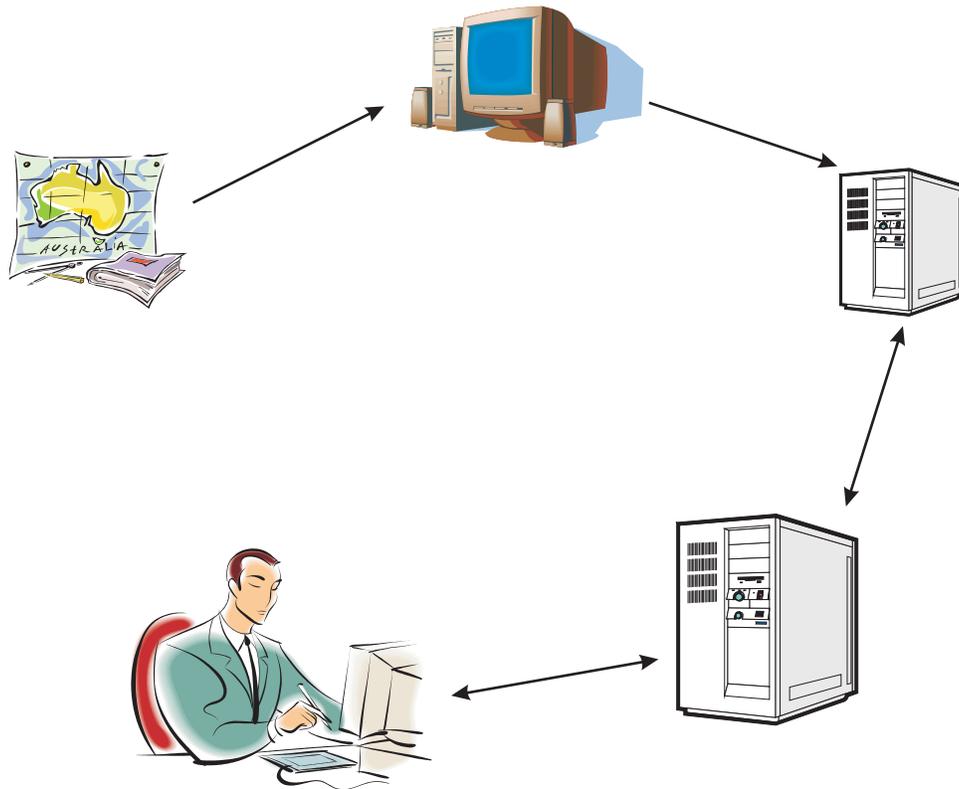


METADATA WORKBOOK



Creating Metadata for the Geospatial Data Clearinghouse Mechanism using PC MetaLite and the isite software

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1.0 Introduction

This workbook was prepared primarily to assist persons with the preparation of metadata, using PC MetaLite and the isite software, for the Geospatial Data Clearinghouse Mechanism. It takes you through the steps of entering the data into PC MetaLite, parsing the metadata records, indexing and testing the parsed metadata records and finally provides some guidance on registering with the Clearinghouse Mechanism to make the metadata records searchable over the Internet. In addition it gives an overview of additional metadata creation tools, both commercial and free, that are available.

1.1 What is Metadata?

Simply put metadata are 'data about data'. More specifically metadata are a structured means of describing the content, sources, condition, quality and other appropriate characteristics of acquired data or alternatively, metadata answer **who, what, when, where, why, and how** about every facet of the data that are being documented. *Metadata do not, in any way, represent the actual content of the data - they only describe the data.* An example of metadata can be found in the legends of most 'paper' maps - although not complete it serves as a simple means of illustrating what metadata is. In this form, metadata is readily apparent and easily transferred between map producers and map users. When map data are in a digital form, metadata are equally as important, but their development and maintenance often require a more conscious effort on the part of data producers and the chain of subsequent users who may modify the data to suit their particular needs.

Keep in mind that metadata may exist in many forms. These range from the most basic, which is a short description of available data (such as the example with the map above) to the more detailed (such as those that follow the Federal Geographic Data Committee, FGDC, standard).

1.2 Uses of metadata

- To tell others what datasets are available. This helps prevent duplication of efforts, especially among government agencies. Some organisations could end up sharing maintenance efforts with other organisations.
- Help organisations document (categorise and inventorise) the information they have. This helps prevent duplication by allowing organisations to easily locate their datasets. It would also provide a smooth transition for new employees – they would know what exist and why they were developed.
- Provide some legal protection in the event of misuse of datasets.
- Aid the receiving organisation/agency in understanding and interpreting the content of the datasets. Also allow them to update their data catalogue(s).
- To advertise and market spatial datasets.

Besides advertising in catalogues, one of the most convenient means of presenting metadata is by utilizing the power of the web. That way metadata can be updated as soon as the datasets change, provide the widest possible coverage and still not be a strain on financial resources.

To make metadata searchable over the web, the National Spatial Data Infrastructure (NSDI) of the United States established a Clearinghouse mechanism. This is a collection of servers¹ in the United States that allow anyone to search for spatial datasets. To understand how this works take a look at the diagram below (Figure 1).

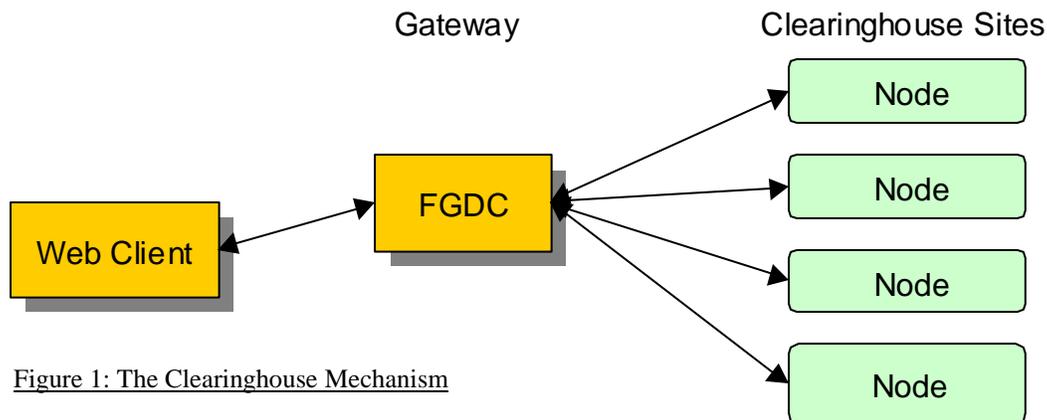


Figure 1: The Clearinghouse Mechanism

An example will be used to illustrate how this process works. To search the clearinghouse sites a person would go to the FGDC website and access the page with the search form. The person would then choose the appropriate options and enter a keyword to search for (e.g. water quality, Leguan, forest, etc.). The request would be sent to the 'gateway' which would search all the nodes (or the ones specified by the user) for the keyword(s) and any other parameter specified in the search form and returns the results to the web client (normally a web browser such as Netscape Navigator/Communicator or Microsoft Internet Explorer). The user can then view the details of the metadata record.

A search form available at the NSDI can be viewed by pointing your web browser to <http://clearinghouse.csc.noaa.gov/servlet/FGDCServlet>.

The result of a search for 'guyana' using this search form is available in Appendix 1.

2.0 Developing Metadata for the CHM

Metadata developed for the Clearinghouse Mechanism mentioned above must conform to the FGDC standard. This standard is very extensive and involves 334 elements of data for

¹ A server is a computer system that allows sharing of files, information via web sites, email communications, etc.

every dataset. This is done to ensure that all dataset could be described adequately. No attempt would be made to cover the entire standard in this document; however, some parts of it would be covered. For more details on this standard please consult the FGDC publication, “Content Standard for Digital Geospatial Metadata Workbook”. This publication can be downloaded from the FGDC website which is listed in the reference section of this document.

