National Training Workshop on Marine Spatial Planning

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Department For Continental Shelf, Maritime Zones Administration & Exploration
Prime Minister’s Office

20 October 2020
Marine Spatial Planning

- Introduction – Status of implementation in Mauritius
- Existing zoning & Regulated Zones
- MSP in Action: Review of Aquaculture Sites
- Ocean Observatory - Data Catalogue
- MSP & SDG14
- Joint Management Area (JMA)
Republic of Mauritius

**Facts**

- Maritime Zones: 2,7 M Km²
- Land Area: 2,000 Km²
- Population: 1.2 M
Territorial Seas
Why MSP?

• **Drivers**
  - Growing number of Economic Activities
  - Conflicting usage of Maritime Space
    - Aquaculture, Tourism, Fishing, Conservation
  - Provision for Concession Deeds
    - DOWA, Marinas
  - Cabinet Decision for the elaboration of MSP
    - To sustain the Blue Economy

• **Objectives of MSP**
  1. Provide a framework/Platform for the identification, selection, establishment and management of Potential areas for New Economic Activities:
     - Aquaculture, Marina, Renewable Energy, Tourism,
     - Specific Areas for Exploration and development of living Marine Resources
     - Specific Areas for hydrocarbon and mineral resources
     - Environmentally Sensitive Areas / Conservation Zone
     - Multi-Use Areas
  2. Preserve and Sustain ecosystem and marine resources: Integration an Ecosystem-based approach
  3. Ensure sustainable management of the maritime space and marine resources.
  4. Promote **judicious allocation of maritime space** by considering environmental, cultural and economic factors.
  5. Reduce conflict of usage
  6. Integrate the use of geospatial data
Overview of the MSP process

Pre-Planning Phase

1. Identifying Need and Establishing Authority
2. Obtaining Financial Support
3. Organizing the Process through Leadership
   - Forming the Team and Developing a Work Plan
   - Defining Principles, Goals and Objectives
   - Specifying Boundaries and Time Frames

Existing / Upcoming Conditions

3. Defining and Analyzing Existing Conditions
   - Mapping Important Biological Ecological Areas
   - Identifying Spatial Conflicts and Compatibilities
   - Mapping Existing Areas of Human Activities

6. Defining and Analyzing Future Conditions
   - Mapping Future Demands for Ocean Space
   - Identifying Alternative Spatial Scenarios
   - Selecting a Preferred Spatial Scenario

Towards Implementation

7. Preparing and Approving the Spatial Management Plan
   - Identifying Alternative Spatial Management
   - Developing the Spatial Management Plan
   - Approving the Spatial Management Plan

8. Implementing & Enforcing the Spatial Management Plan Measures

9. Monitoring and Evaluating Performance

10. Adapting the Spatial Management Process

A Step-by-Step Approach

(IOC / UNESCO)
Structure of MSP in Mauritius

Coordinating Committee

- PMO
- CSMZAE

Technical working group 1
- Conservation

Technical working group 2
- Development projects

Technical working group 3
- Framework for MSP

Current Issues
- Sustainable Development Goals (SDG14) commitment
- Underwater Cultural Heritage
- Marinas
- New Aquaculture Sites
- Offshore Windfarm zones
- Online platform for Data Access
- Coordinating MSP related projects
- Legislation: MSP Bill

All Stakeholders

Specific Stakeholders
Status of MSP in Mauritius

Setting up of 3 Working Groups:
1. Conservation (SDG 14)
2. Economic Activities (Aquaculture)
3. Framework (Online GIS Platform)

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Status

3 Working Groups:
1. Conservation (SDG 14)
2. Economic Activities (Aquaculture/Marina/Tourism)
3. Framework (Online GIS Platform)

Working Groups:
1. ATBAs
3. CHAGOS MPA

Offshore Aquaculture Study
Northern Plateau Study
SDG 14 Study

2019
2020

Working Group Meetings
Marine Spatial Planning

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Example: Regulatory Boundaries

**LEGISLATION**

**THE MARITIME ZONES ACT**
- Maritime Zones (EEZ Outer Limit Lines) (Amendment of Schedule) Regulations 2008
- Maritime Zones (Coordinates of Outer Limits of Extended Continental Shelf in the Mascarene Plateau Region) Regulations 2012
Legislations in the Maritime Space

- **MARITIME ZONES ACT (2005)**
  - Maritime Zones (EEZ Outer Limit) (Amendment of Sch.) Regulations 2008
  - Maritime Zones (Economic Activities) (Amendment) Regulations 2017
  - Maritime Zones (Conduct Of Marine Scientific Research) Regulations 2017
  - Maritime Zones (EEZ Outer Limit Lines) Regulations
  - Maritime Zones (Baselines And Delineating Lines) Regulations 2005
  - Maritime Zones (Coordinates of Outer Limits of Extended Continental Shelf in the Mascarene Plateau Region) Regulations 2012
  - Land-Based Oceanic Industry (Prescribed Area) Regulations 2015
  - Maritime Zones (Economic Activities) Regulations 2014

- **The Fisheries and Marine Resources Act 2007**
  - Maritime Zones (Fishing Licences) Regulations No 23 of 1978
  - Fisheries and Marine Resources (Marine Protected Areas) Regulations 2001

- **Environment Protection Act 2002 (Amended 2008)**
  - EIA, ICZM
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MSP in Action: A multi-stakeholder approach
Deep Ocean Water Application – Concession Area in Sea-Port Area
Concession Area
Preliminary Survey
Nov 2018 – Feb 2019
Proposal and Assessment of Offshore Aquaculture Sites

Factors considered:

- Bathymetry
- Benthic Cover
- Physico Chemical
- Shipping lanes
- Marine Mammals
- Existing Coastal Activities
Marine Spatial Planning

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• MSP & SDG14
• Joint Management Area
Ocean Observatory E-Platform

A platform for GIS data to support the MSP initiative for the Republic of Mauritius, including ocean exploration and sustainable development.
Ocean Observatory E platform

- Available on GINS
- Upgraded system to GeoNode 3.0 with new functionalities
- New layers added on the system

Catalogue of Datasets for the Republic of Mauritius:

- Updating of Data Catalogue

![Ocean Observatory E platform](image1)

![Catalogue of Datasets for the Republic of Mauritius](image2)
Data Catalogue – Geophysical Data

1. Bathymetry
2. Seismic
3. Gravity

1. Seamounts
2. Knolls
3. Hydrothermal Vents
Data Catalogue – Ecosystem/Habitat

- Ecological Richness
- Environmentally Sensitive Areas (ESA - UNDP)
- Key Biodiversity Areas (SDG14)
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Working Group on SDG 14

• SDG 14.5 – “to conserve by 2020 at least 10% of coastal and marine areas, consistent with national and international law and based on the best available scientific information”.

• In order to choose and achieve the 10% conservation goal, Key Biodiversity Areas (KBAs) are to be identified.

• For Coastal areas: Percentage of conserved areas / Coastal Zone Areas.

