mandate. He was of the opinion that the group should recommend the best approach, which was to have a GIS department with capable officers. GIS activities can be killed if the director is not interested in GIS.
- Yuri Chakalall expressed that the workshop session should not limit itself to the repository criteria and training needs. Ian King responded that the meeting was not restricted as indicated, but the two issues were most pertinent.
- It was noted that if CPACC is dealing with climate change then it was necessary to look at both national and regional capacities.
- Marc Rammelaere noted that digital information is difficult to copyright since work can be done again. It was noted that there were some strategies to address this including introducing an insignificant, but known error in the databases.

Planning and Follow-up

- Elizabeth Charles-Soomer commented that since CPACC is 4 year project, she would not recommend a new department be formed even though this is the long term goal. She felt that it is necessary to look at requirements outside of CPACC as well as CPACC specific requirements since each country had signed conventions and needed to implement national plans as a result of these agreements.
- Ian King agreed that CPACC should fit into what the country is doing currently, but there is also a need to establish how the information and systems would fit in and work together.
- Keith Nichols expressed that the success of this project depends on the use of data, which is tied to a need for the information. He felt that it may be necessary to show the benefits of

using the system and disadvantages of not using it in terms of efficiency. Those who affect policies must be sensitised so that the project is driven from the top to ensure the delivery of the product at the end. CPACC must examine how the project is sold at the national level. He emphasized that we should not be doing this for the sake of a project and that if we believe there is a real threat to our coastal resources then we must start by convincing the policy makers at the top or it will not be effective. Additionally, he points out that in countries where there is no feedback or reporting, this is often because there is no reporting structure upward to ensure that the agency is responsive. Ian King commented that there is always this challenge with projects and focal points.

- Jacob Opadeyi suggested that CPACC should co-host a meeting with the ministers responsible who can be presented with the need for GIS in region. It was suggested that getting ministers to attend a specific meeting is difficult but a presentation to an existing meeting would be more effective. It was pointed out that CPACC made a presentation to a CARICOM Heads of Governments meeting in Grenada in March 1998.
- Elizabeth Charles-Soomer commented that projects like CPACC are not incorporated in the work-plans at the national level and that if the project is not in the work-plan then there will be no time or effort allocated and it will sit on the periphery. This is what happened to CFRAMP.

Training Discussion

A discussion on training ensued where the following issues were raised:

- Keith Nichols pointed out that CIDA has funded a project for the OECS with a significant GIS component for environmental capacity development. The project was not yet designed but includes institutional strengthening, GIS training and capacity building. The project was limited to OECS member states and it was agreed that states will say what they need and not be imposed upon.
- In the OECS short term training has been provided which has sometimes been associated with projects eg. the Integrated Development Planning (IDP) Project.
- Dominica and St. Lucia have received some level of training through the IDP project. Antigua only requested equipment support through the IDP project.
- Other training has been provided for St. Kitts, Nevis and Grenada.
- A question was asked as to whether OECS, CPACC and UWI could collaborate on training. Keith Nichols responded that OECS uses Cable & Wireless extensively for training, but there is room for additional training which is more specific than application training. He noted that there has been exposure by IDAS to the Arcview software and related applications, but no further training on what to do with it. IDAS is a software and services vendor and therefore is mainly interested in supplying these products.
- Elizabeth Charles-Soomer identified difficulties in getting training for application in specific disciplines, such as planning in her case.
- Elizabeth Charles-Soomer commented on difficulty with funding if the consultants from the funding agency's country are not being used and there is no regional centre for training established.
- Ian King commented that CPACC has made a point of using expertise from the region. Keith Nichols noted that OECS also attempts to do this. He felt that if expertise from the

region is not utilised it will not develop and the dependency on external assistance will remain.

- Noreen Fairweather pointed out that it is important to be able to negotiate this when funding is being granted and that she had been successful in doing so in Belize.
- It was expressed that there was also an opportunity to attract technical assistance from sister governments who sometimes would be willing to provide assistance at a minimal or no charge.
- Marc Rammelaere felt that to be effective GIS training should be designed to reflect the specific needs and interest of the various user-group.

Needs

The following needs were identified by the participants based on a submission by Dr. Opadeyi ([Annex 7](#)):