2.1 Steps in developing Metadata

An attempt would be made to give as broad an overview as possible rather than focus on specific tools and specific procedures. In a nutshell the different processes are listed below. Note however that this is somewhat biased towards the procedures established by the FGDC. Nevertheless, some steps cannot be skipped for the preparation of FGDC compliant metadata.

1. Choose metadata tool (software)
2. Generate metadata using the tool
3. Parse the metadata
4. Index the parsed metadata
5. Test the indexed parsed metadata for conformity
6. Test the indexed parsed metadata on a zserver for conformity
7. Register your server on the CHM
8. Link to the Clearinghouse interface (i.e. establish a node).

2.1.1 Choose metadata tool

There are quite a few tools available for creating metadata. Some are free while the others are not. A study done by Prof. Harold Moellering of the Geography Department of the Ohio State University in 1998 found 45 tool that are capable of gathering, compiling, generating and loading metadata in a PC/MAC environment. Only the most popular of these tools would be described below. Some new tools have been developed since then, these include ArcCatalogue and SMMS.

2.1.1.1 Metadata Creation

PC Metalite (<http://edcnts11.cr.usgs.gov/MetaLite/default.htm>)

Developed by the FGDC for collecting and validating FGDC compliant metadata. Very useful for collecting information from maps and other non-digital spatial information. PC Metalite only makes use of a subset of the full metadata standard.

MetaMaker (http://www.emtc.nbs.gov/http_data/emtc_spatial/applications/nbiimker.html)

Developed by the Biological Resources Division, United States Geological Surveys. It adds a special biological extension to the FGDC standard.

ArcView Metadata Collector (<http://www.csc.noaa.gov/metadata/text/download.html>)

An ArcView extension designed by the National Oceanic and Atmospheric Administration (NOAA) for capturing metadata from themes within ArcView.

[ArcCatalog \(http://www.esri.com/software/arcinfo/index.html\)](http://www.esri.com/software/arcinfo/index.html)

One of the many tools included with ArcInfo 8.x which is developed by Environmental Systems Research Institute, Inc. (ESRI). This tool generates FGDC compliant metadata among other things. It helps by extracting certain information from the dataset like the bounding coordinates; similar to ArcView Metadata Collector, but much more powerful.

[SMMS \(Spatial Meta-data Management System; http://www.rtseusa.com\)](http://www.rtseusa.com)

Commercial metadata tool developed by RTSe USA. This tool has lots of good features such as user defined fields, extraction of certain data from digital datasets (shapefiles, ArcInfo coverages, etc.), built in searching, support for the biological extension, reusable keyword list, metadata templates, data reuse and it is compliant with the FGDC standard.

Additional tools for capturing metadata include Corpsmet 95, xtme, MetaLite.AML and Document.AML.

2.1.1.2 Metadata Validation

[mp \(Metadata Parser\)](#)

This program is a compiler to parse formal metadata, checking the syntax against the FGDC Content Standard for Digital Geospatial Metadata and generating outputs in HTML, SGML, XML, text and DIF format for use in clearinghouse, metadata sharing and on web servers. It was developed by Peter N. Schweitzer of the USGS.

[cns \(Chew and Spit\)](#)

A pre-parser developed by Peter N. Schweitzer of the USGS for formal metadata designed to assist metadata managers to convert records that cannot be parsed by **mp** into records that can be parsed by **mp**. This is especially useful for metadata created using other software and which has to be formatted for the National Spatial Data Clearinghouse.

[Stomp](#)

Stomp is a utility that converts metadata expressed in well-crafted SGML into a form suitable for input into **mp**. It was developed by Peter N. Schweitzer of the USGS.

2.1.1.3 Search and Retrieval

[Isite](#)

Developed by the Clearinghouse for Networked Information Discovery and Retrieval (CNIDR). Isite is a complete Internet Information System; it integrates database systems with other open Internet systems and protocols such as the World Wide Web, Gopher, electronic mail and, primarily, ANSI/NISO Z39.50. The primary protocol, Z39.50, offers a variety of search and retrieval facilities suitable for complex database operations. Isite includes Z39.50 communications applications as well as an http to Z39.50 gateway and a complete text search system, Isearch.

For the Caribbean Planning for Adaptation to Global Climate Change (CPACC) project, the national data repositories for the twelve countries involved have all agreed upon the use of a common software for collecting metadata – PC MetaLite. *The rest of this*

document focuses on using PC MetaLite and the Isite software almost exclusively for creating and processing metadata. Once the metadata records are created, using anyone of the software mentioned above, the final files have to be processed with the isite software before they are placed on the CHM. This may involve additional steps such as pre-parsing using the 'cns' software followed by parsing using the 'mp' software.

2.1.2 Generate metadata using the tool

There are basically two stages in creating metadata at this step.

1. Create metadata for data sources using printed forms (see Appendix 2).
2. Transfer the data from the printed forms to the computer and make it searchable over the Internet (i.e. create a clearinghouse node).

Obviously these two stages can be combined into one if a computer is available to everyone developing metadata. Unfortunately this may not always be the case. The first component is about 80% of the entire process whereas the other is only 20%. This may seem surprising but it is true.

2.1.2.1 The first stage

This component involves using the form supplied in Appendix 2 to generate metadata; this would later be transferred to the computer. The form is specifically designed for PC MetaLite.

The metadata created using the form (from Appendix 2) and PC Metalite (see "*The second component*") is in conformance with the metadata standard developed by the FGDC. The form in Appendix 2 is the paper version of PC Metalite.

In order to use the form, relevant sections have extracted and described (to provide guidance) from the full metadata standards workbook developed by the FGDC. Both of these are included in Appendix 2. When in doubt while filling out the form for a particular dataset always consult with the standards workbook (included in Appendix 2). An example showing how to develop metadata from 'raw data' is given in Appendix 3.

2.1.2.2 The second stage

This component involves either transferring the data from the metadata form (Appendix 2) into PC Metalite or entering it directly into PC Metalite. PC Metalite is quite user friendly (due to its simple User Interface) and anyone who has used Microsoft Windows for a while will find it easy to use. Some words of caution when entering data into PC Metalite:

- Never leave any field blank – use 'none' or 'not applicable'. This would generate errors when parsing the records.
- Never use '>' or '<' signs (i.e. 'greater than' or 'less than' signs). These confuse the isite software.
- Never leave spaces at the end of dates in date fields. These result in errors while processing the records with the isite software.

- Never leave spaces in export names. Apparently this prevents the isite software from indexing those records.

One very handy feature of PC Metalite is its ability to duplicate records. This is extremely useful when documenting spatial datasets that vary very little from one dataset to another like maps and digitised layers from the same maps. PC Metalite also contains an online help which is very useful if you get stuck along the way.

