

# Sustainability of Large Marine Ecosystems: Bridging the Governance and Socio-Economic Gap

## Using Geospatial Technology and the Internet to Support Large Marine Ecosystem Programs

Christopher Damon, URI Environmental Data Center

Funding provided by GEF through IOC/UNESCO



# Introduction:

- Who am I ?
- What do I do?
- What is my role within the LME Community?

## Session Objectives:

- Describe past/present efforts to promote information sharing
- Discuss design and usefulness of an LME GIS KM system
  - Participant discussion
- Open a dialog on data and information standards
  - Participant Discussion

# What is a GIS?

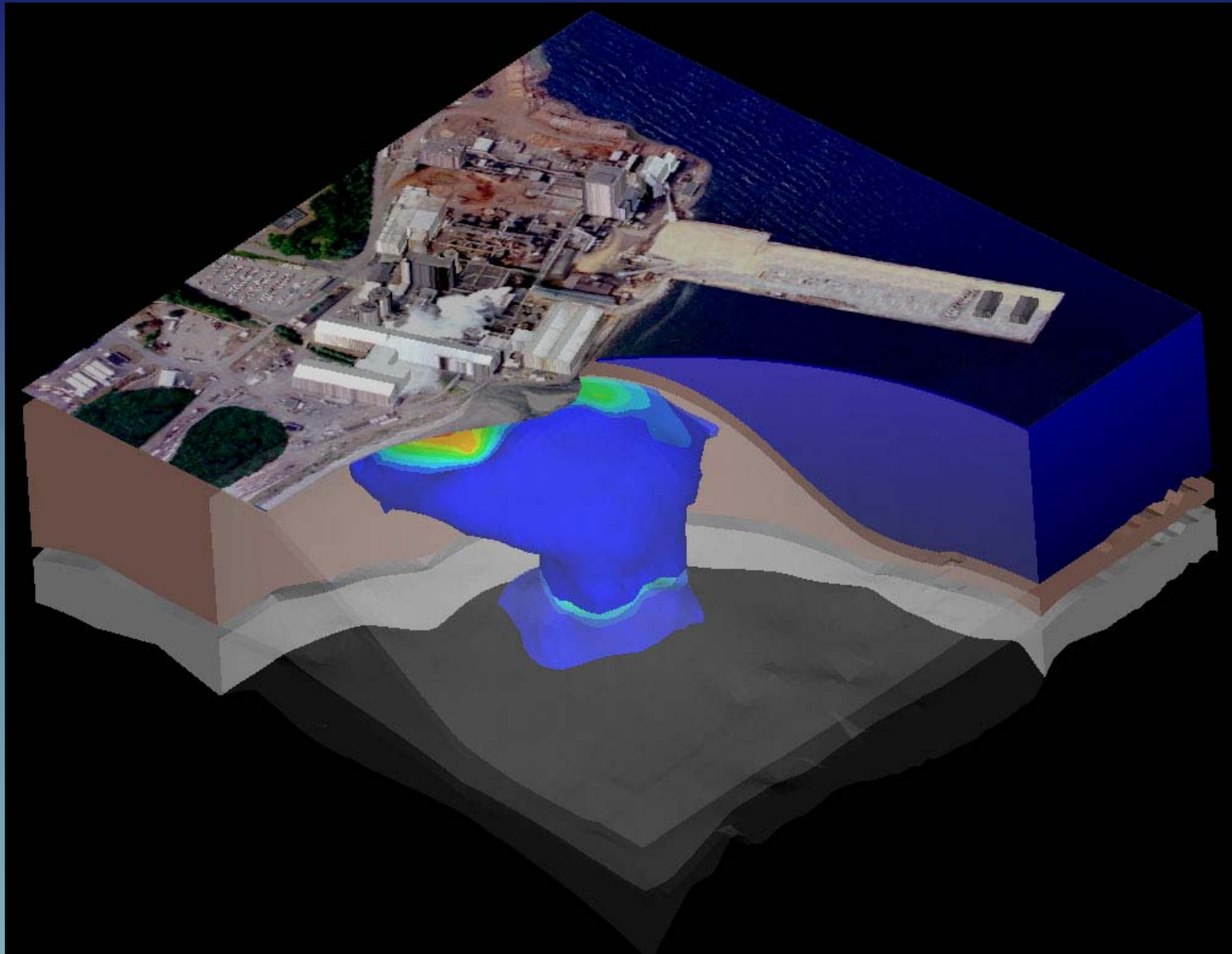
“ A computer system designed to store, manipulate, analyze and display data in a geographic context ”