1. In Jamaica, the IT branch of the NRCA needs more human resources but this may be resolved by the upcoming merger of the NRCA with TPD & LUDC.
2. Development of manuals that are specific to the area in which people are working. CPACC should provide training manuals that can be handed over to countries for on site training.
3. Bathymetric maps
4. Data base development to create information
5. Training for people on how to get information from the system
6. Establishment of standards. Data exchange and data conversion is becoming less of an issue but consultants should be made to use a format which can be interchanged with other systems
7. A template for GIS development such as the official guideline which Marc Rammelaere has for Jamaica.
8. GIS data clearinghouses need to be established and their roles clearly defined at the local level.
9. To undertake clearing house roles, the levels of training need to be identified.
10. Attachment at other agencies, both local and regional should be adopted as training strategies.
11. Short courses, including at the UWI, should be adopted for training in technologies of data capture.
12. Limitations of equipment in the relevant units needs to be identified
13. Identification of basic infrastructure for an agency to become a repository
14. Clarification of the “coastal zone” in relation to CPACC activities. It was noted that CPACC has identified the near shore area as the critical area
15. Need to look at national requirements outside of CPACC as well as CPACC specific requirements since each country has signed conventions and need to implement plans.
16. It was noted that standards are needed for marine habitat mapping.
17. High resolution and accurate data for the countries.
18. A national GIS database to be used as a starting point for further development. This does not have to be expensive noted Jacob Opadeyi, as in the case of Trinidad and Tobago producing a national database for approximately US\$6,000.
19. An effective and coordinated network of GIS agencies, expertise and databases, as well as a national GIS society.

20. Common standards are needed across the region to ensure compatibility and to assist countries in benefitting from the experience of others as well preventing the adoption of inappropriate strategies and approaches.
21. There is a need to change attitudes amongst technicians and policy makers to the use and management of GIS capability.
22. Development of GIS centres of excellence to facilitate propagation of expertise and standards.
23. National policy on key issues affecting the development, application and management of GIS and related technologies.
24. More networking is needed to make use of resources and build expertise in the region
25. There is a need to research and use models in other countries in terms of the approaches to payment for data.
26. Additionally, there is a need for a cost benefit analysis of cost recovery options.
27. In many countries there is a need for a systematic land tenure registration
28. It was suggested it would be useful to have national input into what the CPACC consultants are contracted to do at country level including a feedback mechanism on data sets being utilised.
29. Following the previous recommendation, it was also noted that CPACC should call a meeting with the focal points, consultant and the relevant agencies so that there is consensus on the plan of action. There was an alternative view that there should be consensus before consultants arrive and begin meeting with country representatives.

Component 3 Status Discussion

- Reference was made to the handout on the Request for Proposals from consultants which outlines what is to happen in Component 3 (Annex 3). CPACC has received proposals from consultants which were being assessed.
- Training for selected local agencies is to be included in the CPACC Component 3 process.
- The question of whether CPACC was only going to focus on limited areas and themes or on the entire marine area in the inventory, data collection and analysis activities was raised. Ian King responded that the consultants will determine what is required and what is missing and then gather the required data for the respective pilot projects.
- It was noted that the national focal points were not necessarily equipped to determine issues in marine areas. Ian King responded that specific lead agencies in the countries were identified for each of the CPACC components, and these were not always the national; Focal Points. In the case of Jamaica, even though the national Focal point was the meteorological service, the NRCA and the Centre for Marine Science were lead agencies for Components 3 and 5.
- The meeting was informed that information will be circulated electronically to keep people informed on the status of the project and Component 3 in particular.

Repository Discussion

- Individual countries have to decide on which agency will become the repository for CPACC generated data, particularly spatial data.

- Existing data sets may continue to belong to the original owners and be accessed from those agencies. All metadata generated should reside at UWICED for central storage and access. It has not been determined whether the entire dataset generated in the project would also reside at UWICED. The specifics of a possible Climate Change Centre as a follow on to the CPACC project had not been determined.
- The sustainability of the data was strongly emphasised and therefore the coastal inventory should feed in to some other mechanism to continue the process.

Characteristics/Criteria For Central Repository

The agency will have:

1. A related function and/or related data base
2. The capacity to administer data - availability of personnel & experience
3. Basic hardware/software including Internet connectivity
4. Financial resources for upgrade of hardware/software and physical resources.
5. Existing efficiency in managing data
6. Stability of personnel (related to 2 above)
7. Experience in data management and data sharing
8. Institutional structure and mandate

Training Needs

Training is required for the areas listed below:

1. Needs Assessment/User Requirements Analysis
2. Database Design and Development
3. Integration of Databases
4. Adaptaation and building of friendly user interfaces
5. Geoidal Computation
6. Use of GPS and spatial data collector
7. Building of applications, particularly in the following sectors:
 - 7.1. Utilities
 - 7.2. Natural Resource Management
 - 7.3. Business Geographics
 - 7.4. Cadastral Systems
8. Use of Remote Sensing as spatial and attribute data collector
9. Use of Digital Photogrammetry techniques not only for mapping but also for updating maps of small areas
10. Digital Cartography
11. Project planning, negotiation and management
12. Design, development, adoption and maintenance of Geomatics standards
13. Creation and management of Metadata
14. Datum transformation
15. Data conversion
16. Geostatistics

17. Spatial analysis and modelling
18. Temporal databases
19. Error analysis and modelling

Ian King commented that CPACC training is not restricted to the repository but the project cannot address all the regional problems associated with training.

It was agreed that a general training model should be identified and initiatives such as CPACC could structure activities in that context.

