MyNODC: Spatial Data Info-Structure for Marine Spatial Data Planning

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Ministry of Science Technology and Innovation, MOSTI
National Oceanography Directorate (NOD), MOSTI

NOD is the National Focal Point for R&D&C Oceanography and Marine Science established in 2001 (MOSTE) coordinator for related Oceanographic activities
- National focal point for IOC-UNESCO/IOC-WESTPAC
- National CTI Secretariat Malaysia
- NFP EU-SEA marine-environment

Committed to Excellence in the Marine Sciences
Intergovernmental Oceanographic Commission (144 members)

MALAYSIA was elected as EXECUTIVE COUNCIL MEMBER since 2008, won re-election in 2011

MALAYSIA elected as 2\textsuperscript{nd} Vice Chairperson and executive member of Advisory Group 2008-2012
5 World Ocean Data Centre System (WODCS):
1. Rusia
2. China
3. USA
4. Japan
5. Australia

- NODC
Malaysia as a Maritime Country

329,845 km² of landmass
450,000 km² of marine coverage (EEZ)
VISION
A healthy and productive ocean, rich in biodiversity and heritage, wisely managed, safe and secure, and economically developed for the equitable benefit of all, now and in the future.

GOAL 1
• Understand, Conserve & Restore Ocean Environment

GOAL 2
• Support Sustainable Economic Growth and Opportunities

GOAL 3
• Practice Good Ocean Governance

GOAL 4
• Achieve Participatory, Responsible and Sustainable Development for Islands

10th MALAYSIAN PLAN
Situational Analysis
Ocean Data Management-Knowledge Management and MIS

Ocean is complex
Different jurisdictions under various agencies
- Heterogeneous
- Distributed
- Autonomous

Need mechanism for data sharing

Data Centre
Portal
Database
SEAMLESS SOLUTION
MyNODC NATIONAL OCEANOGRAPHY DATA CENTRE
Degree of completion of the initial design targets for the ocean component of the Global Climate Observing System to be reported to the UN Framework Convention on Climate Change SBSTA (Bonn, June 2009).
For Ocean Experts
and Users

http://www.mynodc.gov.my
Imperative need for a central database housing oceanographic and marine data and information

Launched on the 24th of July 2010

Mission is to provide stewardship and access for the national resource of oceanographic data

Requires the gathering, quality control, processing, summarisation, dissemination, and preservation of data generated by stakeholders

Plays an important role in identifying and disseminating information
Need to establish:
1. Meta-data.
2. Ontology to define standard vocabularies.
3. Data Exchange Language to being both human and machine understandable.
4. Malaysian National GRID to provide high computing power.
5. Subject headings.

The data must be:
• Free and unrestricted
• Non commercial
MYNODC FEATURES

Data Mining & Analysis

- Factsheets (authors, publications etc)
- Gallery
- Related Literature
- Associated Material
- Email To
- Post To Social Networks (CiteULike, Connotea, Facebook, Twitter etc)
- Data Alerts
Hybrid Data Centre Model:
- Autonomous management
- Heterogeneous business process
- Computing infrastructure capacity

Data Centre
- PHN, ARSM, JMM, Buoys, Satellites etc.

Data Provider
- crawler

Data Centre
- NODC-ODT
- interface

NODC-DB
1. Physical Oceanography
2. Chemical Oceanography
3. Marine Contaminants/Pollution
4. Marine Biological/Fisheries
5. Marine Geology/Geophysics
6. Marine Meteorology

Way Forward
- Spatial Data Explorer
- Geospatial Server
- Metadata Catalogue
MyNODC Portal

http://www.mynodc.gov.my/

Government Agencies

Academic & Research Institutions

Private Sector

Public

Forum
e-Learning
Publication
News
Announcement
Oceanarium
MyNODC Facebook

MyNODC Portal

MyNODC H2ODatabase
MyNODC Database

Field Study

Sensor

Spatial

GUI

RDBMS Format
MySQL

XML Format
SDE Format

Advanced MIS & GIS Editing

Ontology

Data Model

Semantic Searching

Spatial Data Infrastructure

Data Browser
Interface for MyNODC Phase 2

Spatial Data Infrastructure for Heterogeneous Distributed Oceanography and Marine Sciences

Data and Knowledge Sources
MyNODC Data Infrastructure

Web Services

MyNODC ONTOLOGY

ANNOTATION

MyNODC DATA MODEL

DATA MODEL
DATA MODEL
DATA MODEL
DATA MODEL
DATA MODEL

DATA STANDARD

SBML - MyNODC
Exchange Language

USER
Query/Search

RESULTS

9 Marine Research COEs

DTM
ATT
LOKASI CENTRE OF EXCELLENCE (COE) BIDANG OSEANOGRAFI DAN SAINS MARIN DI MALAYSIA
Data & Activities in Oceanographic Domain
Application of Ocean-informatics