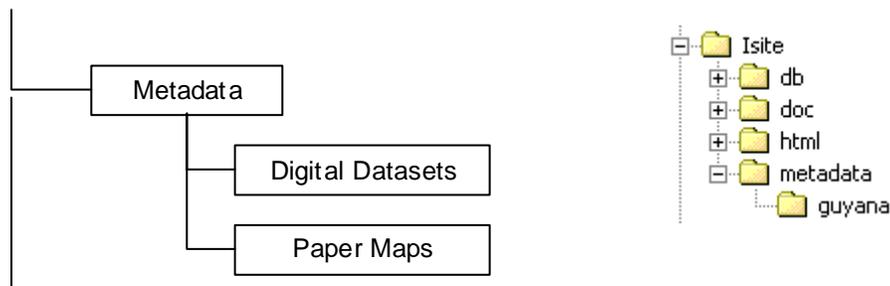
2.1.3 Parse the metadata

This is done by exporting the records from PC Metalite. PC Metalite installs 'mp' during its installation process and clicking or selecting "export" invokes 'mp' to do the parsing. After the parsing any errors encountered by 'mp' are displayed. These should be taken seriously and corrected before any further processing. At the end a minimum of three files should be produced. These should look something like "exortname.txt", "exportname.sgml" and "exportname.html" where exportname is the name given to the record at the beginning of its creation. An additional "exportname.err" file would be generated. This file contains the error report generated by 'mp' just after it parses the record. These files should be deleted just before processing with the isite software since they take up additional space and serves no other purpose (provided that no errors were reported after parsing).

For software other than PC Metalite, parsing the records may not be as simple as the steps described above and I would not go into them in details. Additional steps that have to be taken may include pre-parsing using 'cns' software and parsing using the 'mp' software. Both of these steps may have to be done manually.

2.1.4 Index the parsed metadata

This step follows the one above and involves using the isite software. The isite software can be obtained free from the FGDC through their web site. As mentioned above, when you're satisfied that the metadata records are error free and are completed to your liking, delete the .err files. A good management practice is to place all the files in one folder or create different 'thematic' folders within one folder. This ensures all the metadata records are together. A setup might look like the following:



After doing the above go to the command prompt in Windows. It should look something like this:

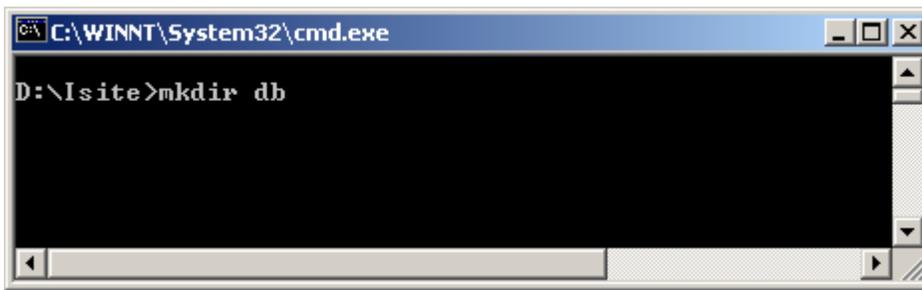


```
C:\WINNT\System32\cmd.exe
Microsoft Windows 2000 [Version 5.00.2195]
(C) Copyright 1985-1999 Microsoft Corp.

C:\>_
```

Next go to the isite folder. If you don't already have it create a directory/folder (a good name is 'db' or 'index') to hold the indexed data by typing the following at the command prompt. It may help to place all the metadata records within the isite folder using the structure proposed above. That way everything is together.

```
D:\Isite>mkdir db
```



```
C:\WINNT\System32\cmd.exe

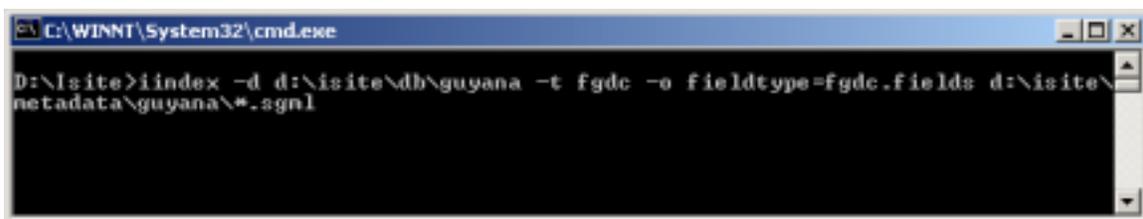
D:\Isite>mkdir db
```

Then issue the following command:

```
D:\Isite> iindex -d d:\isite\db\[DB] -t fgdc -o
fieldtype=fgdc.fields [datafiles]
```

- [DB] is the name of the database you want to create. It stores all the indexed data.
- [datafiles] contains the path to your metadata records.

A command may look something like the following:



```
C:\WINNT\System32\cmd.exe

D:\Isite>iindex -d d:\isite\db\guyana -t fgdc -o fieldtype=fgdc.fields d:\isite\
metadata\guyana\*.sgml
```

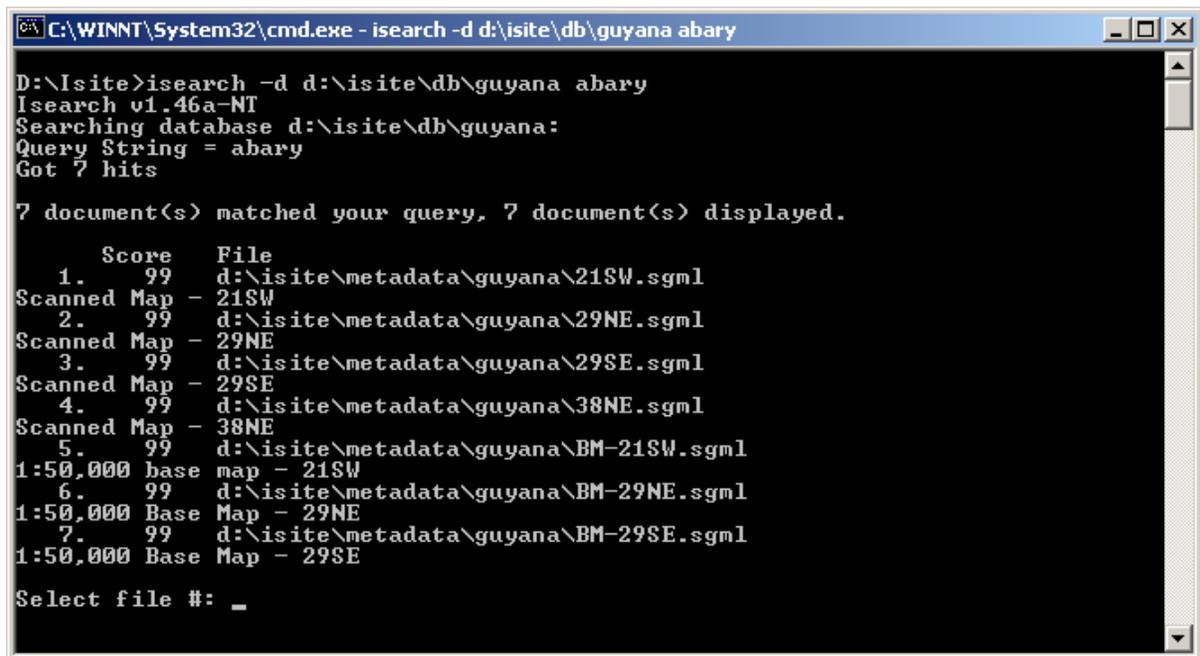
In this case the **database [DB]** name is **Guyana** and the **[datafiles]** are found at **d:\isite\metadata\guyana*.sgml**. The most common problem encountered is incorrect pathnames to the data or database. This step would also highlight any internal problems with the metadata records that may have escaped PC MetaLite and 'mp'.

