

# The Regional Training Workshop on Methodologies for Coastal Inventories & Information Management

## Appendix XXV

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### Technical Blueprint of Criteria and Guidelines for the Development of a GIS-based Coastal Resource Information System [CRIS]

#### Module I: Data Assessment

##### Objectives of Data Assessment Study

To identify, quantify and evaluate existing coastal resource data available in each of the participating countries.

To identify data gaps and other issues relevant to the development of CRIS in each country: quality and currency of data.

The study will among others:

- a. Identify agencies that have coastal-related functionalities
- b. Identify primary and secondary sources of coastal resource data
- c. Identify hardware, software and human resources available for data collection and management.
- d. Assessment of the status of coastal resource data in each of the participating countries.

#### **I Process Involved:**

- a. Identification of data categories, data types and sub-types required for the preparation of Coastal Resource Information System [CRIS]
- b. Formulation of data assessment objectives and assessment criteria
- c. Design of questionnaire to be used for the data assessment based on (a) and (b)
- d. Preparation of a list of respondents in each of the participating countries
- e. Admission of the questionnaire by the respondents
- f. Analysis of the questionnaire and identification of key issues: Data gaps, data sources
- g. Submission of draft report.

- h. Feedback from participating countries
- i. Modification of draft report and submission of final report

**II Critical Success Factors**

- a. Simplicity and effectiveness of questionnaire
- b. Choice of respondents based on
  - knowledge of subject matter
  - availability of time required to respond
  - completeness of information provided
  - quality of information provided

**III Critical Technical Issues**

- a. Comprehensive data type
- b. Relevance and adequacy of data assessment criteria

**IV Responsibilities**

CPACC:	(a), (b), (d), (e)
Consultant:	(b), (c), (f), (g), (i)
Participating Country:	(d), (e), (h)

**V Training**

Not necessary, but CPACC official or consultant may need to introduce the questionnaire to the respondents in each participating country.

## **Module II: Data Cataloguing and the development of Metadata Guidelines and Standard**

### **Introduction**

Metadata are descriptive information applied to a digital data set. They contain common set of terms and definition used when documenting data sets. It helps users to find the data they need and determine how best to use the data. It encourages appropriate use of the data set and it protects the data producer from conflicts over misuse of the data.

Metadata standard provides a consistent approach format for the description of data characteristics required for C-CRIS. The FGDC content standards for Metadata should be adopted for the Caribbean CRIS.

Sample content of the Metadata for each data set\*:

#### **1. Data Identification**

- Data Resource Citation
- Data Description
- Time Period of Content
- Status of the data: [Bounding coordinates]
- Spatial Domain
- Keywords
- Access and Use Constraints
- Point of Contact
- Browse Graphic of the Data set
- Security Information
- Native Data Set Environment
- Related References

#### **2. Data Quality**

- Data Collection Methodology and Instrument
- Attribute Accuracy

- Logical Consistency Report
- Completeness Report
- Lineage
- Positional Accuracy

**3. Data Organization**

**4. Spatial Reference**

**5. Entity and Attribute Information**

**6. Data Dissemination**

- Distributing Agency
- Resource Description
- Distribution Liability
- Ordering Process
- Technical Prerequisites

**7. Metadata Reference**

- Metadata Status Information
- Metadata Contact Person
- Metadata Standard Used
- Metadata Access and Use
- Metadata Security Information
- Metadata Source Reference

**8. Citation Information**

**9. Contact Information**

*\*Adapted from CIESIN Metadata Guidelines*

## Module III: Database Design

### Database Design Principles

- a. Corporate or Enterprise-wide database
- b. Data-driven design
- c. GIS-based design

### Properties of a corporate database

- a. User-centered. [Flexibility of use].
- b. Independent of any specific application.
- c. Independent of computer hardware and software.
- d. Supports different use both public and private.
- e. Permits different users both public and private.

### Properties of a Data-driven Design

- a) Owner responsibility for data integrity
- b) Accommodates Spatial and Attribute data
- c) Multi-sourced as well as multi-user

### Properties of a GIS-based Design

- a. Provides a single platform for the interpretation of data
- b. Provides an integrated analysis with other computer modelling software for most environmental phenomena.
- c. Accumulates all forms of data formats
- d. Provides a consistent data storage and retrieval mechanisms
- e. Provides a convenient linkage of spatial and attribute data
- f. Accommodates both raster and vector data models
- g. Facilitates the linkage of all data to a common geographic reference framework.

## **I Process**

- a. Identification of data entities and relationships required based on the data identification exercise.
- b. Construction of entity-relationship model [ERM] for CRIS.
- c. Conversion of ERM to relational tables
- d. Normalization of relational tables (if necessary)
- e. Design of the spatial database: layers, naming schemes etc
- f. Prototyping of the designed database and development of user interface for data entry
- g. Evaluation of the prototype
- h. Documentation of the design

## **II Critical Success Factors**

- a. Knowledge of the consultant in the design of systems similar to CRIS
- b. Proper documentation
- c. Adequate involvement of end-users
- d. Timeliness in the delivery and evaluation of the design

## **III Critical Technical Issues**

- a. Flexibility of the design: addition of new entities and relationships; updating of records; integration of other databases.
- b. Choice of Design Platform
- c. Validation of rules

## **IV Responsibilities**

CPACC	Monitoring, facilitating and evaluation of design
Consultant	a, b, c, d, e, f, g, h.
Participating Countries	Provision of sample data, and evaluation of design

## **V Training Needs**

## Introduction of Databases and database design concepts

### Database Design Options

Vector model; Raster model; or Both models

### Database Design Questions

- What data is needed to support the required and planned applications?
- What is the positional accuracy required?
- How should the data be partitioned? By: themes/layers; administrative boundaries; watersheds; distribution districts.
- What are the graphic and non-graphic database requirements?
- Should database be distributed or centralized?
- What standards and formats are required?
- What are the required data relationships for a complete database design?
- What is the target GIS platform?
- What is the target GIS data format and database structure?