- ONLY A TOOL!
- Questions and goals must be clearly identified

# Making Your Point:

COAST	GEOLOGY	FILE			
Elevation	Ocean	Ocean	Sand	Bedrock	
194	4	1	1	2	3
0	912	0	0	-38.2	-57.7
24	895.2	0	0	-42.9	-60.3
44.4	882.7	0	0	-38	-56.9
56.2	863.5	0	0	-38.9	-55.3
57	853.1	0	0	-42.3	-57.9
69.4	846.4	0	0	-44.9	-62.9
88.7	838.5	0	0	-36.8	-51.1
101.2	843	0	0	-41.5	-52.7
113.7	845.3	0	0	-36	-55.7
145.6	836.2	0	0	-37.6	-48.1
155.8	838.5	0	0	-39.2	-54
185.3	853.3	0	0	-43.5	-59.8
197.1	855.1	0	0	-39.3	-54.2
214.5	850.2	0	0	-37.7	-54.3
236.8	848.8	0	0	-44.9	-56.5
247.2	850.2	0	0	-38.7	-58.1
259.8	852.7	0	0	-38.5	-49.1
276.3	858.3	0	0	-42.1	-54.8
294.2	857.4	0	0	-44.7	-58.2
302.8	856.4	0	0	-40	-60
331.2	854.4	0	0	-38.4	-55.8
349.9	837.4	0	0	-39.7	-53.6
355.4	826.8	0	0	-44.7	-65.7
363	800.9	0	0	-41.3	-57.4
370.8	787.9	0	0	-35.3	-48.3
376.9	767.1	0	0	-36.2	-45.4
387.8	756.4	0	0	-40.6	-59.6
464.8	638.3	0	0	-44.9	-60.2
470.7	607.1	0	0	-35	-44.5
470.7	564.2	0	0	-41.2	-59.6
492.2	472.4	0	0	-37.4	-46.9
500.6	440.3	0	0	-44.9	-57.2
521.5	425.6	0	0	-42.5	-57.7
535.2	398.2	0	0	-42.9	-60.8
529.3	353.3	0	0	-39.9	-59.3
507.8	318.2	0	0	-39.4	-51.7
460.9	253.8	0	0	-42.9	-59.1
421.9	181.5	0	0	-44.8	-56.8
408.2	111.3	0	0	-35.8	-49.4
404.3	66.4	0	0	-42.8	-62.1
402.2	0	0	0	-35.2	-49.8
50	962	0	-10	-35.8	-52.3
74	945.2	0	-10	-44.2	-59.8
94.4	932.7	0	-10	-42.7	-55.9
106.2	913.5	0	-10	-39.9	-47.4