2.1.5 Test the indexed parsed metadata for conformity

Next test the indexed metadata locally. To do this go to the root (D:\isite>) of the isite directory and issue the following command.

```
D:\Isite>isearch -d d:\isite\db\[DB] [Query Terms]
```

- [DB] is the database name just like above.
- [Query Terms] is the data you want to find. This searches the indexed data contained in [DB] for the [Query Terms]. If you need help type “isite” at the command prompt. A command with results may look like the following:



```
C:\WINNT\System32\cmd.exe - isearch -d d:\isite\db\guyana abary
D:\Isite>isearch -d d:\isite\db\guyana abary
Isearch v1.46a-NT
Searching database d:\isite\db\guyana:
Query String = abary
Got 7 hits

7 document(s) matched your query, 7 document(s) displayed.

      Score      File
  1.      99      d:\isite\metadata\guyana\21SW.sgml
Scanned Map - 21SW
  2.      99      d:\isite\metadata\guyana\29NE.sgml
Scanned Map - 29NE
  3.      99      d:\isite\metadata\guyana\29SE.sgml
Scanned Map - 29SE
  4.      99      d:\isite\metadata\guyana\38NE.sgml
Scanned Map - 38NE
  5.      99      d:\isite\metadata\guyana\BM-21SW.sgml
1:50,000 base map - 21SW
  6.      99      d:\isite\metadata\guyana\BM-29NE.sgml
1:50,000 Base Map - 29NE
  7.      99      d:\isite\metadata\guyana\BM-29SE.sgml
1:50,000 Base Map - 29SE

Select file #: _
```

To view the result, type the number associated with the result you want to view at the command prompt.

When this step is finished and you observe no errors, it is time to move on to the next step.

2.1.6 Test the indexed parsed metadata on a zserver for conformity

This step tests the indexed metadata records on a zserver. Before you can do this a few configurations have to be made. The first involve editing the ‘sapi.ini’. This file is located in the isite directory and can be edited with any text editor such as Windows Notepad. The contents of the file would look like the text box on the following page. Each database that you want to make searchable should be listed in this file using the format below:

```
[DB Name]
Type=ISEARCH
```

Location=[DB Path]
FieldMaps=bib1.fgdcmap,gils.fgdcmap,geo.fgdcmap

The database name [DB Name] must match the name entered in 'zserver.ini' discussed below. These names should be taken from one of the names given to the databases created in 2.1.4 above with the iindex software. The database path [DB Path] points to where the database index resides. Note that only the items in squared brackets [] have to be changed, the others remain as they are. To see how this is done take a look at the text box below.

```
# Example sapi.ini file
#
# See doc/bsite.ps or doc/untested_guide.html for full details.
#
# If you create a database with Iindex called TESTHTML and store that index in
# /tmp, this file will work as is.
#
[Default]

[TESTHTML]
Type=ISEARCH
Location=c:\temp

#
# Default FieldMap is bib1. In this case, any entries in mymap.ini will
# override those in bib1.map.
#
FieldMaps=my.map

[guyana]
Type=ISEARCH
Location=d:\bsite\db
FieldMaps=bib1.fgdcmap,gils.fgdcmap,geo.fgdcmap

#[jamaica]
#Type=ISEARCH
#Location=d:\bsite\db
#FieldMaps=bib1.fgdcmap,gils.fgdcmap,geo.fgdcmap

#[stest]
#Type=SCRIPT
#
# Location is the name of the script used to conduct the search
# It is called with the command line:
# <location> <result-file-name> <query>
#Location=Search.bat
#
#
# GetFull is the name of the script used to retrieve full records
# It is called with the command line:
# <get-full> <result-file-name> <record-key>
#GetFull=Get.bat
#
#Results=c:\
#FieldMaps=bib1.map
```

One of the databases listed is [guyana] and the path to the database is d:\isite\db\. The entire database configuration is bold (used here for illustration purposes). Note that multiply databases can be listed and the ones you do not want to be searched can be 'commented' out as in the [jamaica] database above. The '#' sign placed in front of anything is used to denote a comment. The zserver ignores all comments.

Next you will have to edit the 'zserver.ini' file. This file is also located within the isite directory and can also be edited with a text editor such as Windows Notepad. This file should look like the text box below.

```
# Example zserver Configuration File
#
# Please read doc/isite.ps or http://vinca.cnidr.org/software/Isite/Isite.html
# for more information on this file.
#
# This is the Server Information Group
[Default]
#
# What detail of debugging information would you like printed to the screen?
#
# Valid values are 0-9 ranging from less to more debugging information.
#
DebugLevel=5
#
# Do you want to run the server as a forking daemon or a single connection
# server? Note that INETD doesn't mean you have to run under inetd, just
# that the server will accept a single client connection and then exit.
#
# STANDALONE or INETD
#
ServerType=STANDALONE
#ServerType=INETD
#
# What TCP port number for the server?
#
Port=6668
#
# What is the maximum number of simultaneous client connections you'll accept?
#
MaxSessions=50
#
# What is the FULL FILENAME of your Search API configuration file?
#
# For example, "SAPI=c:\windows\system32\sapi.ini"
#
SAPI=d:\isite\sapi.ini
#
# Access (transfer) log filename
#
AccessLog=zserver_access.log
#
# From the list of databases available in your sapi.ini file, which ones
# do you want clients to have access to (comma-delimited, no spaces)?
#
```

Five lines in this file have to be edited. These are listed below.

1. DebugLevel=5
2. ServerType=STANDALONE
3. Port=[Port Number]
4. SAPI=[sapi.ini path]
5. DBList=[DB Name1],[DB Name2], ...

Help with assigning configuration settings are given as comments in the file above. You can accept the default settings in lines 1 and 2 above. The port number defines the port zserver listens to connections on. It can be any unused port. Again, it may be best to accept the default port number of 6668. The 'sapi.ini path' defines the location of the sapi.ini file. In our example it is 'd:\isite\sapi.ini'. The database list lists the databases that are defined in the 'sapi.ini' file. In our example it is only one – guyana. Additional databases are added to the list and separated by comas with **no space** between the coma and the next database name.

In a command window, while in the isite directory type 'zserver' to start the server. The 'zserver' first reads the 'zserver.ini' file and starts "listening" for client processes. A successfully mounted database should look like the following:

```

C:\WINNT\System32\cmd.exe - zserver
D:\Isite>zserver
CNIDR zserver, Version 2.06a-NT, Copyright (c) 1995-1998 MCNC/CNIDR
zserver.ini Path = D:\Isite\zserver.ini
SAPI File = d:\isite\sapi.ini
Looking for map files in d:\isite\
Attempting to mount database guyana
Location is d:\isite\db
Successfully mounted.
Attempting to add 484 fields from d:\isite\bib1.fgdcmmap to internal mapping tables...
Attempting to add 484 fields from d:\isite\gils.fgdcmmap to internal mapping tables...
Attempting to add 484 fields from d:\isite\geo.fgdcmmap to internal mapping tables...
NT Threaded Server Started
Listening on port 6668...
NT Forking Server Started
Waiting to Accept client...

```

To stop the server press CTRL and C simultaneously within the command window.

Next start another command window and navigate to the isite directory. You will now test the zserver using the zclient. **The zserver must be running in order to perform a search.** To perform a search type the following at the command prompt:

```
D:\Isite>zclient [server] [port] [DB] [Query Terms]
```

- [server] is the server you want to search. To search your PC use “localhost” as the server or to search another PC connected to a network running the zserver use the PC name as the server.
- The [port] should be the same as the port number used in the ‘zserver.ini’ file. If the default is used, that would be 6668.
- [DB] is the database you want to search, this should be taken from the ‘Dblist’ in the ‘zserver.ini’ file above.
- [Query Terms] is the data you wish to find.