Constraints To The Provision of Training

1. Absence of coordinated approach at regional level to training
2. Existence of only vendor driven training rather than user/application driven training
3. Lack of pre-requisite knowledge for courses
4. Multi disciplinary nature of GIS
5. Insufficient exchange and use of regional resource personnel
6. Accessibility of training locations - cost of getting to location and cost to organisation of missing personnel for long periods
7. Lack of success realised in GIS acquisitions in the past - a project approach rather than a program approach/process approach
8. Funding agency agendas differ from national agendas
9. General cost
10. Lack of collaboration/communication between agencies

Approaches To Training

1. Provide a training guideline with phases and core courses.
2. Provision of self pace courses or manuals.
3. Distance education.
4. Using regional data for training, adapting courses to regional data sets - CPACC could use datasets it is creating for training.
5. Exchanges and attachments.
6. Provision of on-site training.
7. Directory of professionals with skills.
8. Need for core training.
9. Training in applications development.
10. Encourage the use and involvement of regional resource personnel.
11. Developing/formation of 4 regional training centres - Barbados, Trinidad, Jamaica, St. Lucia.
12. Training of multiple groups at once across agencies to make the activity cost effective. This would emphasise the importance of collaboration amongst agencies.
13. Production of manuals for training elements in the CPACC project.
14. General announcements of training in the region so that attendees can participate by covering their own costs.
15. Scheduling training before or after regional activity/conference to maximise cost effectiveness and convenience of participation.

16. Where training programs under the CPACC project are conducted by extra-regional consultants, funding should be allocated for at least one resource person to attend as a “train the trainer” exercise.
17. Establish a structured plan for each country of training requirements.
18. Increase the training of trainers.

RECOMMENDATIONS TO CPACC FOR FACILITATION

1. Capacity building for the collection and management of geographic information - training & technical support, meta data, advocacy, standards workshop, acquisition and production of base data.
2. Utilisation of remote sensing along with training.
3. Filling data gaps using influence to get better rates from providers of information gathering services.
4. Ensuring that data meets objectives, using appropriate technology.
5. Purchase the most efficient package when buying satellite services even if it extends beyond the pilot area.
6. CPACC must point out that resource people must be supplied and focal points must know what type of profile is required for this person.

ANNEX 1: ATTENDANCE

- Dr. Jacob Opadeyi, Geospatial Centre, Engineering Institute, Faculty of Engineering, UWI St Augustine, Trinidad and Tobago. Email: jopadeyi@hotmail.com
- Mrs. Elizabeth Charles-Soomer, Ministry of Planning, St. Lucia. Email: est_mpde@candw.lc
- Ms. Cecile Blake, National GIS Coordinator, Office of the Prime Minister, Jamaica. Email: cblake@cwjamaica.com
- Mr. Marc Rammelaere, Systems Manager, Natural Resources Conservation Authority, Jamaica. Email: rammelae@infochan.com
- Ms. Noreen Fairweather, Head, Land Information Centre, Belize. Email: LINCENBZE@BTL.NET
- Mr. Yuri Chakalall, Coastal Planner, Coastal Zone Management Unit, Barbados. Email: chaka@caribsurf.com
- Ms. Althea Batson, Research Officer, Coastal Zone Management Unit, Barbados. Email: abatson@coastal.gov.bb
- Mr. Keith Nichols, Program Officer, OECS Natural Resources Management Unit. Email: oeccs@candw.lc
- Ms. Marjo Vierros, Interim Program Officer, UNEP/CEPNET: Email: marjo@cwjamaica.com
- Ian King, Information Systems Coordinator/GIS Specialist CPACC RPIU. Email: kingcpacc@sunbeach.net
- Mrs. Suzanne Shillingford-Brooks, Part-time Assistant, CPACC RPIU.

ANNEX 2: STRUCTURE, OBJECTIVE AND CONTEXT OF MEETING
Ian C King, Information Systems Coordinator/GIS Specialist CPACC RPIU

Structure of Meeting

The meeting is organised in four distinct components:

Review of GIS status and needs
Corrections/additions to RPIU GIS report
Other surveys and findings
General findings
Review of regional initiatives to address needs
General strategies to address defined needs
Strategies to address needs in the context of CPACC Component 3.

Objective

To identify an effective and efficient intervention for the CPACC project in capacity building for GIS and spatial information management and dissemination.

Context

This activity comes under Component 3 - Inventory of Coastal Resources and Uses. The overall objective of this component is to advance each country's inventory of coastal resources and to provide the baseline data for the execution of other project activities. Details of the Component 3 process will be presented later in the schedule.

Under Component 3, one of the activities specified in the Project Document is to

Consolidate, evaluate, and computerize (GIS) existing information in each participating country; provide necessary GIS training.

This goal is to be achieved through several strategies. The main approach is through the use of consultants as outlined in RFP for component 3 (see document). Consultants will be required to undertake most of the tasks specified, including the provision of training, including hands-on training. The proposals were all received at the end of January and will be assessed over the next two weeks.