• How can KBAs be identified for offshore conservation (Beyond reef -> EEZ)?
  • KBA World Database on Key Biodiversity Areas and Birdlife International => coverage incomplete and not up-to-date.
  • Compile KBA at national level from existing data (literature, surveys, cruise).
Example: UNESCO Heritage Site - Le Morne
Marine Spatial Planning

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Overarching goal for the Joint Management Area (JMA) Marine Spatial Plan (MSP):

“Establish a comprehensive marine plan to address key challenges in the JMA, providing greater opportunities for the stakeholders of Mauritius and Seychelles to engage in marine planning decisions, streamline operations, and to promote regional economic, environmental, social and cultural well-being”

The JMA MSP plan:

1) Will serve as the basis for guiding the implementation and achievement of strategies and decisions of the Joint Commission

2) Will be based on the identification of stakeholders and consideration of their interests through meaningful and sustained engagement

3) Will help to plan for the sustainable use of the JMA and to balance demands for resource exploration and exploitation with the need to protect the environment
Joint Management Area Demonstration Project

11 January 2018 – Agreement signed between Mauritius-Seychelles Joint Commission on the Extended Continental Shelf and UNDP for the implementation of a joint database system that will facilitate the management of the joint area
Challenges of MSP process

- Vast Ocean space
- Rely on Contribution and shared responsibilities from MSP Partners
- Consensus and Mutual Agreement amongst stakeholders
- Data Access and Upgrading the legal and regulatory framework
- Areas Beyond National Jurisdiction (ABNJ)
Thank You
Workshop on Marine Spatial Planning Practices and Methods

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The ideas and opinions expressed are the speakers’ own; they are not necessarily those of UNESCO and do not commit the Organization.
Workshop on Marine Spatial Planning practices and methods

Wednesday, 20 October 2020
IOC-UNESCO
The Intergovernmental Oceanographic Commission of UNESCO
IOC within United Nations

- Only intergovernmental organization that has mandate to **promote marine science** in all ocean basins (UN Convention on the Law of the Sea; UNCLOS)
- **Science, services, observations, data exchange** and **capacity development**
- **Foster sustainable development** of the marine environment
IOC figures

- IOC was founded in **1960**
- IOC has **150 Member States** (2020)
- Our governing bodies are the **General Assembly** and the **Executive Council**
- IOC staff is made by **50 people** (30 at the headquarters and 20 in the field)
- IOC funds comes from the **UNESCO regular budget**, **extrabudgetary incomes** (contributions from member states and donors) and from **projects** (e.g. GEF)
Context

Joint Roadmap to accelerate Maritime/Marine Spatial Planning processes worldwide, adopted by the European Commission's Directorate-General for Maritime Affairs and Fisheries (DG MARE) and the IOC-UNESCO

MSPglobal is co-financed by the European Commission's European Maritime and Fisheries Fund
Joint Roadmap to accelerate Marine Spatial Planning worldwide

PA 1: TRANSBOUNDARY MSP
Guidance on transboundary MSP
Transboundary projects in WestMED & SE Pacific / 3rd International Conference

PA 2: SUSTAINABLE BLUE GROWTH
MSP and Blue Growth Studies and Conferences at global and regional scale

PA 3: ECOSYSTEM-BASED MSP
Knowledge and capacities on environmental pressures

PA 4: CAPACITY BUILDING
Training the trainer for planning our ocean in line with Agenda 2030 targets

PA 5: MUTUAL UNDERSTANDING
International Fórum of experts and joint communication actions

#OceanAction15346  #MSPglobal
What is MSP?
What is MSP?

“The public process of analyzing and allocating the spatial and temporal distribution of human activities to achieve ecological, economic, and social objectives that are usually specified through a political process.”

(IOC-UNESCO, 2006)
MSP characteristics

• Integrated and multi-objective, including all important economic sectors; economic and social objectives as well as ecological ones

• Strategic and future-oriented, considering alternative means to achieve a vision

• Continuing and adaptive, with an emphasis on performance monitoring and evaluation—and learning by doing

• Participatory, building a broad base of stakeholders to ensure long-term support for management

• Ecosystem-based, with a focus on maintaining ecosystem services over time

• Place-based, with a focus on marine spaces that people can understand, relate to, and care for
Integration for **multisectoral consensus**

![Diagram showing Marine Spatial Planning and its sectors](IOC-UNESCO, 2009)
MSP step by step

1. Identifying Need and Establishing Authority
2. Obtaining Financial Support
3. Organizing the Process through Pre-planning
   - Forming the Team and Developing a Work Plan
   - Defining Principles, Goals and Objectives
   - Specifying Boundaries and Time Frames
4. Organizing Stakeholder Participation
5. Defining and Analyzing Existing Conditions
   - Mapping Important Biological Ecological Areas
   - Identifying Spatial Conflicts and Compatibility
   - Mapping Existing Areas of Human Activities
6. Defining and Analyzing Future Conditions
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8. Implementing & Enforcing the Spatial Management Plan Measures
9. Monitoring and Evaluating Performance
10. Adapting the Spatial Management Process

(IOC-UNESCO, 2009)
Continuous adaptive process
Fundamental questions

1. Where are we today?
   ✓ *Baseline characterization*

2. Where do we want to be?
   ✓ *Objectives/outcomes*
   ✓ *Alternative scenarios*

3. How do we get there?
   ✓ *Management actions/plan*

4. What have we accomplished?
   ✓ *Monitoring and evaluation*
Status of MSP

http://www.mspglobal2030.org/resources/key-msp-references/
Guidelines on MSP (2009)

http://www.mspglobal2030.org/resources/key-msp-references/
Guidelines to evaluating MSP (2014)

http://www.mspglobal2030.org/resources/key-msp-references/
2030 Target for Marine Spatial Planning

≥33% of surface area of World’s EEZs covered by government-approved MSP plans
Uses & Activities
The spatial problems

Figure III.1.1a, Demand for space in the BNS, based on legislation and on the condition that all space would be both available and suitable (abstract and simplified scheme).

264% TOTAL CLAIM FOR SPACE

(Maes et al., 2005)
Example: Belgium

OVERVIEW MAP

- Fishing everywhere except around the windmills
- Shipping routes
- Protected sandbanks, SAC Flemish Banks with 4 subzones
- 4 zones for fishing with adapted techniques
- Special protection areas for birds
- Test zone coastal protection
- Area for renewable energy (wind farm)
- 'Flug at sea'
- Sustainable aquaculture
- Exploitation areas
- Energy atolls
- Paardenmarkt

(FPS Health, Food Chain Safety and Environment, 2014)
MSP outputs

Ecosystem-based Management

Marine Spatial Planning

Other Management Measures

Marine Spatial Management Plan (Vision)

Ocean Zoning Maps and Regulations

Permits and Other Management Measures Used to Achieve Specified Objectives

(IOC-UNESCO, 2009)
Summary

• **Reduce conflicts** between sectors and create synergies between different activities

• **Encourage investment** by instilling predictability, transparency and clearer rules

• **Increase coordination** between administrations in each country, through the use of a single instrument to balance the development of a range of maritime activities

• **Increase cross-border cooperation** between countries and sectors

• **Protect the environment** through early identification of impact and opportunities for multiple use of space
Sustainable Blue Economy
What is blue Economy?

“A sustainable ocean economy emerges when economic activity is in balance with the long-term capacity of ocean ecosystems to support this activity and remain resilient and healthy. Essentially, the blue economy concept is a lens by which to view and develop policy agendas that simultaneously enhance ocean health and economic growth, in a manner consistent with principles of social equity and inclusion.”

(The World Bank, 2016)
Towards a Blue Economy Policy

Step 1: Agenda setting, awareness, and sensitization

Step 2: Coordination in formulating the Blue Economy policy

Step 3: Building national ownership of the Blue Economy policy formulation process

Step 4: Sector identification and prioritization

Step 5: Designing the Blue Economy policy

Step 6: Policy implementation

Step 7: Monitoring and Evaluation (M&E)

Stakeholder Participation!