A successful search for the word ‘enmore’ from the database ‘guyana’ on a local PC should look like the following:

```

C:\WINNT\System32\cmd.exe
D:\Isite>zclient localhost 6668 guyana enmore_

C:\WINNT\System32\cmd.exe - zclient localhost 6668 guyana enmore
CNIDR zclient, Version 2.06a-NT, Copyright (c) 1995-1998 MCNC/CNIDR
4 total records matched your query
1) Scanned Map - 20NE
2) Scanned Map - 21SW
3) 1:50,000 Base Map - 20NE
4) 1:50,000 base map - 21SW
Enter # of record to view (return to quit):

```

The requests sent out by the zclient and the subsequent processing are reflected in the zserver command windows as illustrated below:

```

C:\WINNT\System32\cmd.exe - zserver
There were 4 hits.
Client has closed. Reason: Finished
Connection has arrived...
Now up to
DebugLevel=2 child process(es)
5.
Received connection - threaded server is responding... Back to 1 child proces
s(es)

Waiting to Accept client...
Searching ISEARCH Database guyana
Searching using a OPSTACK based query
Query type is 1
Attribute Set ID = 1.2.840.10003.3.1
Decoding AttributesPlusTerm.
Decoding attr list
1 attrs avail
USE=1016
Mapping: AttrSetId=1.2.840.10003.3.1
Mapping: Converting field from 'BIB1/1016' to Any
Term = "enmore"
There were 4 hits.
-

```

Bear in mind that each step described above depends on the error-free completion of the preceding step. You can view this as quality checks for the metadata records. The entire process ensures that when the metadata records are available for searching on the clearinghouse mechanism, they are as error free as possible.

2.1.7 Register your server on the CHM

This step is done by registering your node through the FGDC website at <http://www.fgdc.gov/clearinghouse/clearinghouse.html>. You can view the requirements by going to the web site URL listed above.

2.1.8 Link to the Clearinghouse interface

After registering your node you will be required to put it online (this means 24/7). The FGDC will then test your node and when they are happy with the outcome it would be added to the FGDC clearinghouse registry. This means that it would be searchable like any other node in the FGDC clearinghouse registry.

3.0 Resources

The following resources are meant to supplement this workbook. Most of these resources are web based, hence, an Internet connection would be required to view them. Keep in mind that this is a limited list and anyone with an Internet connection can perform a search for metadata and receive much more links than the ones listed below.

1. Federal Geographic Data Committee, 1995, "Content Standards for Digital Geospatial Metadata Workbook", Washington, Federal Geographic Data Committee.
2. <http://www.fgdc.gov> - Federal Geographic Data Committee home page. This site provides extensive information on metadata. It also includes the clearinghouse mechanism through which anyone can search metadata nodes around the world.
3. http://clearinghouse.csc.noaa.gov/servlet/NOAA_CSCgateway - web page containing a search form for searching nodes around the world.
4. <http://rat.lic.wisc.edu/metadata/metaprim.htm> - National States Geographic Information Council (NSGIC) primer on metadata.

Appendix 1

Search Results for Guyana



National Spatial Data Infrastructure

Clearinghouse Search Results

You are currently viewing record 1 out of 3 matches from database *Caribbean Environment Programme*.

[Next Search Again](#)

Having troubles using this software to find what you need?

[Click here to send us a message](#)

Guyana

Metadata:

- [Identification Information](#)
 - [Spatial Data Organization Information](#)
 - [Distribution Information](#)
 - [Metadata Reference Information](#)
-

Identification_Information:

Citation:

Citation_Information:

Originator:

Information Systems Management of Marine and Coastal Resources (CEPNET)

Publication_Date: 19970609

Title: Guyana

Edition: 1.0

Geospatial_Data_Presentation_Form: map

Publication_Information:

Publication_Place: Kingston, Jamaica

Publisher: The Caribbean Environment Programme (CEP)

Online_Linkage: <URL:<http://www.cep.unep.org/data/caribbean/caribbean.html>>

Description:

Abstract:

The Regional Programme on Information Systems Management of Marine and Coastal Resources (CEPNET) extracted the Republic of Guyana coverage from the Digital Chart of the World (DCW) data base. The dataset is a digital line, point and area representation of selected base categories of geographic features and characteristics of these features. The data structure is based on graph theory, in which a two-dimensional arrangement is expressed as a set of spatial objects in a manner that explicitly expresses logical relationships. This concept is used to encode the spatial relationships between the objects, including adjacency and connectivity between objects and topologically structured data files to support graphic applications.

The Guyana data set depicts information about geographic features on or near the surface of the Earth. The geographic features are represented in a six layer digital data set which include a drainage network layer, road network layer, land use layer, political and administrative boundaries layer, cities layer and a towns layer.

Purpose:

The Guyana data set was created by the Regional Programme on Information Systems Management of Marine and Coastal Resources (CEPNET) to develop an Information Management System (IMS) using a Geographic Information System (GIS) software package.

Supplemental Information:

The Caribbean Environment Programme (CEP) emerged as result of many years of work by governmental and non-governmental representatives of the Caribbean community, assisted by the United Nations Environment Programme (UNEP), Inter-American Development Bank (IDB) and the Economic Commission for Latin America and the Caribbean (ECLAC). The states and territories of the Wider Caribbean Region have joined in pursuit of a common goal - protection of the marine and coastal environment through the promotion of balanced and sustainable economic development and in the development of an Information Management System (IMS) to strengthen the coastal and marine resource management capabilities.

Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: 0000

Ending_Date: present

Currentness_Reference: ground condition

Status:

Progress: Complete

Maintenance_and_Update_Frequency: Continually

Spatial_Domain:

Bounding_Coordinates:

West_Bounding_Coordinate: -61.396

East_Bounding_Coordinate: -56.480

North_Bounding_Coordinate: 8.558

South_Bounding_Coordinate: 1.175

Keywords:

Theme:

Theme_Keyword_Thesaurus: None

Theme_Keyword: Administrative

Theme_Keyword: Border

Theme_Keyword: Boundary

Theme_Keyword: Cities

Theme_Keyword: Coastline

Theme_Keyword: Drainage

Theme_Keyword: Land Cover

Theme_Keyword: Land Use

Theme_Keyword: Layers

Theme_Keyword: National

Theme_Keyword: Parish Name

Theme_Keyword: Population

Theme_Keyword: Region

Theme_Keyword: Road

Theme_Keyword: Towns

Place:

Place_Keyword_Thesaurus: None

Place_Keyword: Caribbean Region

Place_Keyword: Central America

Place_Keyword: Guyana

Place_Keyword: Jamaica

Place_Keyword: Kingston

Place_Keyword: North America

Place_Keyword: South America

Place_Keyword: United States

Place_Keyword: Western Hemisphere

Access_Constraints: None

Use_Constraints: None.

Browse_Graphic:

Browse_Graphic_File_Name:

<URL:<http://www.cep.unep.org/data/caribbean/dcw/gy/gyadmn.gif>

Browse_Graphic_File_Description: Guyana

Browse_Graphic_File_Type: GIF

Spatial_Data_Organization_Information:

Direct_Spatial_Reference_Method: Vector

Distribution_Information:

Distributor:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: Caribbean Environment Programme Regional Coordinating Unit

Contact_Position: Kenneth D. Korporal

Contact_Address:

Address_Type: mailing and physical address

Address: 14-20 Port Royal Street

City: Kingston

State_or_Province: Jamaica

Postal_Code: 00000

Country: Jamaica

Contact_Voice_Telephone: (876) 922-9267

Contact_Facsimile_Telephone: (876) 922-9292

Contact_Electronic_Mail_Address: <<mailto:kdk.unepcuja@toj.com>>

Resource_Description: The Digital Chart of the World

Distribution_Liability: None.