Additionally, the RPIU has undertaken activities in this area including:

- A workshop addressing coastal inventorying as well as metadata development and management (including tools)
- Assessment of GIS resources and capabilities – primarily for organisations likely to be involved with the assessment and mitigation of climate change impacts in the coastal zone

- Supported the development of the Certificate in GIS program through the establishment of a geomatics facilities at CERMES, UWI Cave Hill
- Established two scholarships per year to the Certificate in GIS program.

Meeting Outcomes

Although CPACC has invited proposals from consultants for the implementation of the data cataloguing and automating as well as preparing coastal resource inventorying systems and supporting training, the CPACC project is seeking input from experienced GIS practitioners on the most effective means of improving capacity.

The outcomes of this meeting will therefore inform the approach that CPACC will adopt and also assist in advising the consultants on strategies regarding training.

ANNEX 3: SCOPE OF WORK
Request For Proposals
Inventory of Coastal Resources and Uses Consultants
Caribbean Planning for Adaptation to Global Climate Change.

Scope of Work

The coastal resource data for the proposed project will include coastal physical characteristics, natural environments, and information on the use of coastal areas and resources.

The inventory will take into consideration the widely varying coastal zone resources, existing inventories, and analysis capabilities in the region. Under this component, all twelve participating countries will acquire metadata capability, and existing data will be collated and computerized.

Training will be provided in aspects of resource inventory development (data cataloguing, database design and development, and data automation and conversion) and should be incorporated into the implementation of coastal resource design and development activities undertaken by consultants, where possible.

All twelve participating countries will need new data to support pilot project implementation during the implementation of this component.

The Inventory of Coastal Resources and Uses Component will be implemented in twelve CARICOM countries (Guyana, Trinidad and Tobago, Barbados, Grenada, St. Vincent and the Grenadines, St. Lucia, St. Kitts and Nevis, Dominica, Antigua and Barbuda, Jamaica, Belize and the Bahamas).

It is envisaged that the inventory of coastal resources and uses will comprise three phases defined by, but not limited to, the listed activity elements:

ANNEX 4: COMMENTS FROM C. A. ALBURY ON GIS REPORT

3. SUMMARY OF GIS IN CPACC COUNTRIES - Bahamas

THE BAHAMAS

In The Bahamas, several agencies have GIS capability, including:

- 1) The Bahamas Environment, Scientific and Technological (BEST) Commission
- 2) *The Bahamas National GIS Centre* in the Office of the Prime Minister.
- 3) *The Department of Physical Planning Office of The Prime Minister*
- 4) *The Royal Bahamas Police Force*
- 5) *The Bahamas Electricity Corporation*
- 6) *The Bahamas Telecommunications Corporation*
- 7) *The Bahamas Water & Sewerage Corporation*

The former, through one of the Commission members, Mr. Philip Weech of the Water and Sewage Authority, serves as CPACC's NFP. Several other agencies appear to have access to GIS as well, but it appears that the two already mentioned are the main ones from CPACC's perspective.

1. The Bahamas National GIS Centre (formerly The GIS Unit) in the Office of the Prime Minister

2. Origin

The Bahamas National GIS Centre had its origins in a recommendation from a Ministry of Public Works Committee in 1989 to review the applicability of the technology for the coordination of public utilities' activities¹. Phase I consisted of a project in 1990 in which three of the utility companies provided \$40,000 Bahamian each to facilitate the development of GIS capacity focussing on the acquisition and digitization of maps and photos of New Providence Island, *with the Department of Lands and Surveys providing maps and aerial photographs and the Department of Physical Planning coordinating activities related to Phase 1*. By 1992, the GIS database of New Providence had been completed and *Phase 2, the establishment of a coordinating unit (The GIS Unit, new name The Bahamas National GIS Centre) had* been commenced with the establishment of The Bahamas National GIS Centre under the port folio of the Ministry of Public Works.

Following the continued development of the GIS facility, a user needs analysis and proposals for further development took place in 1995. A Cabinet Paper proposing this and other recommendations resulted in The Bahamas National GIS Project, which received support from the Inter-American Development Bank and the Japanese Government. The project seeks to

¹Discussion with Carolann Albury, *GIS Technical Supervisor*, GIS Unit, October 1998

address the development and application of GIS throughout government agencies and nationally. The concept calls for a corporate GIS and the strengthening of The National GIS Centre. Components include:

- Geographic Information Policy Development including a National Data Management Strategy for all participating agencies
- Information Systems (technology)
- Technical Assistance consisting of training and database development
- Pilot Projects (environmental)
- *Land use and Administration Study*
- *Recommendations for International standards for GIS metadata development and national GeoSpatial Data Clearinghouse mechanism*
-

Conditions Precedent to Project implementation include:

- *Assignment of a National Coordinator*
- *Establishment of a GIS Steering Committee*
- *Additional Staff for the National GIS Centre*
- *Signing of Memorandum Understanding by participating agencies*
- *Office accommodations for the GIS Centre*

The project was at the stage in October of final selection of the consulting team from submitted proposals.