(UN Economic Commission for Africa, 2016)
Challenges to the Blue Economy

- **Overcome current economic trends** that are rapidly degrading ocean resources (e.g., unsustainable extraction of marine resources, destruction of marine and coastal habitats, marine pollution)

- **Overcome inadequate capacity** (human capital) required to harness the employment and development benefits of investing in innovative blue economy sectors

- **Overcome inadequate valuation of natural capital** (marine resources and ecosystem services) and isolated sectoral management of maritime activities, without addressing cumulative impacts

(The World Bank, 2017)
Actions

1) Value the contribution of marine natural capital to welfare

2) Use of the best available knowledge to shape long-term decision making

3) Weigh the relative importance of each sector of the blue economy and decide which ones to prioritize based on accurate valuation of its national capital, natural, human and productive

4) Anticipating and adapting to the impacts of climate change

5) Target financial instruments for Blue Economy

6) Effective implementation of UNCLOS

7) Effective inclusion and active participation of all societal groups

8) Establish partnerships to enhance capacity building

9) Develop MSP plans
Examples
VISON

“The overarching vision of the 2050 AIM Strategy is to foster increased wealth creation from Africa’s oceans and seas by developing a sustainable thriving blue economy in a secure and environmentally sustainable manner.”

(African Union, 2012)
Example: **Africa**

Africa is developing fast and Blue Economy can support and sustain its rapid and sustainable development.

**Key objectives:**

1) Exploring individual and collective leadership challenges
2) Encouraging multisectoral collaboration toward joint transformation action
3) Producing prototypes of transformative actions
4) Stimulating a network of change agents

(UN Economic Commission for Africa, 2016)
Example: Mauritius

The Ocean Economy in Mauritius (2017) has the following objectives:

(i) Assessing the overall potential of the OE to contribute to Mauritius’s development (in terms of economic growth and diversification, trade balance, reduction of poverty and inequality, and effects on the government’s finances);

(ii) identifying key sectoral and cross-cutting challenges to be overcome in order to seize that potential; and

(iii) evaluating the prospects to ensure the OE’s longer-term sustainability, especially in terms of conservation of the environment and of the risks posed by climate change.
Part A: Promoting the Ocean Economy: The Big Picture

1 Setting the Stage

2 Prospects for Doubling the Ocean Economy

Part B: Making It Happen: Deep Dives into Selected Sectors

3 Fisheries and Aquaculture and the Ocean Economy

4 Information, Communications, and Technology in the Ocean Economy

5 Energy and the Ocean Economy

6 Ports and the Ocean Economy

Part C: Making it Last

7 Options for Adopting Marine Spatial Planning

8 Addressing the Challenge of Climate Change

Example: Mauritius
Example: European Union

**Blue Growth:** Long term strategy to support sustainable growth of maritime sectors. It is the maritime contribution to achieving the goals of the Europe 2020 strategy for smart, sustainable and inclusive growth.

**Components:**

I. Develop sectors that have a high potential for sustainable jobs and growth (*aquaculture, coastal tourism, marine biotechnology, ocean energy, seabed mining*)

II. Essential components to provide knowledge, legal certainty and security in the blue economy (*marine knowledge, MSP, integrated maritime surveillance*)

III. Sea basin strategies to ensure tailor-made measures and to foster cooperation between countries
EU Ocean Economy:
- 5.4 million jobs
- Gross added value of almost €500 billion a year
Thank you!

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#OceanAction15346
Thanks to National Partners

Department for Continental Shelf
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Summary MSP Conference

https://www.youtube.com/watch?v=HpOTwheqjNo
MSPforum Brussels

https://www.youtube.com/watch?v=Iigi3wN_Bal
MSPforum La Reunion

https://www.youtube.com/watch?v=m5vczX28p5g&feature=emb_title
MSPforum Vigo

https://www.youtube.com/watch?v=Q3k2sKNmKso&feature=emb_title
https://www.youtube.com/watch?v=x46QaC8G3n0&feature=emb_title
Video Blue Economy

https://www.youtube.com/watch?v=Oovu6oeFlw8
MSP in the Mauritius-Seychelles Joint Management Area

Julian Roberts
Background to the JMA
Status of the JMA

- 396,000 sq. km area of extended continental shelf
- Based on recommendations made by the UNCLCS in 2011 (Article 76)
- Mauritius and Seychelles exercise ‘joint sovereignty’ pursuant to two bilateral treaties
- Currently managed through a Joint Commission
- Guided by two-year Strategic Plan adopted by the Joint Commission
• Many references online to general habitats and species due to environmental interest
• Several relevant surveys and some modelling
• Some photographic and video imagery and good descriptions
• Recent scientific investigations adding to knowledge base
• Broad understanding of main activities
• Deeper waters poorly understood
Current Knowledge to support MSP

R.V. ODISEY and submersible SEVER-2 in 1981

"Hydronaut" Base in Sevastopol was operating in the 1970-80s a fleet of the first generation of submersibles.

Photos from the archive of V.P. Petrov

From Vortsepneva & Spiridonov, 2008

Expeditions = 26
Vessels = 20
Publications in Russian = 30
Publications in English = 10
Current Knowledge to support MSP
Current Knowledge to support MSP

SS-39 Sand/ Gravelly sand/ Algae patches/ Sandy gravel/
Seagrass meadows/ Corals/ Bedrock
The Unique Situation of the JMA
Maritime Zones

- **Coast/Baseline**: 12 nm
- **Territorial Sea**: 12 nm to 24 nm
- **Contiguous Zone**: Limited law-enforcement zone (24 nm)
- **Exclusive Economic Zone**: 200 nm
- **Extended Continental Shelf**: To a maximum of 350 nm from the coast/baseline or 100 nm beyond the 2,500 meter isobath, whichever is greater
- **The High Seas**: Beyond the 200 nm EEZ

**Sovereignty**
- Sovereign rights over natural resources of the water column and the seabed and subsoil

**Extended Continental Shelf**
- Sovereign rights over natural resources of the seabed and subsoil

**Deep Seabed Area**
**Regulating Activities in the EEZ**

**LOSC, Article 56**

In the exclusive economic zone, the coastal State has:

(a) sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living;

(b) jurisdiction with regard to:
   1. establishment and use of artificial islands, installations & structures
   2. marine scientific research
   3. protection and preservation of the marine environment
Regulating Activities in the EEZ
Regulating Activities in the JMA

LOSCE, Article 76

1. The coastal State exercises over the continental shelf sovereign rights for the purpose of *exploring it and exploiting its natural resources*

4. The natural resources .... consist of the mineral and other non-living resources of the seabed and subsoil together with living organisms belonging to *sedentary species*...
Regulating Activities in the JMA
Regulating Activities in the JMA

Acquire  Explore  Appraise  Develop  Produce  Abandon
Regulating Activities in the JMA

**LOSCE, Article 78**

1. The rights of the coastal State ... do not affect the legal status of the superjacent waters [High Seas]

2. The exercise of the rights of the coastal State must not infringe or result in any unjustifiable interference with navigation and other rights and freedoms of other States
Regulating Activities in the JMA
1. All States are entitled to lay submarine cables and pipelines on the continental shelf.

2. Subject to its rights for exploration and exploitation of the continental shelf, the coastal State may not impede the laying or maintenance of such cables or pipelines.
Regulating Activities in the JMA

LOSC, Article 245

1. Coastal States, in the exercise of their jurisdiction, have the right to regulate, authorize and conduct marine scientific research...