# The Power of a Picture:

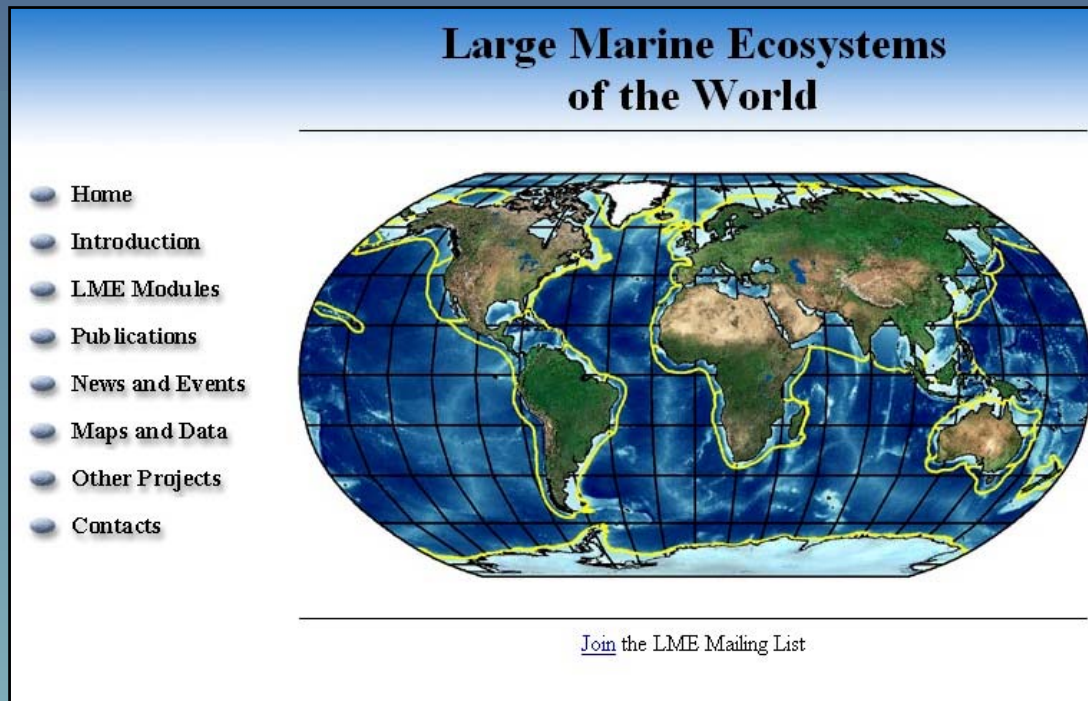


# Bringing Information to the People:

## The LME Data Distribution Project

Objective: To provide free, dependable, easy access to core LME data (maps, boundary files, module summaries)

Strategy: Capitalize on the power of the Internet



### Rationale:

- Operates 24/7
- Global coverage
- Consistent data

### Effectiveness:

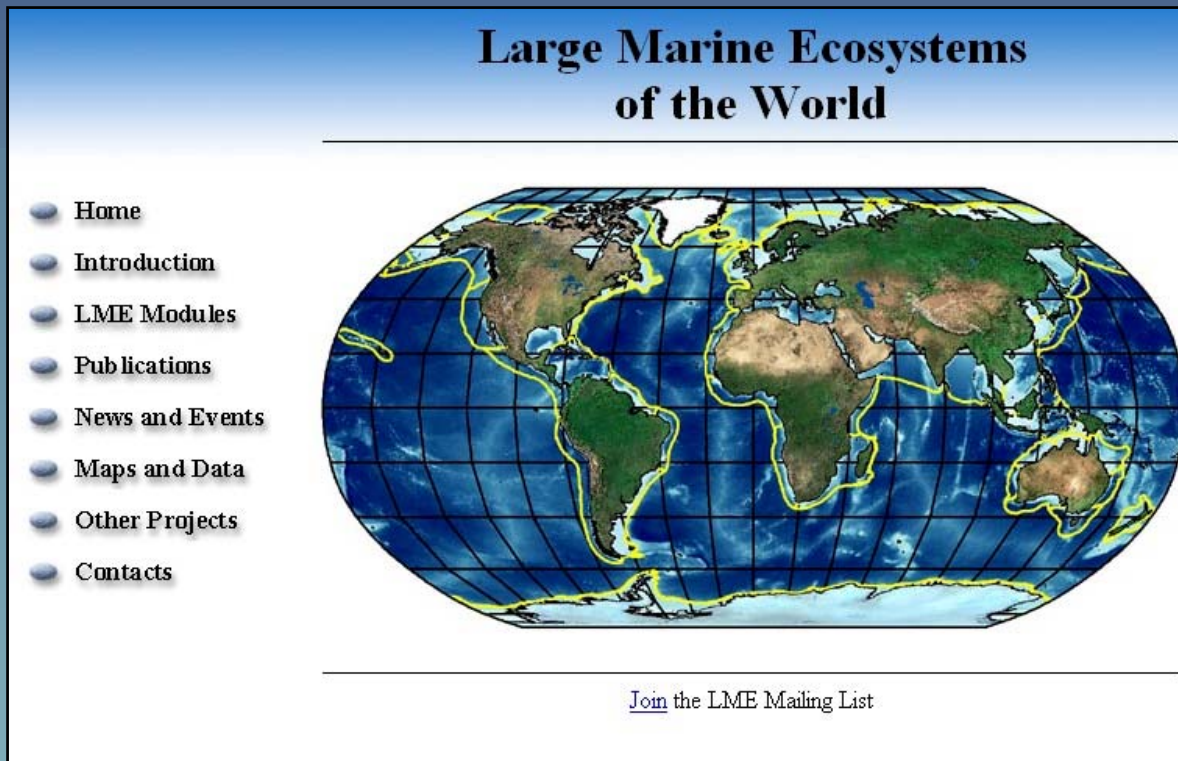
- ~ 530k pages served
- ~ 200 / day
- ~ 70 Gb data transferred
- ~ 7000 distinct hosts
- ~ 3200 on mailing list