Personnel

The Bahamas National GIS Centre comprises three officers with varying levels of experience and training. *The GIS Technical Supervisor of the Centre* is a graduate who has been involved with the development of GIS *in The Bahamas*, from the beginning and has been exposed to a number of training and conference activities. The two other officers consist of a technician and a data entry operator.

Infrastructure

The GIS Unit is equipped with a network of three computers, two large format digitizers, a plotter, an engineering size copier as well as printers, and other peripherals. The principal software is Autocad, ArcCad and ArcView. As a result of the Centre's focus and those of the agencies that it assists in the areas of training, database development and hard copy outputs, the available databases are concentrated on infrastructural and economic themes.

Through The Bahamas National GIS Project, the National GIS Centre should acquire additional hardware and software as well as additional personnel. The Centre, through the pending project (*tentative start-up date, January 1999*) should address issues such as training and data management increasing the efficacy of CPACC activities in these areas.

Constraints and Needs

Up to October 1998, the *GIS Centre* was waiting to move into more suitable accommodation in order to undertake the National GIS Project. The Project should also address training and equipment needs for the department and other agencies. Under Component 3, CPACC should assist in addressing the deficiencies in coastal databases, which have had little attention to date. Additionally, CPACC's emphasis on metadata development is timely given the current attention to data management.

The Bahamas Environment Science and Technology (BEST) Commission

The CPACC NFP in The Bahamas is The BEST Commission, which is mainly a policy development and coordinating agency. The Commission consists of representation from many agencies and has a relatively small core staff. A representative from one of the member agencies serves as the lead for CPACC activities.

Origins

The BEST Commission developed a GIS using the MapInfo software in mid 1997 and funded by the Commonwealth Fund for Technical Cooperation (CFTC). The purpose of the initiative was described in the Final Report of the CFTC Funded Project as to allow speedy preliminary assessment of the environmental impacts of development proposals.

Personnel

The BEST Commission has one staff member who appears to have responsibility for the GIS and other information systems. This person has a wide range of other responsibilities and also, limited training in GIS. Generally speaking, GIS is not the individual's main responsibility.

Infrastructure

The GIS was described as primarily an inventory of islands and cays based on 1:250,000 data. Additional data for the main islands were incorporated from 1:100,000 maps. The initiative also reviewed GIS data and training needs of other institutions in the country and tasks to be completed. As noted earlier, MapInfo is the software used and a desktop PC stores the software and data. However, the PC is not dedicated for GIS activities.

Constraints and Needs

This GIS facility appeared static with little activity following the report and lack of full cooperation from local agencies in the proposed follow-up. Even in some of the activities undertaken by BEST for which the development or application of the GIS would have been relevant, the GIS was not utilised. Compounding the situation is the limited staff resources of the agency. The development of a National GIS Project also appeared to have taken little notice

of the BEST MapInfo facility. The limited databases and the coarseness of the data sources have probably limited the usefulness of this resource.

If GIS is to be applied within the Commission, there will need to be an investment in personnel, training and equipment.

Fisheries Division

The Fisheries Division currently no GIS capacity, but will be a key operational contact for Component 3 and Component 5 matters. GIS is an area of some interest, particularly given the resource management mandate of that department.

Recommendations

Although the BEST Commission is the CPACC NFP and the focal point for Component 3, the expertise, mandate and activities of ***The Bahamas National GIS Centre*** appear to recommend it as the best choice for a repository of the GIS data. Further, CPACC should work closely with that department in delivery of training and implementing the GIS components of the project. Beyond working with the GIS ***Centre*** in the implementation of Component 3, it may be beneficial for the Fisheries Division and the BEST Commission to also benefit from some aspects of the scheduled training.