## **Module IV: Data Collection**

### **I Process**

- a. Identification of data to be collected in each participating country based on the result of the data assessment exercise.
- b. Identification of the most efficient sources of the data to be collected in each participating country.
- c. Development of cost-effective data collection strategy for each data type. Strategy should be devised based on the following data sources dimensions: primary source (field measurement), secondary sources (existing maps, records, reports, files and equipment).
- d. Design of geo-reference strategy for collection of attribute data.
- e. Acquisition and installation of data collection equipment.
- f. Design of data coding schemes
- g. Design of data collection forms (tables that would aid data automation).
- h. Design of QC/QA strategy for each data types to be collected.
- i. Design of data collection programme and schedule for each countries.
- j. Actual data collection.
- k. Monitoring of data collection programme.
- l. Data verification in submission/delivery of data collected to CPACC or to a Data Management Centre.

### **II Critical Success Factors**

- a. Design of a cost-effective data collection programme
- b. Adequate funding of data collection programme
- c. Continuity of the data collection programme
- d. Inter-agency support for the data collection programme
- e. Timeliness
- f. Cost Containment

### **III Critical Technical Issues**

- a. Adequacy of data collection techniques

- b. Quality control and quality assurance strategies
- c. Use of GPS for geo-referencing
- d. Selection of appropriate mapping parameters [projection, scale, datum]
- e. Technical competence of the data collectors

#### **IV Responsibilities**

CPACC	a, b, i
Consultant	c, d, e, f, g
Participating Countries	a, b, h, j

#### **V Training Needs**

- a. Use of GPS and mapping of features
- b. Interpretation of aerial photographs
- c. Collection of specific field data
- d. Extraction of specific data from existing records
- e. Use of any other data collection equipment

## Module V: **Data Automation/Conversion**

### **I Process**

- a. Prioritization and scheduling of data automation programme for each of the participating countries.
- b. Determination of a cost-effective data automation technique for each data types of the countries.
- c. Development of data automation manual for each data type.
- d. Training on data automation for each country.
- e. Acquisition and installation of data automation equipment.
- f. Actual data automation conversion exercise.
- g. Design of QC/QA techniques for data automation (error trapping).
- h. Design of data identifiers (user-ids)
- i. Data validation

### **II Critical Success Factors**

- a. Scheduling and timeliness of data automation data conversion programme
- b. Quality of data entry personnel hired.
- c. Adequacy of data automation training
- d. Adequacy of QC/QA techniques.
- e. Coordination and monitoring.

### **III Critical Technical Issues**

- a. Data automation formats (software dependent).
- b. Adequacy of data storage space.
- c. Data sharing/dissemination techniques
- d. Integration of other date formats (satellite data, aerial photos, images, videos, etc.)

#### **IV Responsibilities**

CPACC	a, d
Consultant	b, c, e, g, f
Participating Countries	e, h, i

#### **V Training Needs**

- a. Digitizing and errors editing
- b. File management techniques
- c. Integration of data [scanned images, videos]

#### **Data Automation/Conversion Questions**

- Does the data conversion approach meets the project requirements, and is it appropriate for the available source data?
- Is the conversion approach cost-effective?
- Should outside expertise and/or resources be used in the design and implementation stages?
- How will the converted data be maintained and by whom?

#### **Data Automation Options**

- a. Digitizing; Scanning; or Both.
- b. Discrete digitising or Spigethi digitising

## Module VI: Data Management

- a. Updating and validation mechanisms.
- b. Data partition.
- c. Data storage, archiving and retrieval mechanic.
- d. Data dissemination and revenue generation.
- e. Data integration [resolution].
- f. Data access, security and confidentiality.
- g. Data quality control and quality assurance.
- h. Funding arrangements
- i. Institutional arrangements.

### Database Management Questions

- a. What storage media to use?
- b. How large is the database?
- c. What data should be stored on-line?
- d. What is the likely growth-rate of the database?
- e. Will new attributes be added?
- f. What security is needed?
- g. Who should be able to redefine the data schema?
- h. Who should be able to edit/update the data?
- i. What are the cost recovery mechanisms?

## General Training Needs

- a. Management awareness on the need for CRIS
- b. Use of CRIS for decision making
- c. Computer literacy

### *General Implementation Issues*

- Does the implementation plan meet the criteria for success?
- Does the project have executive support?
- Have risks been minimized?
- Have realistic and reasonable budget estimates been established?
- Is the schedule both appropriate and realistic?
- Have roles and responsibilities been clearly defined?

Is the organization prepared for the challenges brought by a GIS?