Metadata_Reference_Information:

Metadata_Date: 19970609

Metadata_Contact:

Contact_Information:

Contact_Person_Primary:

Contact_Person: Customer Services Representative

Contact_Address:

Address_Type: mailing and physical address

Address: U.S. Geological Survey, EROS Data Center, Customer Services,

City: Sioux Falls

State_or_Province: SD

Postal_Code: 57198

Country: USA

Contact_Voice_Telephone: (605) 594-6151

Contact_Facsimile_Telephone: (605) 594-6589

Contact_Electronic_Mail_Address: custserv@edcmail.cr.usgs.gov

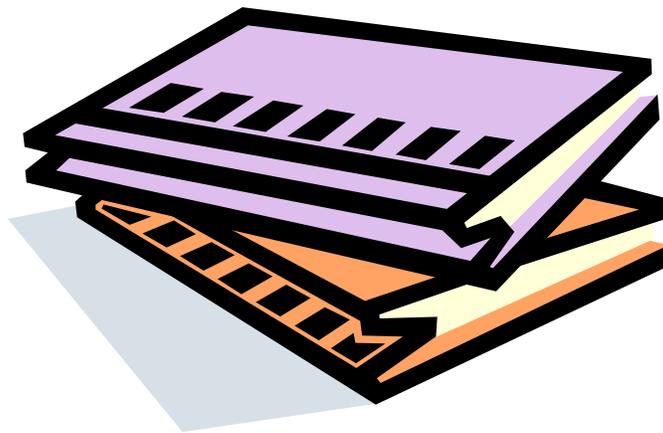
Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata

Metadata_Standard_Version: Version 1.0, June 8, 1994

Generated by [mp](#) on Thu Jun 26 15:03:52 1997

Appendix 2

Metadata form and workbook



Template of information required for the Creation of Metadata for Coastal Resources Information System

| 1. Citation Information | | | |
|---|----------------------------------|---|--|
| 1. Originator | | | |
| 2. Publication Date | | | |
| 3. Title | | <i>Edition (if applicable)</i> | |
| 4. Geospatial Presentation Form <i>(choose one)</i> | Atlas <input type="checkbox"/> | Profile <input type="checkbox"/> | |
| | Diagram <input type="checkbox"/> | Remote Sensing Image <input type="checkbox"/> | |
| | Globe <input type="checkbox"/> | Section <input type="checkbox"/> | |
| | Map <input type="checkbox"/> | View <input type="checkbox"/> | |
| | Model <input type="checkbox"/> | | |
| 5. Publication Place | | | |
| 6. Publisher | | | |
| 7. On line Linkage | | | |

| 2. Description |
|------------------------------------|
| 1. Abstract |
| |
| 2. Purpose |
| |
| 3. Supplemental Information |
| |

| 3. Time Period and Status Information | |
|--|--|
| Time Period of Content: | |
| <i>1. Time Period Information</i> | Beginning Date: _____ End Date: _____ |
| <i>2. Currentness Reference</i> | Ground Condition <input type="checkbox"/> Publication Date <input type="checkbox"/> (choose one) |
| Status: | |
| <i>1. Progress</i> | Complete <input type="checkbox"/> In Work <input type="checkbox"/> Planned <input type="checkbox"/> |
| <i>2. Maintenance and Update Frequency</i> | Continually <input type="checkbox"/> Annually <input type="checkbox"/> Daily <input type="checkbox"/> Unknown <input type="checkbox"/> Weekly <input type="checkbox"/> As Needed <input type="checkbox"/> Monthly <input type="checkbox"/> Irregular <input type="checkbox"/> |

| 4. Spatial Domain | |
|---------------------------------|-------|
| 1. Bounding Coordinates: | |
| West Bounding Coordinate | _____ |
| East Bounding Coordinate | _____ |
| North Bounding Coordinate | _____ |
| South Bounding Coordinate | _____ |

| 5. Keywords | |
|-----------------------------------|-------|
| 1. Theme: | |
| <i>Theme Keyword Thesaurus</i> | _____ |
| <i>Theme Keyword</i> | _____ |
| 2. Place: | |
| <i>Place Keyword Thesaurus</i> | _____ |
| <i>Place Keyword</i> | _____ |
| 3. Temporal: | |
| <i>Temporal Keyword Thesaurus</i> | _____ |
| <i>Temporal Keyword</i> | _____ |

| 6. Constraints and Graphics | |
|---|--|
| 1. Access Constraints | |
| | |
| 2. Use Constraints | |
| | |
| 3. Browse Graphic | |
| Browse Graphic File Name | |
| Browse Graphic File Description | |
| Browse Graphic File | |
| 4. Direct Spatial Reference Method | Point <input type="checkbox"/> Raster <input type="checkbox"/> Vector <input type="checkbox"/> |

| 7. Distribution Information | |
|------------------------------------|-----------------------------------|
| 1. Distributor | |
| Contact Organization | Contact Person |
| Mailing Address: | Phone: Fax: E-mail Address: |
| 2. Resource Description | |
| 3. Distribution Liability | |

| 8. Metadata Reference Information | |
|--|-----------------------------------|
| 1. Metadata Date | |
| 2. Metadata Contact | |
| Contact Organization | Contact Person |
| Mailing Address: | Phone: Fax: E-mail Address: |

Additional Information for filling out the Metadata form

The information provided below was extracted from the relevant sections of the "Content Standards for Digital Geospatial Metadata Workbook" prepared by the Federal Geographic Data Committee (FGDC). Additional information about certain elements are given in a smaller and different font and bordered by horizontal lines at the top and bottom.

1. Citation Information - the recommended reference to be used for the data set.

1. *Originator* - the name of an organisation or individual that developed the dataset. If the names of editors or compilers are provided, the name must be followed by "(ed.)" or "(comp.)" respectively.
2. *Publication Date* - the date when the data set is published or otherwise made available for release.
3. *Title* - the name by which the data set is known.
4. *Edition* - the version of the title.
5. *Geospatial Data Presentation Form* - the mode in which the geospatial data is represented.
6. *Publication Place* - the name of the city (and state or province, and country, if needed to identify the city) where the data set was published or released.
7. *Publisher* - the name of the individual or organisation that published the data set.
8. *Online Linkage* - the name of an online computer resource that contains the data set. Entries should follow the Uniform Resource Locator (URL) convention of the Internet.

2. Description - a characterisation of the data set, including its intended use and limitations.

1. *Abstract* - a brief narrative summary of the data set.
2. *Purpose* - a summary of the intentions with which the data set was developed.
3. *Supplemental Information* - other descriptive information about the data set.

What is the difference between the "Abstract" and the "Purpose" elements?

The "Abstract" briefly describes the "what" aspects of the data set (For example, what information is in the data set? What area is covered?). The "Purpose" describes the "why" aspects of the data set (For example, why was the data set created?).

3. Time Period and Status Information - information about the data and time of an event.

Time Period of Content: - time period(s) for which the data set corresponds to the ground.

1. *Time Period Information* - beginning and end date of an event.

2. *Currentness Reference* - the basis on which the time period of content information is determined.

What does "currentness reference" mean?

Information about the currentness of a data set (that is, information about how "up-to-date" is a data set) is important to many, if not most, potential users. Most users are interested in the currentness of a data set related to the "ground conditions" (that is, when the "real world" looked the way it is described in the data set). Unfortunately, sometimes only the time that the information was recorded or published is known. The Currentness Reference element requires the producer to identify if the Time Period of Content dates and times refer to the ground condition, or some later time when the information was recorder, published, etc.