# Inherent Internet Drawbacks:

## The Limitations:

- Vast amount of potential
- Inefficient design for KM system
- Too much for 1 person/group with limited time and funds



## The Results:

- Limited Content

## Is There a Better Way?

- Decentralize data holdings
- Elicit additional help

# The Second Generation: Finding a Better Way

## Objectives:

- Build a true LME community
- Provide free, dependable, easy access to available LME data and resources

Strategy: Capitalize on technological advances as well as the power of the Internet



# The Second Generation: LME Data and Information Portal

## What is a Portal?

- A master website of relevant links

## Strengths:

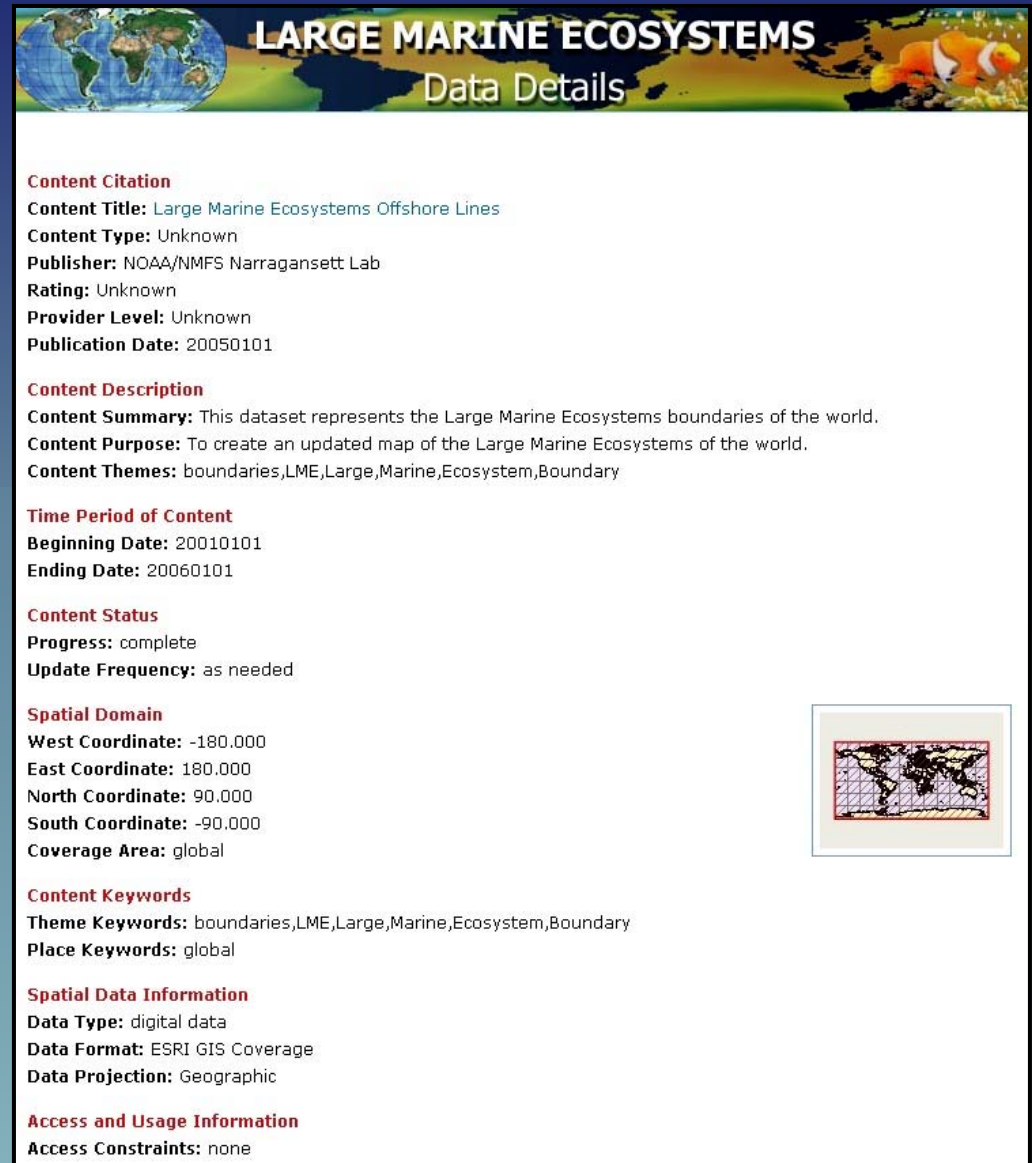
- Searchable database
- Content added/maintained by users
- Comprehensive, relevant content
- Little effort required by any one group