Appendix 1: Summary of Findings

1 Country	Institution	Equipment	GIS Software	Personnel	Comments
Antigua & Barbuda	Development Control Authority	<ul style="list-style-type: none"> ▪ 3 stand-alone PCs ▪ 1 plotter ▪ 1 large digitizer ▪ 1 printer ▪ 1 scanner 	<ul style="list-style-type: none"> ▪ ArcView ▪ ArcInfo 	3 draughtsmen <ul style="list-style-type: none"> ▪ supervised hands-on training in data automation ▪ short workshops at CAST in Jamaica 	DCA <ul style="list-style-type: none"> ▪ inadequate data management ▪ inadequate office security Fisheries Division <ul style="list-style-type: none"> ▪ possible repository for CPACC data with support ▪ CPACC NFP
	Fisheries Division	<ul style="list-style-type: none"> ▪ no dedicated hardware 	<ul style="list-style-type: none"> ▪ none 	<ul style="list-style-type: none"> ▪ limited exposure to GIS through workshops 	
The Bahamas	<i>The Bahamas National</i> GIS Centre	<ul style="list-style-type: none"> ▪ 3 networked computers ▪ 2 large digitizers ▪ 2 plotters ▪ 1 large format copier ▪ printers ▪ other peripherals 	<ul style="list-style-type: none"> ▪ ArcView ▪ Mapinfo 	<i>1.1.1 Head of Centre's operations</i> Experienced GIS practitioner 2 Technicians <ul style="list-style-type: none"> ▪ Mainly hands-on training and experience 	National GIS Centre <ul style="list-style-type: none"> ▪ Improved equipment & accommodation with start of National GIS project ▪ Likely GIS repository for CPACC databases
	BEST Commission	<ul style="list-style-type: none"> ▪ 1 PC (not dedicated) 	<ul style="list-style-type: none"> ▪ MapInfo 	Technical Officer <ul style="list-style-type: none"> ▪ Limited exposure to and experience with GIS; mainly MapInfo 	BEST Commission <ul style="list-style-type: none"> ▪ Limited resources ▪ Limited application of GIS facility and databases
	Fisheries Division	<ul style="list-style-type: none"> ▪ no dedicated hardware 	<ul style="list-style-type: none"> ▪ no GIS software 	<ul style="list-style-type: none"> ▪ limited exposure to GIS 	Fisheries Division <ul style="list-style-type: none"> ▪ CPACC NFP ▪ Main users and collectors of coastal and marine ▪ Component 5 Focal point
	Coastal Zone Management Unit	<ul style="list-style-type: none"> ▪ 2 stand-alone PCs ▪ 1 plotter ▪ 1 large digitizer ▪ 1 A2 sized laser printer ▪ GPS base station and roving units 	<ul style="list-style-type: none"> ▪ ArcView ▪ AutoCAD 	Technical Officers <ul style="list-style-type: none"> ▪ One undertaking the '98-'99 CERMES GIS Certificate Course ▪ Some working with GIS and short training courses Draughtsmen <ul style="list-style-type: none"> ▪ Experienced in AutoCAD 	
		<ul style="list-style-type: none"> ▪ 	<ul style="list-style-type: none"> ▪ 		

ANNEX 5: BELIZE PRESENTATION
Ms. Noreen Fairweather, Head, Land Information Centre, Belize

The primary objective of the Land Information Centre (LIC) is to use its data resources for the improvement of all aspects of land management and allocation in Belize.

In Rio de Janeiro, June 1993, Belize signed the Convention on Biological Diversity. Since then, we have entered into numerous international agreements on issues of natural resource and environmental management and monitoring.

In recent years Central American countries have been aggressively pursuing regional initiatives in various areas with regards to strategies for development. A number of these forums were particularly directed toward the Environment and Biodiversity. Among them, the Central Alliance for Sustainable Development (ALIDES).

Like our Mesoamerican and Caribbean partners there is a lot of data being collected by numerous government and non-government organizations "nationally". In recognition of the potential for duplication, poor allocation of human and financial resources, poor and sometimes impossible access to existing data, the Conservation and Environmental Data System (CEDS) initiative was conceived with a membership of seventeen organizations.

CEDS formalizes the relationships among data gathering organizations both within government and without. The basis of this relationship is data sharing, so often a weakness in other countries. In June 1995, the physical CEDS Network was established with "dial-up" access . While we are experiencing some problems, among them communication on the Network, lack of human resources and strong sustainable measures. These can all be overcome with some effort and dedication from the membership.

The LIC is the Secretariat and National Node of the CEDS , the role of which has been defined and characterized as follows; define data standards, identification and prioritization of data, establish memorandum of understanding with generators of the data, input quality data and maintenance of catalogue, classify data in accordance with article 8 of the convention. Characteristics- has capacity to administer the data, confidence of the users, has highest quality data, good financial and physical resources, stable - reliable support, fewer changes in personnel, impartiality - no conflict of interests, attitude of key personnel towards data sharing.

CEDS members share and access data through a Memorandum of Understanding, which is based on honour since Belize does not have copyright laws at this time. This is a simple two page document which includes, provision for sufficient notice to execute requests, return copies of information/data generated from request, disclaimer on quality, access permissions etc. Also, what type of info is to be shared (environmental library categorization for data) , who can be a member, data must be accompanied by history/source sheet. The system uses Novell, however plans are on-stream to change to Windows NT. - Intention is to put metadata catalogue on the web

LIS and GIS components of the LIC report to the Permanent Secretary of the Ministry of Natural Resources and the Environment. CEDS reports a Policy Committee, which is made up of nine members.

The LIC has a number of national datasets in digital format. These include Forest Cover >96 (LIC), Land Use 89/92 (LIC), Land Systems 85/92 (NRI), Natural Vegetation >95, Census >91 (CSO), Biological Corridors and all the baseline data coverage. The Protected Areas Map is also kept current.