Right to participate or be represented in research

Right to access to all data and samples
The Approach to MSP in the JMA
<table>
<thead>
<tr>
<th>Roadmap Element</th>
<th>Specific Development Objectives (SDOs) and Results Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Goals &amp; Objectives</strong></td>
<td>Results Areas:</td>
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<tr>
<td></td>
<td>1.1 Understand the drivers for MSP</td>
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<tr>
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<td>1.2 Define and prioritize goals and objectives for MSP</td>
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<td>Result Areas:</td>
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<tr>
<td></td>
<td>2.1 Define the planning area and geographic boundaries</td>
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<td></td>
<td>2.2 Understand the limits of jurisdiction, rights and obligations</td>
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<tr>
<td></td>
<td>2.3 Establish what existing and future uses of the JMA need to be addressed in the MSP framework</td>
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<tr>
<td><strong>2. Geographic Boundaries &amp; Scope</strong></td>
<td>Result Areas:</td>
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<tr>
<td></td>
<td>3.1 Establish effective institutional arrangements to support MSP</td>
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<td>3.2 Establish robust implementation mechanisms to support MSP</td>
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<tr>
<td><strong>3. Governance Arrangements</strong></td>
<td>Result Areas:</td>
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<tr>
<td></td>
<td>4.1 Establish robust data management and mapping systems</td>
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<td>4.2 Collate and map spatial data to create GIS layers for MSP</td>
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<td>4.3 Support future science and research priorities for the JMA</td>
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<tr>
<td><strong>4. Data Collection &amp; Management</strong></td>
<td>Result Areas:</td>
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<td>5.1 Implement a comprehensive programme for stakeholder engagement</td>
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<td>5.2 Define a zoning framework for the JMA</td>
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<tr>
<td><strong>5. Multiple-Use Planning</strong></td>
<td>Results Areas:</td>
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<td></td>
<td>5.3 Prepare a broad-scale spatial management plan</td>
</tr>
</tbody>
</table>
Future Management Priorities

• Petroleum exploration and production
• Exploration and exploitation of seabed minerals, including seabed aggregates
• Harvesting of sedentary marine species
• Bioprospecting
• Conservation of marine habitats
• Installation of structures
• Submarine cables
• Marine scientific research
<table>
<thead>
<tr>
<th>Zone Type</th>
<th>Purpose/Rationale</th>
<th>Scope</th>
<th>Possible Management Mechanism</th>
</tr>
</thead>
</table>
| General use zone          | To allow for all activities to continue subject to the appropriate permissions being granted | • Default position  
• All activities permitted subject to the appropriate permissions  
• Activities under the jurisdiction of the JC/DA require relevant assessments & approvals | • No management mechanisms for high seas activities  
• MCS* to protect JC/DA interests  
• Licencing by JC/DA for activities under their jurisdiction |
| Petroleum extraction zone | To control activities that may conflict with petroleum exploration & production activities | • Limited restrictions on activities that may interfere with the normal operations associated with petroleum exploration & production  
• 500 m safety zones and limits on activities near pipelines | • Declaration of safety zones around offshore installations  
• Ships routing measures through the IMO  
• No anchor/no trawling zones  
• MCS to protect JC/DA interests |
| Seabed mining zone        | To provide for potential exploitation of seabed mineral resources under the exclusive jurisdiction of the JC/DA | • Applies to non-petroleum seabed mineral resources  
• Restrictions on high seas activities that may disturb or damage seabed mineral deposits  
• Permit activities that have no impact (e.g. scientific research) | • MOUs with third parties (e.g. SIOFA) to restrict activities under their control  
• Licences for extractive activities issued by JC/DA subject to EIA  
• MCS to protect JC/DA interests |
| Seabed conservation zone  | To provide for conservation & future exploitation of sedimentary marine species under the exclusive jurisdiction of the JC/DA | • Applies to sedentary living resources  
• Restrictions on high seas activities that damage seabed  
• Restrict third-party fishermen exploiting sedentary sp.  
• Restrict commercial exploration for marine genetic materials  
• Permit activities that have no impact (e.g. scientific research) | • MOUs with third parties (e.g. SIOFA) to restrict activities under their control  
• Licences for extractive activities issued by JC/DA subject to EIA  
• LICencing by DA for activities under their jurisdiction (e.g. exploitation of sedentary species)  
• MCS to protect JC/DA interests |
| Habitat protection zone   | To provide for specific protection of defined areas of critical habitat types     | • Restriction on all activities that may impact the specific habitat types in the defined area of the habitat (e.g. coral, seagrass etc.)  
• Would still permit activities that had no impact (e.g. marine scientific research) | • MOUs with third parties to restrict activities under their control  
• Prohibit certain activities under the jurisdiction of JC/DA  
• Higher environmental standards for operations under the jurisdiction of JC/DA |

* MCS: Marine Conservation Strategy
Identified Challenges

• Monitoring control and surveillance

• Possible implications of BBNJ negotiations on the ECS
Plenary Discussion

Dr Julian Roberts
j.roberts@blueresources.co.uk
Ecosystem based management approach to MSP
– a data-driven system for ecosystem-based Marine Spatial Planning

Jonas Pålsson, SwAM
Duncan Hume, SGU
Gustav Kågesten, SGU
Swedish Marine Spatial Planning

» Guiding strategic plans

» The plans will guide:
  • Local and regional planning
  • Licensing
  • Sector management

» Possibility of binding regulations
Administrative borders

- **Coastal Zone**
- **Baseline**
- **Overlapping marine area covered by both national and kommunal (local) marine planning**

Distances:
- **Max 1.85 km (1 nautical mile)**
- **Max 22.2 km (12 nautical miles)**
- **Max 374 km (200 nautical miles)**

Zones:
- **Internal waters**
- **Territorial waters**
- **Exclusive Economic Zone (EEZ)**
- **Bordering Countries Exclusive Economic Zones (EEZ)**

Planning:
- **Municipal Marine Spatial Planning**
- **National Marine Spatial Planning**

Swedish 1st Marine Plan
Timeline
Plans will be updated every 4-8 years
Sustainability assessment

* Each use/sectors in respect to each criteria and indicators

* Assessment steps:
  1. Impact of marine spatial plan; positive/negative or none
  2. Extent of impacts scale 0-4
  3. Summing up into index
MSP is about managing human activities in the marine environment
IOC-UNESCO

Swedish Symphony tool

» First Swedish ecosystem-based MSP 2014 - 2020

» Environment is **one** (fundamental) component of MSP

» Decision-makers and planners need **practical** access to data

» Need to **compare** environmental performance of MSP

» **Symphony** was developed – using only "existing data"

» **Strategic** support to MSP

» Symphony, international attention
Cumulative impact assessment

Halpern et al 2008 Science 319
Cumulative impact ($P$) is calculated as the sum of the product of all pressures’ ($B$) effects on all ecosystem components ($E$), given the particular sensitivity ($K$) of every ecosystem component to every pressure.

$$P_{sum} = \sum_{i=1}^{n} \sum_{j=1}^{m} B_i \times E_j \times K_{i,j}$$
Symphony tool

» Developed for Swedish MSP, to test MSP-scenarios and inform marine planning at strategic level

» Tailored for offshore waters in the Baltic and North Sea
Symphony tool

» Developed for Swedish MSP, to test MSP-scenarios and inform marine planning at strategic level

» Tailored for offshore waters in the Baltic and North Sea
Symphony tool

» Indicates areas of high or low combined impact
Symphony tool

» Compares MSP alternatives
More information on Symphony


» Report in English - email jonas.palsson@havochvatten.se


» 3 min video - https://www.youtube.com/watch?v=E9p7ISpNGKM&t=6s
Globally:
IOC-UNESCO
BBNJ