The screenshot shows the homepage of the 'LARGE MARINE ECOSYSTEMS Data and Information Portal'. The header features a globe on the left and a clownfish on the right, with the title 'LARGE MARINE ECOSYSTEMS Data and Information Portal' in the center. The main content area is divided into two columns. The left column contains a sidebar with navigation links: 'Make a Map' (with a 'Launch: The LME Map Viewer' button and a small map), 'Search for Data' (with a search box and 'GO' button), 'Login' (with 'Username:' and 'Password:' fields and a 'LOGIN' button), 'My Maps', 'My Searches', 'My Functions', 'Help' (with links to 'Quick Start Guide', 'Why Participate?', and 'How Do I Publish Data Collections'), and 'About This Site' (with links to 'Partnerships' and 'Contact Us'). The right column is titled 'Explore an LME' and features a large world map. Below the map, the 'LME Modules' section lists various marine ecosystems: EAST ATLANTIC (Baltic Sea, Faroe Plateau, Canary Current, North Sea, Celtic-Biscay Shelf, Mediterranean Sea, Guinea Current, Iberian Coastal, Norwegian Sea, Black Sea, Benguela Current), WEST ATLANTIC (South Brazil Shelf, Newfoundland-Labrador Shelf, Caribbean Sea, Gulf of Mexico, North Brazil Shelf, Northeast U.S. Continental Shelf, Patagonian Shelf, Southeast U.S. Continental Shelf, Scotian Shelf, East Brazil Shelf), EAST PACIFIC, WEST PACIFIC, INDIAN, and POLAR.

# LME Data and Information Portal : Key Features

## Key Features:

- Searchable
  - Metadata database
    - What is metadata?
      - Who, What, When, Where, Why
    - What can be searched?
      - Location, Data Format, Content
  - Content decided by users
    - Links/metadata added via internet
    - Users maintain full control of data
  - Online Forum
    - Ask questions, solve problems



**LARGE MARINE ECOSYSTEMS**  
Data Details


**Content Citation**  
**Content Title:** Large Marine Ecosystems Offshore Lines  
**Content Type:** Unknown  
**Publisher:** NOAA/NMFS Narragansett Lab  
**Rating:** Unknown  
**Provider Level:** Unknown  
**Publication Date:** 20050101

**Content Description**  
**Content Summary:** This dataset represents the Large Marine Ecosystems boundaries of the world.  
**Content Purpose:** To create an updated map of the Large Marine Ecosystems of the world.  
**Content Themes:** boundaries,LME,Large,Marine,Ecosystem,Boundary

**Time Period of Content**  
**Beginning Date:** 20010101  
**Ending Date:** 20060101

**Content Status**  
**Progress:** complete  
**Update Frequency:** as needed

**Spatial Domain**  
**West Coordinate:** -180.000  
**East Coordinate:** 180.000  
**North Coordinate:** 90.000  
**South Coordinate:** -90.000  
**Coverage Area:** global