At a provincial level, we have just completed the Land Use Land Cover mapping of central Belize-Nov. >98. There is also a classified mangrove coverage of the coastal plains (Zisman), cadastral surveys, SDA zoning plans and Marine Habitat Map.

At a regional level, the LIC has Natural Vegetation Map, Protected Areas and Biological Corridors A97 for Central America.

Other issues raised:

- Information on the marine side is missing and is weak
- CZMP needs to participate in CEDS
- USAID funded original project and agencies who had indicated GIS got GIS capability
- Will not be undertaking training on their own

Question asked on hardware support and network support where will this come from since this is difficult especially for GIS specific hardware

- there are limitations throughout the region in this area
- the centre could also meet this need.
- Belize uses the Internet to send help messages and they get good response
- IDAS has also offered help
- Stick to mainstream brands

CONCERNS/UPDATE - RE. REPORT

CZMP no longer has a personnel with GIS capability. This organization has changed GIS staff at least twice in almost equal number of years. The newly hired data manager has received only 5 days introduction to GIS from the LIC.

CZMP has PC ArcInfo and is therefore limited when manipulating large datasets. With the additional responsibilities the LIC now has opportunities to use our resources will become less available.

CZMP is not a member of the CEDS and as such do not make their data holdings known or available to the CEDS. Data shared is usually by request to the LIC an under a MNRE/LIC Memorandum of Understanding.

LIC has acquired additional personnel with GIS training, one technician (ITC Cert.) and one Land Information Officer (B.Sc.).

Any recommendation must take into account that the Government of Belize has established a national focal point for all natural resource, environmental and related datasets at the Land Information Centre through the CEDS. While CZMP and /or the Fisheries Department might have or have access to, some of the relevant/required marine data to support and facilitate the implementation of CPACC activities neither has the technical expertise or capacity to serve as the repository. It is herein suggested, that at a national level and perhaps with the encouragement of CPACC they should be join the CEDS membership and actively participate along with the LIC (and other national agencies) in the generation of the data process and that the CEDS be the repository of the data.

It is also recommended that any selection of a national focal point take into account some of the characteristics, stated further below, which such an organization should have.

ANNEX 6 - THE CEPNET PROJECT: ADDRESSING GIS NEEDS
Ms. Marjo Vierros, Interim Program Officer, UNEP/CEPNET

Comments and Discussion

(Based on CEPNET's Powerpoint Presentation)

- No analysis online except for layering
- State of the coast report:
 - Web based report
 - Created a template for this report
 - GIS used in the case study portion
 - Disappointing because of lack of analytical tools
 - Marc interested because of ability to get info out to the field even though no analysis possible. Applying to map based project by showing maps in Arcview the way they appear in printed form and can use some overlaying to make it useful. For many instances this is sufficient.

Issues:

- internet connectivity speed & cost
- tight timeframe less than a year
- language issues for manuals sites etc
- making part of operational procedure of agencies to convert to html

Collaboration with CPACC eg. Metalite adoption

- CPACC should consider image analysis training
- CEPNET IDB project can be sustained through CPACC project

In response to the question of when would project extend to other islands and what islands, it was noted that the answer would depend on funding and islands will be added as nodes.

- offered to represent country information in metadata if country is ready
- metadata aspect was funded by project and also training - 3 day
- metadata software allows detailed information input. Restrained by the amount of data available
- not necessary to have the same software but metalite was picked for ease of use and price although there are downsides
- there is a new version
- offers a template to start with
- problem with standards, maybe new int'l standard which metalite will be converted to
- marc comments on option for internet server is to use an internet provider but were very sensitive about using software that was not theirs
- State of coast report has static GIFS but want to convert from original autocad format to a map GIS product.
- State of environment report in web based format is the long term goal

**ANNEX 7 - CAPACITY BUILDING TOWARDS THE EFFICIENT UTILIZATION OF
GEOMATICS PRODUCTS AND SERVICES IN THE CARIBBEAN:
THE ROLE OF THE CENTRE FOR GEOSPATIAL STUDIES
Dr. Jacob Opadeyi, Geospatial Centre**

20 Critical Geomatics Activities that are currently lacking in the Region:

- Needs Assessment/User Requirements Analysis
- Database Design
- Integration of Databases
- Customerization and building of friendly user interfaces
- Geoidal Computation
- Use of GPS and spatial data collector
- Building of Applications particularly in the following sectors:
 - Utilities
 - Natural Resource Management
 - Business Geographics
 - Cadastral Systems
- Use of Remote Sensing as spatial and attribute data collector
- Use of Digital Photogrammetry techniques not only for mapping but also for updating maps of small areas
- Digital Cartography
- Project planning, negotiation and management
- Design, development, adoption and maintenance of Geomatics standards
- Creation and management of Metadata
- Datum transformation
- Data conversion
- Geostatistics
- Spatial analysis and modelling
- Temporal databases
- Error analysis and modelling
- Database development