Swedish MSP collaborations 2019
The WIO Symphony collaboration

» Long term SWE-WIO partnership
» SwAM Ocean cooperation, Sida funded
» Regional MSP Policy Workshop, Dar es Salaam 2019
» Agreement on co-development of WIOSym
» 2020: Preparations and formalization
From Symphony to WIO Symphony

» Agreement reached between SwAM and Nairobi Convention to collaborate on advancing MSP issues in the WIO

» To support **regional** MSP strategy

» To also support **national** MSP processes

» To facilitate **science-to-policy** in MSP

» All requires input and practical **collaboration**

» **Timeline 2021** (Dec) WIOSym 1.0 for regional MSP strategy, **2022** (Dec) WIOSym 2.0 fully operational
from Symphony to WIO Symphony

**Swedish EEZ**
- Total area ~ 0.165 Mkm²
- 1% > 200m deep
- 50% 0 - 40 m
- 1 UTM Zone

**West Indian Ocean**
- Total area ~ 26 Mkm²
- 94% >1000m deep
- 1% 0 - 40 m
- 50 UTM Zones
Symphony “front end”

Cumulative impact \( (P) \) is calculated as the sum of the product of all pressures’ \( (B) \) effects on all ecosystem components \( (E) \), given the particular sensitivity \( (K) \) of every ecosystem component to every pressure.

\[
P_{\text{sum}} = \sum_{i=1}^{n} \sum_{j=1}^{m} B_i \times E_j \times K_{i,j}
\]

Pressures
From human activities

Ecocomponents
Nature values

Sensitivity matrix
Describes the specific effect of each pressure on each ecocomponent

Results
Figures and tables
Symphony “behind the scenes”

Standards were critical, such as:

1. Standard grid (which all data is mapped to)
2. Standardized uncertainty layer
3. Metadata and process logs (repeatability)
4. Data transformation & expert knowledge
5. …
Best available data principle

- Combine and interpolate data when appropriate to provide full coverage maps
- Uncertainty layer to highlight limitations
- Ideally - data processing transparent/repeatable to enable an iterative approach

Symphony “behind the scenes”
Symphony “behind the scenes

The limitations of colorful maps

The difference between no data/poor data and a true absence can be important for MSP

“Green map” based on ecosystem components weighted by theme (birds, mammal, fish, habitat)

“Green map” data availability
% layers with data (uncertainty layer = no data)

“Green map” data uncertainty
Show combined uncertainty of models
Where would data be useful to you and at what resolution?*

**Data collection area**
Currently bounded by:
Lat 42 deg South, 18 Deg North
Long 6 Deg East, 80 Deg East

**Standard grid v00**

*Projection*: Lambert Cylindrical Equal Area, meridian adjusted to WIO area

*Resolution*: ~5km, ~1km, ~250m

*Watermask from SRTM Water Body Data*

* Management resolution, i.e. spatial scale for decision making
WIO Symphony
Setting up a standard grid version 0

Data collection area
Currently bounded by:
Lat 42 deg South, 18 Deg North
Long 6 Deg East, 80 Deg East

Standard grid v00
Projection: Lambert Cylindrical Equal Area, meridian adjusted to WIO area

Resolution*: ~5km, ~1km, ~250m

Watermask from SRTM Water Body Data

* Management resolution, i.e. spatial scale for decision making
WIO Symphony - data examples

**Indata**
Different resolutions, formats and coordinate systems

**Process**
Repeatable, Open source Transparent

**Processed data**
combined data standard grid original units & normalised data

---

**Environmental data**
- Depth: gebco 250m
- Depth: Sentinel 5m
- Allen Coral Atlas

**Ecosystem data**
- Wcmc corals
- Octo corals

**Human pressure/activity data**
- Vessel movements
- Landcover copernicus

---

**Processed data**
- Combined data
- Standard grid
- Original units & normalised data

**Env. var. as proxy for eco/pres**

---

**Accumulated Vessel activity**
- Farmland & artificial surfaces
WIO Symphony data example: Corals

Process overview

Fresh ingredients and a well organised kitchen

Cook book & a hot oven

Main course

Maps of corals
- combined sources
- standardised

Maps of potential corals
- env. proxy
- caution areas

Uncertainty
- maps
- metadata

Data processing
- transparent
- repeatable

Glorioso Islands
Illustration of coral data processing

1. Gather data – Source 1: published global data from WCMC
Illustration of coral data processing

Illustration of coral data processing

3. Combine data. Move from high resolution data to a management scale

Coral polygons converted to presences within a 250m cell using high performance gdal algorithms through R
Illustration of coral data processing

4. Combine data. Use data quality and expert knowledge to create a final coral layer.

Allen atlas data, as well as mangrove data was used to remove some coral areas in the wcmc data which was mapped as other seafloor types (sand/rubble/mangrove) in the data with higher spatial resolution.
Illustration of coral data processing

5. Aggregate data to analysis grid

250m grid with coral presences was resampled to 1km grid using a mean value - enabling 1km cells to contain a rough index of proportional cover of coral habitat.
Illustration of coral data processing

6. Potential habitat

Image show the 1km grid with corals as well as depth zones (gebco 2020) where coral could occur. There are large unmapped areas, especially if also considering mesophotic corals which can live down to ~150m depth.
Illustration of coral data processing
Step 8. Uncertainty map

By using footprint of data, know lat/long of corals as well as maximum depth we can make a first uncertainty map that shows both our expert knowledge of the data (uncertainty in thematic categories to keep it simple), and the nodata area where corals could be present but maps are missing.

Note: The categories "poor model" and "confirmed presence" are also included in the Symphony uncertainty map.
Large "no data" areas

Other data sources showing reefs not in WCMC

http://www.africanmarineatlas.org/

Corals - to do

More data, expert knowledge/evaluation, refined themes (such as % live corals) ...
WIO Symphony data example:

Open ocean and deep sea habitats

- **Cover 94%** of the WIO area
- Seafloor data very sparse, proxys like general habitat needed to cover the gap.
- **Activities** - Deep sea mining, Oil and Gas, Fishing...
- **Transboundary** ecosystems
- **Pelagic zones** from productive surface waters to the Abyssal zone

Illustration of the Deep Sea & Human Activities

Blue habitats
Geomorphology
Pelagic zones
Ocean exploration

Illustration of the Deep Sea & Human Activities

Potential Effects

- **Individuals**
  - Respiratory distress
  - Autolytic distress
  - Reduced feeding
  - Reduced visual communication
  - Bucancy issues
  - Toxicity

- **Populations**
  - Changes in community composition
  - Emigration
  - Mortality
  - Decreased fitness/reproduction

- **Ecosystem Services**
  - Fisheries
  - Seafood contamination
  - Carbon transport
  - Biodiversity

Jeffrey C. Drazen et al. PNAS 2020;117:30:17455-17460
Human impacts – a developing picture
Some conclusions from Symphony

» The multidisciplinary **data exercise generated additional benefits**, including enhanced collaborations and open access data.

» **Usefulness** for regional/national/local MSP depends on the quality and thematic & spatial resolution of the source data. Gaps are mapped and highlighted.