**Content Keywords**  
**Theme Keywords:** boundaries,LME,Large,Marine,Ecosystem,Boundary  
**Place Keywords:** global

**Spatial Data Information**  
**Data Type:** digital data  
**Data Format:** ESRI GIS Coverage  
**Data Projection:** Geographic

**Access and Usage Information**  
**Access Constraints:** none

# LME Data and Information Portal : The Practical Side of Metadata

- Workflow is detailed
- Ensures data used appropriately
- Users can assess utility before obtaining data
- Reduces phone calls and e-mail



## LARGE MARINE ECOSYSTEMS

### Data Details

**Content Citation**  
**Content Title:** Large Marine Ecosystems Offshore Lines  
**Content Type:** Unknown  
**Publisher:** NOAA/NMFS Narragansett Lab  
**Rating:** Unknown  
**Provider Level:** Unknown  
**Publication Date:** 20050101

**Content Description**  
**Content Summary:** This dataset represents the Large Marine Ecosystems boundaries of the world.  
**Content Purpose:** To create an updated map of the Large Marine Ecosystems of the world.  
**Content Themes:** boundaries,LME,Large,Marine,Ecosystem,Boundary

**Time Period of Content**  
**Beginning Date:** 20010101  
**Ending Date:** 20060101

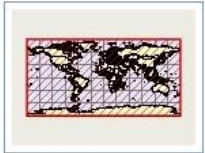
**Content Status**  
**Progress:** complete  
**Update Frequency:** as needed

**Spatial Domain**  
**West Coordinate:** -180.000  
**East Coordinate:** 180.000  
**North Coordinate:** 90.000  
**South Coordinate:** -90.000  
**Coverage Area:** global

**Content Keywords**  
**Theme Keywords:** boundaries,LME,Large,Marine,Ecosystem,Boundary  
**Place Keywords:** global

**Spatial Data Information**  
**Data Type:** digital data  
**Data Format:** ESRI GIS Coverage  
**Data Projection:** Geographic

**Access and Usage Information**  
**Access Constraints:** none




# LME Data and Information Portal

DEMO PORTAL



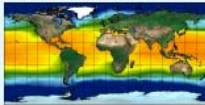
## LARGE MARINE ECOSYSTEMS

### Data and Information Portal



#### Make a Map

Launch:  
The LME Map Viewer



#### Search for Data

[Advanced Search](#)

#### Login

Username:

Password:

[Create a new account!](#)

#### My Maps

#### My Searches

#### My Functions

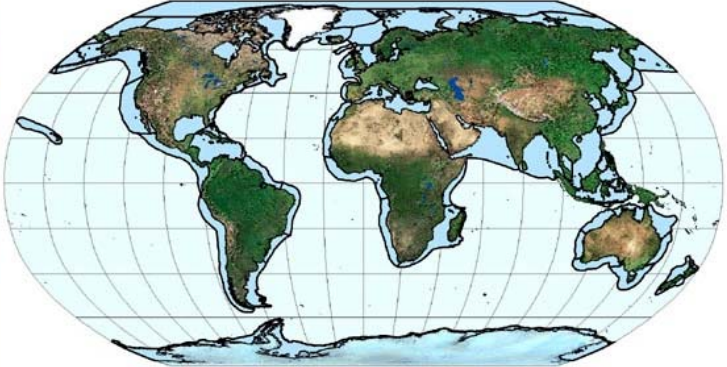
#### Help

- [Quick Start Guide](#)
- [Why Participate?](#)
- [How Do I Publish Data Collections](#)

#### About This Site

- [Partnerships](#)
- [Contact Us](#)

### Explore an LME



#### LME Modules

- - **EAST ATLANTIC**  
Baltic Sea | Faroe Plateau | Canary Current | North Sea | Celtic-Biscay Shelf | Mediterranean Sea | Guinea Current | Iberian Coastal | Norwegian Sea | Black Sea | Benguela Current
- - **WEST ATLANTIC**  
South Brazil Shelf | Newfoundland-Labrador Shelf | Caribbean Sea | Gulf of Mexico | North Brazil Shelf | Northeast U.S. Continental Shelf | Patagonian Shelf | Southeast U.S. Continental Shelf | Scotian Shelf | East Brazil Shelf
- + **EAST PACIFIC**
- + **WEST PACIFIC**
- + **INDIAN**
- + **POLAR**