Status: - the state of and maintenance information for the data set.

1. *Progress* - the state of the data set.

2. *Maintenance and Update Frequency* - the frequency with which changes and additions are made to the data set after the initial data set is completed.

4. Spatial Domain - the geographic areal domain of the data set.

1. *Bounding Coordinates* - the limits of coverage of a data set expressed by latitude and longitude values in the order western-most, eastern-most, northern-most and southern-most. For data sets that include a complete band of latitude around the earth, the West Bounding Coordinate shall be assigned the value -180.0 and the East Bounding Coordinate shall be assigned the value 180.0.

West Bounding Coordinate - western-most coordinate of the limit of coverage expressed in longitude.

East Bounding Coordinate - eastern-most coordinate of the limit of coverage expressed in longitude.

North Bounding Coordinate - northern-most coordinate of the limit of coverage expressed in latitude.

South Bounding Coordinate - southern-most coordinate of the limit of coverage expressed in latitude.

5. Keywords - words or phrases summarising an aspect of the data set.

What is the purpose of the keywords?

A keyword is a word or phrase that signifies the meaning or main ideas of a data set. They often are used as an index to the contents of a data set. The standards provide for four types of keywords: theme (the subject of the data set, such as wetlands, vegetation, etc.), place (the geographic location of the data set, such as Mahaica, Georgetown, etc.), stratum (the vertical location of the data set, such as seafloor, seabed, troposphere, stratosphere), and temporal (time references for a data set such as pre-Columbian, World War II).

1. Theme: - subjects covered by the data set.

Theme Keyword Thesaurus - reference to a formally registered thesaurus or a similar authoritative source of theme keywords.

Theme Keyword - common-use word or phrase used to describe the subject of the data set.

2. Place: - geographic locations characterised by the data set.

Place Keyword Thesaurus - reference to a formally registered thesaurus or a similar authoritative source of place keywords.

Place Keyword - the geographic name of a location covered by a data set.

3. Temporal: - time period(s) characterised by the data set.

Temporal Keyword Thesaurus - reference to a formally registered thesaurus or a similar authoritative source of temporal keywords.

Temporal Keyword - the name of a time period covered by a data set.

6. Constraints and Graphics - restrictions on use of data set and illustration of data set.

1. Access Constraints - restrictions and legal prerequisites for accessing the data set. These include any access constraints applied to assure the protection of

privacy or intellectual property, and any special restrictions or limitations on obtaining the data set.

2. *Use Constraints* - restrictions and legal prerequisites for using the data set after access is granted. These include any access constraints applied to assure the protection of privacy or intellectual property, and any special restrictions or limitations on obtaining the data set.

What types of constraints are to be provided for Access Constraints and Use Constraints?

The types of constraints intended are those applied to ensure rights of privacy or intellectual property, and any other special restrictions, limitations, or warranties on obtaining or using the information resources, or its component products. Recommendations on the types of uses to which the data set may or may not be applied should be described in the "Purpose" data element.

3. *Browse Graphic* - a graphic that provides an illustration of the data set. The graphic should include a legend for interpreting the graphic.

What is the purpose of a browse graphic?

A browse graphic is an image of the data set. The image allows prospective users move beyond textual descriptions and see what the data set looks like. The image might show a simple display of the data set, the results of an application that used the data set, different aspects of the quality of the data set, or other information.

Browse Graphic File Name - name of a related graphic file that provides an illustration of the data set.

Browse Graphic File Description - a text description of the illustration.

Browse Graphic File Type - graphic file type of a related graphic file.

4. *Direct Spatial Reference Method* - the system of objects used to represent space in the data set.

7. Distribution Information - information about the distributor and options for obtaining the data set.

1. *Distributor* - the party from whom the data set may be obtained.
2. *Resource Description* - the identifier by which the distributor knows the data set.

What is an example of a Resource Description?

A Resource Description is a label by which a data set can be requested from a distributor. A catalogue number is an example of a Resource Description.

3. *Distribution Liability* - statement of the liability assumed by the distributor.

8. Metadata Reference Information - information on the currentness of the metadata information, and the responsible party.

1. *Metadata Date* - the date that the metadata were created or last updated.

2. *Metadata Contact* - the party responsible for the metadata information.

Who should be the metadata contact?

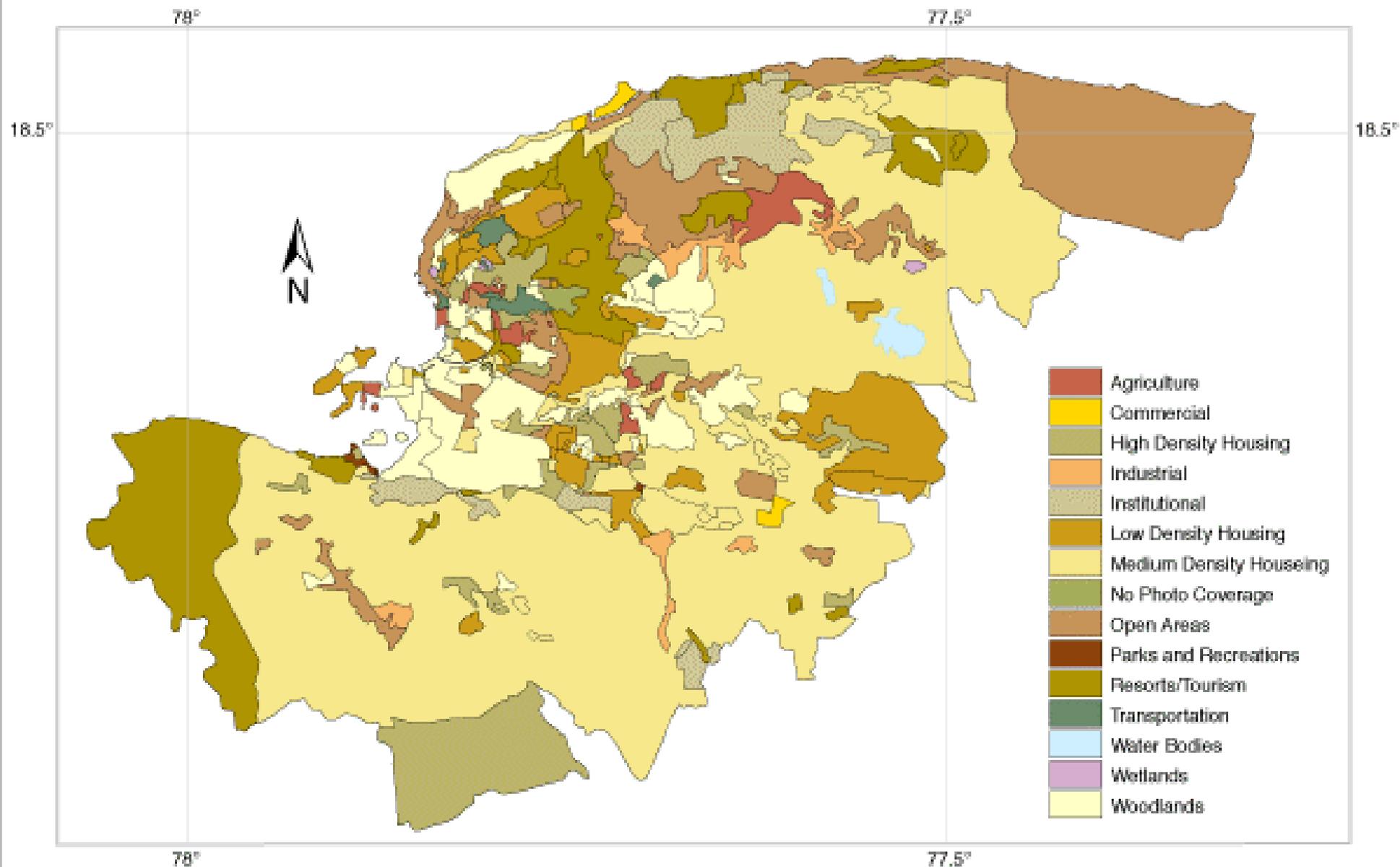
The metadata contact should be the organisation or person that can answer questions about the metadata or can receive reports about errors in the metadata.