- MyNODC Knowledgebase
- Inference Engine
- MyNODC Knowledge Portal
- Protected Access
- MyNODC Collaborative Spatial Decision Support System
- Decision Support System
- Geographical Information System
- Management Information System
- MyNODC Data Infrastructure
  - Ontology
  - Exchange
  - Data & Object Model
- MyNODC Database
- Public Access
- MyNODC Portal
- CoEs
- Agencies
- NOD
- expert
- public
MyNODC ROADMAP

Phase 1
MyNODC Database & Portal

Phase 2
MyNODC Spatial Data Infrastructure

Phase 3
MyNODC Hydroinformatic & Oceanographic Data Exchange and Knowledge Management tools

Phase 4
MyNODC Knowledgebase & Portal

Phase 5
MyNODC Collaborative Spatial Decision Support System

Phase 6
MyNODC Cockpit

Ocean Data Portal
National
Regional
International

Artificial Intelligence
Data Management & Mining
Graphics & Visualization
High Performance Computing
Network & Data Security
Software Engineering

Ocean Informatics

Artificial Intelligence
Data Management & Mining
Graphics & Visualization
High Performance Computing
Network & Data Security
Software Engineering

Project Status
Completed
Proposed
Marine Spatial Planning
Marine spatial planning (MSP) is a tool that brings together multiple users of the ocean to make coordinated decisions on how to use marine resources sustainably and strategically.

MSP uses comprehensive maps in order to identify where and how an ocean area is being utilised and what natural resources and habitat exist.
Application of MSP in Tun Mustapha Park

- Marxan – a software designed to aid spatial planning in conservation areas. MARXAN is fundamental as a decision support tool in designing zones for Marine Protected Areas.

- Marxan is the main tool used in the ongoing zoning process of the proposed Tun Mustapha Park (TMP).
Area ~ 1.028 mill. ha. (2.54 mill. acres);
More than 50 islands
3 districts: Kudat, Kota Marudu & Pitas
Population –
~ 80,000 coastal people;
High biodiversity

Tun Mustapha Park
- 4 species of turtles
- 550 species of fish
- 252 species of corals
- 243 species of invertebrates
- 15,500 TM fish landing
  (~ 100 TM landing/day,
  ~ RM 700,000.00/day)
Recognised as a Priority Conservation Area in SSME*

- Productive marine ecosystem (coral reefs, sea grasses and mangroves)
- Fish habitat & breeding grounds
- A corridor route for various types of migratory marine animals (whales, dolphins, dugongs and turtles)

* SSME – Sulu Sulawesi Marine Ecoregion
The software, which is based on data input by participating authorities assists in the zoning process by finding solutions to identify suitable reserve sites that will protect a suite of selected biodiversity targets.

Partnerships between government and non-government agencies involved:

i. Sabah Parks;
ii. Department of Fisheries Sabah;
iii. Universiti Malaysia Sabah;
iv. WWF-Malaysia;
v. Town & Regional Planning Department; and
vi. Kudat District Office.
Types of data obtained allows the software to focus and highlight sites to be prioritised for full protection. Data required ranged from significant marine species habitats to areas of ecological importance.

E.g.: Percentage of coral cover;
Populations of fish species;
Important fishing grounds; and
Areas providing vital services to mankind.
MARXAN allows the realisation of the multiple-use concept in Tun Mustapha Park, a globally important area within the Sulu Sulawesi Marine Ecoregion and the apex of the Coral Triangle, which encompasses the most biodiverse waters in the world

(Source: WWF)
The Way Forward

- Better manage Malaysia’s information on oceanography and marine science to support R&D and services.

- As the centre for data acquisition and exchange, NODC will augment oceanography and marine science activities at national, regional and international platforms.

- A healthy ocean sector is essential for Malaysia’s transformation to a high income, developed nation by 2020.
CONCLUSION

Partnership in Ocean Data and Information Exchange
Large quantities of oceanography data are being generated.

To be useful, this data needs to be:

- Stored
- Distributed
- Retrieved
- Analyzed
- Visualized
- Interpreted
MOSTI FUNDED PROJECTS
(Escience, Techno-Fund, Inno Fund)
Coordinated by  NOD

RMK 10 - National
Escience: 43 Projects  (RM 12 million)  up to May 2012
Technofund: 2 projects (RM 6 million)
InnoFund: 1 project (RM 500 K)

Strategic International collaborative programs and linkages –Capacity building

1. EU FP7- SHIVA consortium of European and Malaysian Universities
2. Malaysia-China-Thailand: Ocean Forecasting system and SEA-GOOS
3. Coral Triangle Initiative : CT6 and Development Partners
4. IODE training programs and regional training centres
Massive Coral Bleaching Reported Sites

1. Langkawi Island
2. Payar Island
3. Pangkor Island
4. Perhentian Island
5. Redang Island
6. Bidong Island
7. Tenggol Island
8. Tioman Island
9. Tinggi Island
10. Sibu Island
11. Pulau Aur & Dayang (label A)

- Red icon shows bleaching site in Malaysia
- White icon shows bleaching site in neighboring country
Threats

Red tide, Harmful Algae Bloom
THANK YOU