# LME Data and Information Portal: Pros and Cons

## Why is a portal format better?

- Much richer content
- Users determine content
- Users maintain full control of data
- Information is up-to-date
- No new hardware/software

## Why not?

- Requires active user participation



**LARGE MARINE ECOSYSTEMS**  
Data and Information Portal

**Make a Map**  
Launch:  
The LME Map Viewer

**Search for Data**  
   
Advanced Search

**Login**  
Username:   
Password:    
Create a new account!

**My Maps**

**My Searches**

**My Functions**

**Help**  
- Quick Start Guide  
- Why Participate?  
- How Do I Publish Data Collections

**About This Site**  
- Partnerships  
- Contact Us

**Explore an LME**

**LME Modules**

- - **EAST ATLANTIC**  
Baltic Sea | Faroe Plateau | Canary Current | North Sea | Celtic-Biscay Shelf | Mediterranean Sea | Guinea Current | Iberian Coastal | Norwegian Sea | Black Sea | Benguela Current
- - **WEST ATLANTIC**  
South Brazil Shelf | Newfoundland-Labrador Shelf | Caribbean Sea | Gulf of Mexico | North Brazil Shelf | Northeast U.S. Continental Shelf | Patagonian Shelf | Southeast U.S. Continental Shelf | Scotian Shelf | East Brazil Shelf
- + **EAST PACIFIC**
- + **WEST PACIFIC**
- + **INDIAN**
- + **POLAR**

# LME Data and Information Portal: Perceived Benefits to LME Community

## Benefits:

- Builds a true LME Community
- Seamless movement from global to local levels
- Maintain quick and easy distribution
- No specialized software
- Metadata already/should exist
- Identify data gaps
- Consistent data
- Avoid duplication of effort
- Build technological and informational capacity
- Project transparency
- Use participation to justify future funding

The screenshot shows the homepage of the 'LARGE MARINE ECOSYSTEMS Data and Information Portal'. The header features a globe on the left and a clownfish on the right, with the title 'LARGE MARINE ECOSYSTEMS Data and Information Portal' in the center. The main content area is divided into two columns. The left column contains a sidebar with navigation links: 'Make a Map' (with a 'Launch: The LME Map Viewer' button and a small map), 'Search for Data' (with a search box and 'GO' button), 'Login' (with 'Username:' and 'Password:' fields and a 'LOGIN' button), 'My Maps', 'My Searches', 'My Functions', 'Help' (with links to 'Quick Start Guide', 'Why Participate?', and 'How Do I Publish Data Collections'), and 'About This Site' (with links to 'Partnerships' and 'Contact Us'). The right column is titled 'Explore an LME' and features a large world map. Below the map, the 'LME Modules' section lists various marine ecosystems, including the East Atlantic, West Atlantic, East Pacific, West Pacific, Indian, and Polar regions, each with a list of specific sub-regions or features.

**LARGE MARINE ECOSYSTEMS**  
Data and Information Portal

**Make a Map**  
Launch:  
The LME Map Viewer

**Search for Data**  
 **GO**  
Advanced Search

**Login**  
Username:   
Password:  **LOGIN**  
Create a new account!

**My Maps**  
**My Searches**  
**My Functions**  
**Help**  
- Quick Start Guide  
- Why Participate?  
- How Do I Publish Data Collections  
**About This Site**  
- Partnerships  
- Contact Us

**Explore an LME**

**LME Modules**

- - **EAST ATLANTIC**  
Baltic Sea | Faroe Plateau | Canary Current | North Sea | Celtic-Biscay Shelf | Mediterranean Sea | Guinea Current | Iberian Coastal | Norwegian Sea | Black Sea | Benguela Current
- - **WEST ATLANTIC**  
South Brazil Shelf | Newfoundland-Labrador Shelf | Caribbean Sea | Gulf of Mexico | North Brazil Shelf | Northeast U.S. Continental Shelf | Patagonian Shelf | Southeast U.S. Continental Shelf | Scotian Shelf | East Brazil Shelf
- + **EAST PACIFIC**
- + **WEST PACIFIC**
- + **INDIAN**
- + **POLAR**