» **Many assumptions and limitations** to CIA tools such as Symphony, for example connectivity, food web interactions and synergetic effects. **Important to clearly communicate these** limitations and strengths to users.
5 major steps to create a cumulative impact map for marine spatial planning

Note: One of the main outcomes from the Symphony project was the well-documented multidisciplinary geospatial data, which quickly found many MSP related uses outside of the CIA analysis itself

General path to cumulative impact assessment

Define scope
- Purpose/use
- Area of interest
- End user
- Data ‘owner’
- Publication and data sharing plan
- Data standards

Identify data
- Human activities
- Habitats and species
- Existential pressures
- Sensitivity scores

Collect data
- Research & review
- Published
- Archives
- Web
- Email requests
- Share data with partners

Model geodata
- Working platform & structure
- Conceptual models
- Data processing
- Scripts
- Processing logs and Metadata

Calculate impacts
- Analytical tools
- Run scenarios
- Publish results - data, metadata, report & methods
How does WIO Symphony fit in to MSP?
How to do it in practice – our proposal

- **Discuss WIOSym scope & assumptions**
  - TWG Swedish partners
  - Secretariat

- **Identify relevant data & additional experts**
  - TWG Swedish partners

- **Discuss data & uncertainty**
  - TWG Swedish partners

- **Create maps (human & environmental)**
  - TWG Swedish partners
  - Training-at-demand

- **Compile sensitivity matrix**
  - Scientific body

- **Transfer WIOSym software**
  - Swedish partners
  - Secretariat

- **Long-term management and use**
  - Users in WIO
  - Secretariat

**Coordination – Workshops – Subgroups – Individual work & training**

**Common workspace**

**Reference – Validation**

**Storage – CHM**
LIVE DEMO WEBTOOL
Thank you!

jonas.palsson@havochvatten.se
gustav.kagesten@sgu.se
duncan.hume@sgu.se
Marine Spatial Planning Workshop
20th October 2020

Marine Mammals of Mauritius and their integration into MSP

Hugues Vitry
The founder and the current Vice-President
Marine Megafauna Conservation Organisation (MMCO)

Svetlana Barteneva
Biologist
Marine Megafauna Conservation Organisation (MMCO)
Marine Mammals of Mauritius and their integration into MSP

Content:

1. MMCO Activities and Research Projects

2. Marine Mammals of Mauritius: species and their main migration and habitat areas

3. Threats and the importance of integrating Marine Mammals into MSP

4. MSP in Mauritius taking into account the benefits of Marine Mammals
1. MMCO Activities and Research Projects

Conducting Cetaceans Research Projects
- Long-term study of local population of sperm whales
- New large-scale project to study all cetaceans in Mauritius

Public education and sensitization
- Educational programs about whales on board
- Sensitization actions in schools
- Participation in conferences for the diving community

Participation in government committees
- MSP working group on offshore Blue Economy projects
- MSP committee on Proposed Areas to be Avoided by SOLAS Vessel

International communication
- Accredited observer of International Whaling Commission (IWC)
- Participation in international scientific conferences

Field conservation activity
- MV Wakashio Disaster: independent Consultant on Cetacean in Crisis committee
- Mass death of Melon-headed whales in Mauritius 2020: independent observer and consultant, participation in Stranding committee set up by the Ministry of Fisheries, leading push back operation in lagoon

1. MMCO Activities and Research Projects

**MAUBYDICK Project**
- ongoing from 2013

- The study of number and dynamics of the local population of Sperm Whales
- The routes of their movement, including using satellite telemetry
- Social structure and its dynamics
- Documentaries creation

**WHALES OF MAURITIUS Project**
- upcoming 2021

- The Wakashio disaster and Mass death of Melon-headed whales in Mauritius showed a lack of scientific data on cetaceans in the east and southeast of Mauritius
- Comprehensive study of cetaceans has never been carried out in Mauritius

- The WHALES OF MAURITIUS Project involves a large-scale study of the species diversity of cetaceans around the whole of Mauritius and determination of their habitats
- The data obtained will improve the efficiency of MSP, contribute to the conservation of cetaceans, biodiversity and ecosystem integrity

---

2. Marine Mammals of Mauritius: species and their main migration and habitat areas

According to various sources about 19 species of marine mammals found in the waters of Mauritius

16 species of Cetaceans

Large Whales:
1. Sperm whale ( Physeter macrocephalus )
2. Humpback whale ( Megaptera novaeangliae )
3. Blue whale ( Balaenoptera musculus )
4. Fin whale ( Balaenoptera physalus )

Small Cetaceans:
5. Spinner dolphin ( Stenella longirostris )
6. Pantropical spotted dolphin ( Stenella attenuata )
7. Striped dolphins ( Stenella coeruleoalba )
8. Risso’s dolphins ( Grampus griseus )
9. Indo-Pacific bottlenose dolphin ( Tursiops aduncus )
10. Common Bottlenose Dolphin ( Tursiops truncatus )
11. Short-finned pilot whale ( Globicephala macrorhynchus )
12. Melon-headed whale ( Peponocephala electra )
13. Pygmy killer whales ( Feresa attenuata )
14. Blainville's beaked whale ( Mesoplodon densirostris )
15. Pygmy sperm whale ( Kogia breviceps )
16. Killer whale ( Orcinus orca )

2 species of Pinnipeds

1. Southern elephant seal ( Mirounga leonina )
2. Subantarctic fur seal ( Arctocephalus tropicalis )

1 species of Sirenians

Dugongs ( Dugong dugon )
exterminated in Mauritius by the end of the 19th century
2. Marine Mammals of Mauritius: species and their main migration and habitat areas

Status in the IUCN (International Union for Conservation of Nature) Red List of Threatened Species
2. Marine Mammals of Mauritius: species and their main migration and habitat areas

Marine Mammals habitat areas

- Cetaceans can be found all around Mauritius.

- The most common cetacean species are Sperm whales, Short-finned pilot whale, Spinner dolphins and Pantropical spotted dolphin. They can be found all year round.

- Humpback whales migrate through Mauritius to give birth and can be seen from June to late October.

- Seasonality is clearly visible.

- Pinnipeds do not migrate or live in Mauritius, their presence is rare and incidental.

- According to our research, depending of species there are some especially important areas for whales (foraging and breading grounds).
3. Threats and the importance of integrating Marine Mammals into MSP

Anthropogenic threats for Marine Mammals

- Collision with vessels
- Chemical pollution
- Bycatch, fishing gear, especially gillnets
- Noise pollution, including the use of sonars
- Habitat loss
- Debris, especially plastic
- Unauthorized / unregulated tourism
3. Threats and the importance of integrating Marine Mammals into MSP

Anthropogenic threats for Marine Mammals
3. Threats and the importance of integrating Marine Mammals into MSP

Anthropogenic threats for Marine Mammals
3. Threats and the importance of integrating Marine Mammals into MSP

Importance of Marine Mammals’ conservation

- Conservation of global and local biodiversity
- Maintaining the integrity of coastal ecosystems
- The stability of the state and health of the cetacean fauna is one of indicators of ecosystem health and of the effectiveness of coastal ecosystem management
- Marine mammals could be effective patrols for public health problems
- Tourist attraction of the island
- Whales and Dolphins Watching in the wild is an alternative to captivity and dolphinariums, a way of raising and educating the young generation
- Marine mammals - charismatic megafauna that typically stimulate an emotional human behavioral response
3. Threats and the importance of integrating Marine Mammals into MSP

Approaches to conservation of Marine Mammals

**Marine Protected Area (MPA)**
*Area-based conservation measures*

- Suitable for marine mammals with a specific habitat
- Confined area is easier to control
- The protection regime of the territory extends to other species of marine animals, which contributes to their prosperity

  - Environmental variability, movement of protected species
  - Potential conflicts between users and regulators

**Marine Spatial Planning (MSP)**
*Pressure-based conservation measures*

- Suitable for marine mammals with a wide or variable habitat and several species at the same time
- Focused on mitigation measures
- Allows to reduce anthropogenic threats wherever they arise
- Does not drastically restrict the activities of local communities

- More complex and expensive controls
MSP in Mauritius taking into account the benefits of Marine Mammals

Steps taken:

- MMCO’s cetacean data have been taken into account by the MSP Committee in order to establish “Areas to be Avoided” by SOLAS vessels of 500T.