Appendix 3

Metadata Example

The image shows a screenshot of a software application window titled "MetaLite - [Metadata Example : Metadata Entry Form]". The window has a menu bar with "File", "View", "Language", "Window", and "Help". Below the menu bar is a toolbar with icons for file operations. The main area contains several tabs: "Keywords", "Constraints & Graphics", "Distribution", "Metadata Reference", "Originator", "Description", "Time & Status", and "Spatial Domain". The "Originator" tab is selected, and it contains a section titled "Citation Information". This section includes several input fields: "Originator" (a text box), "Publication Date" (a text box with a "Calendar" button), "Title" (a text box), "Edition" (a text box), and "Geospatial Presentation Form" (a dropdown menu with "atlas" selected). Below these is a "Publication Information" section with "Publication Place" and "Publisher" text boxes. At the bottom of the form is an "Online Linkage" text box. The status bar at the bottom of the window displays "5/14/98" and "U.S. Geological Survey ERDS Data Center's International Program".

Montego Bay Pilot Study



Planning Institute of Jamaica (PIOJ)

February 11, 1997

Published by Jamaican Government, Kingston, Jamaica

<http://www.cep.unep.org/data/montego/montego.html>

METADATA EXERCISE 2: Montego Bay Pilot Study

General Data Set Information:

The Jamaican Government has developed an information management system (IMS) using a Geographic Information System (GIS) software package. The Montego Bay Pilot Study data consist of the layers for Land Use, Enumeration District Boundaries (1982, 1991), Housing Topology, Perennial Streams and Rivers, Primary, Secondary and Town Roads, Contours, Zoning, "Urban Fence", Open land suitability analysis, and Place names in Montego Bay. All coverages are stored in the common coordinate system.

The Montego Bay Pilot Study has focused on a number of environmental information and management activities which include: 1. compiling, storing, processing and reporting environmental data and related information; 2. preparing issue-specific/sectoral assessments on environmental quality health and development; 3. preparing research reports.

November 23, 1992 to present



*United Nations Environment Programme
Caribbean Environment Programme
Regional Co-ordinating Unit*

Kenneth D. Korporal
Project Manager - CEPNET/IDB

UNEP CAR/RCU
14-20 Port Royal Street
Kingston, Jamaica, W.I.

☎: (1-809) 922 92 67 to 9
Fax: (1-809) 922 92 92
E-mail: uneprcuja@toj.com

Montego Bay Pilot Study

Metadata:

- [Identification Information](#)
 - [Spatial Data Organization Information](#)
 - [Distribution Information](#)
 - [Metadata Reference Information](#)
-

Identification_Information:

Citation:

Citation_Information:

Originator: Planning Institute of Jamaica (PIOJ)

Publication_Date: 19970211

Title: Montego Bay Pilot Study

Edition: 1.0

Geospatial_Data_Presentation_Form: map

Publication_Information:

Publication_Place: Kingston, Jamiaca

Publisher: Jamaican Government

Online_Linkage: <<http://www.cep.unep.org/data/jam/jam.html>>

Description:

Abstract:

The Jamaican Government has developed an information management system (IMS) using a Geographic Information System (GIS) software package. The Montego Bay Pilot Study data consist of the layers for Land Use, Enumeration District Boundaries (1982, 1991), Housing Topology, Perennial Streams and Rivers, Primary, Secondary and Town Roads, Contours, Zoning, "Urban Fence", Open land suitability analysis, and Place names in Montego Bay. All coverages are stored in the common coordinate system.

Purpose:

The Montego Bay Pilot Study has focused on a number of environmental information and management activities which include: 1. compiling, storing, processing and reporting environmental data and related information; 2. preparing issue-specific/sectoral assessments on environmental quality health and development; 3. preparing research reports.

Supplemental_Information:

The Montego Bay Pilot Study is being distributed through the Inter-Am

Time_Period_of_Content:

Time_Period_Information:

Range_of_Dates/Times:

Beginning_Date: 19921123

Ending_Date: present

Currentness_Reference: publication date

*Status:**Progress:* Complete*Maintenance_and_Update_Frequency:* Continually*Spatial_Domain:**Bounding_Coordinates:**West_Bounding_Coordinate:* -77.825*East_Bounding_Coordinate:* -77.596*North_Bounding_Coordinate:* 18.521*South_Bounding_Coordinate:* 18.437*Keywords:**Theme:**Theme_Keyword_Thesaurus:* None*Theme_Keyword:* Border*Theme_Keyword:* Contour lines*Theme_Keyword:* Enumeration District Boundaries*Theme_Keyword:* Housing Topology*Theme_Keyword:* hydro*Theme_Keyword:* hydrology*Theme_Keyword:* land use*Theme_Keyword:* Open land*Theme_Keyword:* Place name*Theme_Keyword:* Rivers*Theme_Keyword:* roads*Theme_Keyword:* Streams*Theme_Keyword:* Urban Fence*Theme_Keyword:* Urban*Theme_Keyword:* zones*Place:**Place_Keyword_Thesaurus:* None*Place_Keyword:* Caribbean*Place_Keyword:* Jamaica*Place_Keyword:* Mobay*Place_Keyword:* Montego Bay*Access_Constraints:* None*Use_Constraints:* None*Browse_Graphic:**Browse_Graphic_File_Name:* <<http://www.cep.unep.org/data/jam/mobay.gif>>*Browse_Graphic_File_Description:* Montego Bay Pilot Study*Browse_Graphic_File_Type:* GIF - Graphic Interchange Format

*Spatial_Data_Organization_Information:**Direct_Spatial_Reference_Method:* Vector

*Distribution_Information:**Distributor:**Contact_Information:**Contact_Person_Primary:*

Contact_Person: Kenneth D. Korporal
Contact_Organization: Caribbean Environment Programme Regional Co-ordinating Unit

Contact_Address:

Address_Type: mailing and physical address

Address: 14-20 Port Royal Street

City: Kingston

State_or_Province: Jamaica

Postal_Code: 00000

Country: Jamaica

Contact_Voice_Telephone: (876) 922-9267

Contact_Facsimile_Telephone: (876) 922-9292

Contact_Electronic_Mail_Address: kdk.uneprcuja@toj.com

Resource_Description: Montego Bay

Distribution_Liability: None

Metadata_Reference_Information:

Metadata_Date: 19970520

Metadata_Contact:

Contact_Information:

Contact_Person_Primary:

Contact_Person: Customer Services Representative

Contact_Organization: EROS Data Center

Contact_Address:

Address_Type: mailing and physical address

Address:

U.S. Geological Survey EROS Data Center Customer Services

City: Sioux Falls

State_or_Province: SD

Postal_Code: 57198

Country: USA

Contact_Voice_Telephone: (605) 594-6151

Contact_Facsimile_Telephone: (605) 594-6589

Contact_Electronic_Mail_Address: custserv@edcmail.cr.usgs.gov

Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata

Metadata_Standard_Version: FGDC-STD-001-1998

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