# LME Data and Information Portal: Why Share Data?

- Building a GIS is expensive
  - Both capturing and maintaining data
  - Cost sharing is a better way to approach large projects
- Avoid duplication of effort
- User base too small to recoup costs
- Questions are too complex for any 1 group
- Capitalize on institutional strengths
- Database is consistent

**LARGE MARINE ECOSYSTEMS**  
Data and Information Portal

**Make a Map**  
Launch:  
The LME Map Viewer

**Search for Data**  
 **GO**  
Advanced Search

**Login**  
Username:   
Password:  **LOGIN**  
Create a new account!

**My Maps**

**My Searches**

**My Functions**

**Help**  
- Quick Start Guide  
- Why Participate?  
- How Do I Publish Data Collections

**About This Site**  
- Partnerships  
- Contact Us

**Explore an LME**

**LME Modules**

- - **EAST ATLANTIC**  
Baltic Sea | Faroe Plateau | Canary Current | North Sea | Celtic-Biscay Shelf | Mediterranean Sea | Guinea Current | Iberian Coastal | Norwegian Sea | Black Sea | Benguela Current
- - **WEST ATLANTIC**  
South Brazil Shelf | Newfoundland-Labrador Shelf | Caribbean Sea | Gulf of Mexico | North Brazil Shelf | Northeast U.S. Continental Shelf | Patagonian Shelf | Southeast U.S. Continental Shelf | Scotian Shelf | East Brazil Shelf
- + **EAST PACIFIC**
- + **WEST PACIFIC**
- + **INDIAN**
- + **POLAR**



# LME Data and Information Portal: Open Discussion

- Is this useful?
- Would your group be willing to participate?
- What should be added/removed?
- Any potential problems?
- Your thoughts on data sharing?

**LARGE MARINE ECOSYSTEMS**  
Data and Information Portal

**Make a Map**  
Launch:  
The LME Map Viewer  


**Search for Data**  
  
Advanced Search

**Login**  
Username:   
Password:   
  
[Create a new account!](#)

**My Maps**  
**My Searches**  
**My Functions**  
**Help**  
- Quick Start Guide  
- Why Participate?  
- How Do I Publish Data Collections  
**About This Site**  
- Partnerships  
- Contact Us

**Explore an LME**



**LME Modules**

- - **EAST ATLANTIC**  
Baltic Sea | Faroe Plateau | Canary Current | North Sea | Celtic-Biscay Shelf | Mediterranean Sea | Guinea Current | Iberian Coastal | Norwegian Sea | Black Sea | Benguela Current
- - **WEST ATLANTIC**  
South Brazil Shelf | Newfoundland-Labrador Shelf | Caribbean Sea | Gulf of Mexico | North Brazil Shelf | Northeast U.S. Continental Shelf | Patagonian Shelf | Southeast U.S. Continental Shelf | Scotian Shelf | East Brazil Shelf
- + **EAST PACIFIC**
- + **WEST PACIFIC**
- + **INDIAN**
- + **POLAR**

# Expanding the Roll of the LME Community: Looking Foreword

- Should there be standards within and among LMEs?
  - Data format, documentation, attributes, units of measure, legends, coordinate systems, etc.
- Should there be core datasets?
  - Productivity, fisheries, pollution, socioeconomic factors, governance
- What is the best way to build technological capacity?
- Who will coordinate this?

# Expanding the Roll of the LME Community: One Approach

## The LME Data and Information Council (LME DIC)

- Representatives from each LME project

### Core Principals:

- Data and information shall be freely and easily available.
- Databases shall conform, inasmuch as possible, to standard designs allowing exchange of data within LME's, and across LME boundaries.
- Databases shall be fully documented and meet ISO metadata standards.
- The architecture of the LME Information Network shall be based on simplicity, ease of use, reliability, and it shall strive to avoid redundancy and duplication of effort.
- Standards for database design and dissemination be established by the LME Information Council (LME DIC).
- The LME DIC provide leadership in fostering communication, knowledge exchange, cooperation, and training for and by the LME community.

# Expanding the Roll of the LME Community: The LME Data and Information Council

Discussion:

- Is this useful?
- Should this happen?