- MMCO’s recommendations for SOLAS vessels of 500T to limit the speed not exceeding 14 knots when passing through areas where cetaceans are present were also taken into account.

- Consideration of sites for future mariculture projects taking in account breeding and nursing grounds for humpback whales and as well as alternatives proposed by MMCO.

Reducing the threat:

- Oil spills
- Noise pollution
- Collision with vessels
- Habitat loss

Some additional measures that can improve the effectiveness of MSP for the conservation of marine mammals in Mauritius

1. Regular monitoring of cetaceans.

2. Speed limits for fishing and tourist boats, propeller guards.

3. Alerting entering foreign vessels about potential risk of collision with cetaceans.

4. Educational work with local boat operators and fishermen.

5. Limiting the number of tourist boats in whale and dolphin watching areas at one time. Creation of a marine ranger service for control.

Thank you for your attention!

Marine Megafauna Conservation Organisation (MMCO), Mauritius

E-mail: info@ marinemegafaunaconservation.org Web-site: https:// marinemegafaunaconservation.org


International Whaling Commission, Report of the Conservation Committee Intersessional meeting Monday 28 September to Friday 2 October 2020, IWC/68/REP/CC/01, 12.10.2020


10. MARINE MAMMAL BYCATCH IN GLOBAL FISHERIES: A WORKSHOP SUMMARY OF MITIGATION MEASURES, TOOLS, & SOLUTIONS, 22ND BIENNIAL CONFERENCE ON THE BIOLOGY OF MARINE MAMMALS, HALIFAX, NOVA SCOTIA OCTOBER 2017


Presentation

❖ Importance of Data in the MSP process
❖ Ocean Observatory E-platform - Functionalities
❖ Data Layers
### Importance Data in the MSP Process

<table>
<thead>
<tr>
<th>Are there any Environmental Impact?</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Environmentally Sensitive Areas</td>
</tr>
<tr>
<td>• Marine Protected Areas</td>
</tr>
<tr>
<td>• National Parks/ Reserve/Ramsar Sites</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Are there any Social Impact?</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Are there any conflict with existing ocean uses?</td>
</tr>
<tr>
<td>• Artisanal fishing? Dive sites?</td>
</tr>
<tr>
<td>• Cultural sites? E.g Ship wrecks</td>
</tr>
<tr>
<td>• Boat Passage</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Are there any Economic Impact?</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Is it too far from the shore?</td>
</tr>
<tr>
<td>• Is it at the required depth? Bathymetry!</td>
</tr>
<tr>
<td>• What are the physical conditions required?</td>
</tr>
<tr>
<td>• Hydrodynamic? Wave? Temperature? Wind?</td>
</tr>
</tbody>
</table>
Data and MSP

Is the data enough to make an informed decision?

- Is this all the data that exist for this region? Historical data?
- Are there any gaps?
  - Can this be used to plan for additional surveys?

Are the Data Suitable?

- When was the data collected?
- How was the data collected?
  - Insitu from surveys? Remote Sensing? Numerical models?
- What is the accuracy of the data?
- Who collected the data?
- Is the data accessible? Acknowledgment required?
Software

Commercial & Open-Source

- Data processing
- Analysis
- Data management
Software

Need for a system
❖ Collect data
❖ Organize data
❖ Store data
❖ Share data

GeoNode
• Marine Spatial Data Infrastructure (MSDI)
  • Browse and search for geospatial data and web services
  • Upload, manage, and share geospatial data
  • Create and share interactive maps
  • Collaborate and interact with other users

GeoNode features:
- Marine Spatial Data Infrastructure (MSDI)
- Browse and search for geospatial data and web services
- Upload, manage, and share geospatial data
- Create and share interactive maps
- Collaborate and interact with other users
GEONODE - System installation and deployment

E-platform
Support: IORA & UNDP
Expertise: CSIRO, Australia

Access
Accessible on GINS (Government INtranet System)
http://mauritiusoceanobservatory.govmu.org/

Planned
Upgrade from GeoNode 2.8 to Geonode 3.0
Public Access - Vulnerability Assessment (GOC)
Set-up of E-platform

Government Online Centre (GOC)

Server hosted at CSMZAE

Server (UNDP) hosted at CSMZAE
GEONODE - Users

To understand what users can do on the E-platform, you need to understand the different types of users and GeoNode objects.

Unregistered users (anonymous)

An unregistered user is someone who is just visiting the site and is not logged in.

- Browse and search public data, maps and documents.
- View public data, maps and documents.
- View metadata of public data, maps and documents.
- Download data that has been released for download.
GEONODE - Users

Registered users (Superuser)

- System Administrator (CISD)
- Data Administrator (CSMZAE Staff)

Registered users (Active users)

- Users with a registered account may have additional permissions or restrictions. Which actions a user can perform is determined by the permissions assigned to that user by an administrator/data owner.

Groups

- Registered users can belong to a group or groups and permissions can be assigned based on a group. All users in the group will inherit these permissions.
Registered Users

**USERS**
- 32 registered users

**End-User Training**
- Albion Fisheries Research Centre
- Ministry of Tourism
- Tourism Authority
- Department of Environment (ICZM)
- Department of Environment (EIA)
- Department of Environment (Climate Change)
- Department of Environment (Policy)
- National Coast Guard
- Beach Authority
- Mauritius Meteorological Services
- CSMZAE
Terms of Use

- Gives the rights and obligations when using the Ocean Observatory E-platform.
- How personal data is handled.

Registration as Data Controller

- Section 14 of the Data Protection Act 2017 (DPA) makes it a mandatory requirement for controllers to register with the Data Protection Office.
GEONODE – Data Types

3 Main Data Types

- Layers
- Maps
- Documents
GEONODE – Layers

3 Main Data Types

- Layers
- Maps
- Documents

Layers

- Vector (ESRI Shape files – Points, lines, Polygons)
- Raster (GeoTIFF)
- Remote services
Remote Services

WFS (Web Feature Service) and WMS (Web Map Service) are Open Geospatial Consortium (OGC) Open Web Services standards for accessing geographic data over a network.

### Web Mapping Service (WMS)
- Delivers data as map images and does not allow you access to the individual features of a dataset.

### Web Feature Service (WFS)
- Provides direct access to the dataset which allows for the reading, writing, and editing of the data’s features.

Marine Trackline Surveys: All Survey Types. For more information, please visit the NCEI’s Marine Trackline Geophysical database at https://www.ngdc.noaa.gov/mgg/geodas/trackline.html
GEONODE – Map creation

Maps

- creation
- Visualization
- Save
- Share
GEONODE – Data types

3 Main Data Types

- Layers
- Maps
- Documents
GEONODE – Data types

3 Main Data Types

• Layers
• Maps
• Documents

Upload – Documents

• PDF
• Microsoft word, excel, PowerPoint
• JPEG
• Rar
• Links to websites
3 Main Data Types

- Layers
- Maps
- Documents
GEONODE - Metadata

Definition

• Metadata is “Data about Data”
• When someone else goes to use your layer, map or document in the future, the metadata provides context and understanding of what the layer, map or document is for and where the data came from.