The Centre for Geospatial Studies

- Training Programmes
 - MSc
 - BSc
 - Certificate
 - Short Courses
- Projects
 - SALIS
 - CEIS
 - Carrying Capacity
 - POS Waterfront

- WRMS
- National Watershed Studies
- Resources
(not enough)

The Challenge – The Development of a Caribbean Geomatics Centre

- Requirements
 - Network of specialists
 - Regional training programmes
 - Partnership with government and CARICOM
 - Active support from international development agencies: USAID, CIDA, IDRC, OAS
- Activities:
 - Training and Education
 - Consulting
 - R & D
 - Public Education
 - Workshops & Conferences
 - Advocacy

The Way Forward – Jacob Opadeyi

- Often, getting training in all the areas of GIS is required to show the real benefits from the use of the system
- The training proposed does not focus on application training but on the ability to analyse any application
- WRMS - water resource management project also has information on Guyana, Monserrat and others
- There are problems across the region in terms of training which cannot be met by individual territories. There is a need for the development of a Caribbean Geomatics Centre.
- *Question:* How would the centre compete with other private businesses offering similar services?
- *Response:* The centre would have partnership of government and the private sector. He felt that the region must look at the commercialization of GIS.
- *Question:* Has there been a needs analysis done among the private sector?
- *Response:* Very few companies have formed a GIS unit but deal with it project by project. Need to look at the number of projects with GIS component and the amount spent to foreign consultants. Centre would be a virtual one, drawing specialists when needed. In T&T there are agencies like WASA who have spent TT\$5M to acquire information which Lands and Survey was supposed to collect but had no time. They are not going to give it away. Even when it is provided free of charge a value should be placed on the data
 - NRCAA Jamaica interested in getting data for management reasons. If they can provide proper info and people comply then it saves the government money in the long run.
 - Mr. Rammelaere experienced that when agencies charge they want to charge for what it cost them to get the data so it becomes too expensive.

- Agencies are also not used to selling data and sometimes undersell or oversell
- Collaboration among agencies can often facilitate an improved project where funding is combined
- Mr. Rammelaere says GIS should be included in all university programs
- Dr. Opadeyi wanted to get commitment on a GIS training program which can be taken across the region which is comprehensive so that the usual 2 day training which does not achieve anything is avoided

ANNEX 8 – CARIBBEAN WORKSHOP ON TRAINING AND EDUCATION FOR RESOURCE MANAGEMENT AND PROPERTY STUDIES

**Jamaica crest Resort, Portland Jamaica
November 11-14, 1998**

Cecile Blake

The idea to host a Caribbean Workshop on caption matters arose out of a need for regional cooperation as it relates to land administration and management. The focus of the workshop was to determine market needs for: training and consulting services, professional development through continuing education and research activities, conferences, seminars and publications.

Specific objectives of the workshop

Through a process of group dialogue identify:

- Priority groups of persons with needs for training, education and professional development in property systems and resource management
- Conditions, opportunities and constraints specific to ;
- Target groups and their availability to participate in training and education programmes, in light of geographic location, work responsibilities, family situation etc.
- Programme flexibility
- Educational institutions or consortia of institutions best suited to achieve the needs of target groups to be trained
- The priority needs for teaching and learning materials
- Future activities for the development of curricula and learning materials relevant tot the Caribbean.

Target Group

The workshop was designed for representatives of educational institutions, professionals and other interested persons working in the filed of resource management and property systems.

Workshop featured presentations from participants across the Caribbean and Canada which spoke to the status of training and education in the areas of land resource management and planning.

Recommendations from the Workshop

There is a need for:

1. Short courses which are modular
2. Credit transfers between institutions
3. Knowledge of other institutions offerings
4. Identification of programme strengths and weaknesses
5. Information sharing and directing students to other points /institutions
6. Identify an secure funding to support training programmes and future plans
7. Take training programmes to potential beneficiaries

8. Undertake staff exchange programmes
9. Public awareness campaigns
10. National and regional projects on property systems
11. Unit of purpose and commitment required at the national level among all stakeholders
12. International policy support

Plan for the Way Forward

Short Term (6months)

1. Conduct an assessment of training needs and the capacity of institutions to meet present needs
2. Contact ACTI
3. Prepare inventory of existing training programmes, courses/modules and institutional skills
4. Design format for the inventory
5. Develop proposals for funding (bilateral and multilateral)
6. Continue to develop linkages with the University of New Brunswick, Centre for Property Studies and other Institutions.

Medium Term (6-8 months)

1. Develop and implement exchange and attachment programmes at the national and regional levels
2. Identify gaps in land administration and resource management training.
3. Examine institutional regulations
4. Begin dialogue with international professional bodies
5. Gain support from the political directorate and CARICOM
6. Establish Caribbean Professional Association

Long Term

1. Design and implement modular training programmes
2. Apply credits across institutions
3. Develop overall capacities in land administration and management
4. Develop common training standards within the region
5. Conduct continuous evaluation of all activities