Description

• Title
• Keywords
• Date type
• Category
• Regions
• Data quality statement
• Purpose
• Maintenance frequency
• Point of Contact
• Owner
• Metadata Author

Metadata – ISO19115 - ISO19139 XML
GEONODE – Data Sharing

Set Permissions

- Who can view it?
- Who can download it?
- Who can change metadata for it?
- Who can edit data for this layer?
- Who can edit styles for this layer?
- Who can manage it? (update, delete, change permissions, publish/unpublish it)
Functionalities

• Calculate distance, area, bearing
• Print
User Manual - updating

- Explore layers/maps/documents
- Search layers/maps/documents
- Download layers/metadata/documents
- Create/Download Map
- Upload/Edit/Manage layers
- Share layers/maps/documents
Data Layers & Documents
Data categories
Maritime Boundaries

Maritime Zones Act
- Internal Waters
- Territorial Sea

Internal Waters
- full sovereignty
- Right of innocent passage only if straight baseline used
  - Mauritius
  - Rodrigues
  - Saint Brandon
  - Tromelin
  - Agalega
  - Chagos Archipelago

Territorial Sea
- full sovereignty
- Right of innocent passage
  - Mauritius
  - Rodrigues
Maritime Boundaries

Maritime Zones Act 2005
- Exclusive Economic Zones
- Extended Continental Shelf

Department for Continental Shelf, Maritime Zones Administration and Exploration
Ocean Uses

Maritime Zones Act 2005
- Maritime Zones (Land-Based Oceanic Industry (Prescribed Area) ) Regulations 2015
Maritime Resources & Uses

Marine Protected Area

Fish Farming Zones

Fisheries and Marine Resources Act 2007
- Fisheries and Marine Resources (Marine Protected Areas) Regulations 2001 GN 172_2001
Maritime Uses

Tourism Authority Act

- Embarkation Points of Pleasure Craft for Commercial Purposes
- Prohibited Zone for Motorised Crafts
- Speed Limit for Pleasure Crafts
- Snorkeling Zone
- waterskiing zone
Ocean Uses

Port Act
- Port Limit
Ocean Resources

World Heritage Sites

- AAPRAVASI GHAT TRUST FUND ACT
- LE MORNE HERITAGE TRUST FUND ACT
Ocean Resources

Rodrigues Regional Act

- Rodrigues Regional Assembly (Fisheries and Marine Resources – Marine Protected Areas) Regulations
- Rodrigues Regional Assembly (Fisheries and Marine Resources - Marine Reserves) Regulations 2007
- Rodrigues Regional Assembly (Fisheries and Marine Resources - SEMPA) Regulations 2011
Relative Ecological Richness Map of South-East Coast Blue Bay - Grande River South East

- South East Coast
Ocean Resources

Environmentally Sensitive Areas

- Mauritius – ESA 2009
- Rodrigues – ESA 2009

Mauritius – ESA 2009

Rodrigues – ESA 2009
Access to cruise reports and data collected during research cruises that have been approved under the Maritime Zones (Conduct of Marine Scientific Research) Regulations 2017

<table>
<thead>
<tr>
<th>Data</th>
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<td>Marine Resources</td>
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Ocean Uses

Beach Authority Act
- Declared Public Beaches
Physical Oceanography

Directional Wave Spectra Drifter (DWSD) Data link

PENDING APPROVAL

Link to access data for the Directional Wave Spectra Drifter (DWSD). LOGIN & PASSWORD required

Administrator  5 Oct 2020  0

Directional Wave Spectra Drifter (DWSD)

PENDING APPROVAL

On 2 September 2020, CSMZAE deployed a Directional Wave Spectra Drifter (DWSD) instrument received from the National Oceanic and Atmospheric Administration (NOAA) offshore in the South East region of Mauritius. The DWSD equipment will measure and monitor wave heights using an Integrated Global Pos...

Administrator  5 Oct 2020  0  Create a Map

PLANNED

Directional Wave Spectra Drifter (DWSD)

• Wave frequency / Period
Marine Geology and Geophysical

Mauritius Hydrographic Service
- Bathymetry sounding points
- Navigational Chart Catalogue

PLANNED
Marine Geology and Geophysical

PLANNED

Mauritius Hydrographic Service
- Bathymetry sounding Footprints
- Survey Report
PLANNED

Marine Resources

UNDP Mainstream Biodiversity Project

- Mauritius – ESA 2019
- Rodrigues – ESA 2019
Satellite Imagery

Flic-en-Flac (resolution 3.8cm)

Drone Data

- Aerial Imagery
- Digital Surface Model

Source: DAYmarine
<table>
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<td>Submarine Cable</td>
<td>SAFE E platform METISS IOX MARS LION</td>
<td>Telecom Ministry of Information Technology, Communication and Innovation</td>
<td>SHP</td>
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<tr>
<td>Scuttled vessels</td>
<td>Vessels sunk purposely</td>
<td>MPA Ministry of Ocean Economy, Marine Resources, Fisheries and Shipping</td>
<td>SHP</td>
<td>✓</td>
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<tr>
<td>Grounding Sites</td>
<td>Sites where vessels were grounded but removed</td>
<td>NCG</td>
<td>SHP</td>
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<td>Underwater Cultural Heritage</td>
<td>Wrecks that are underwater for more than 100 years</td>
<td>CSMZAE MMCS (Y. Von Arnim)</td>
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<td>Sites used for recreational activities</td>
<td>MSDA</td>
<td>SHP</td>
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<tr>
<td>Tide Stations</td>
<td>Location and access to data</td>
<td>MMS University of Hawaii</td>
<td>SHP</td>
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<td>Fish Aggregating Devices</td>
<td>Fisheries Division</td>
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<td>RAMSAR sites</td>
<td>Marine Resources</td>
<td>NPCS Ministry of Agro Industry &amp; Food Security</td>
<td>SHP</td>
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<td>National Park &amp; Reserves</td>
<td>Protected sites</td>
<td>NPCSS Ministry of Agro Industry &amp; Food Security</td>
<td>SHP</td>
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<td>SHP</td>
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</tbody>
</table>
New Data Sources – Department of Environment

Environmental Sensitivity Index - 2012
Shoreline ESI

ICZM Project - 2008
- Pressure Zones
- Macro Algae coverage
- Mangrove
- Marine Resource Inventory
- Fish Landing Sites
- Hotels
- Marine Protected Area
- Pas Géométrique
- FADS
- Water quality Sites
- Mangrove replanting sites
- Coral Reef Monitoring sites

JICA Project - 2015
THE PROJECT FOR CAPACITY DEVELOPMENT ON COASTAL PROTECTION AND REHABILITATION IN THE REPUBLIC OF MAURITIUS
- Pas Géométriques
- Pressure Zones
- Fish Landing Sites
- Fisheries Posts
- Marine Parks
- Nature Reserves
- Police Station
- Medical Facilities
- Birds
- Rain Gauges
- Public beaches
# Data Sources – Global Databases

<table>
<thead>
<tr>
<th>Online Databases</th>
<th>Description</th>
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<tr>
<td>OceanColor</td>
<td>Chla</td>
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<tr>
<td></td>
<td>SST</td>
</tr>
<tr>
<td>Copernicus Marine Environment Monitoring Service</td>
<td>Temperature, Salinity, Sea surface height, Current velocity, Mixed layer thickness, Wind, Plankton, Oxygen, Nutrients, Carbon, Primary production, Reflectance, Turbidity, Sea surface wave</td>
</tr>
<tr>
<td>ESA’s Sentinel Online website</td>
<td>Multispectral, SAR</td>
</tr>
<tr>
<td>United Nations Environment Programme</td>
<td>Seamount/Knolls, Coral reef, Whale Observations</td>
</tr>
<tr>
<td>GEBCO</td>
<td>Bathymetry</td>
</tr>
<tr>
<td>GSHHG</td>
<td>Shoreline</td>
</tr>
<tr>
<td>A Global Self-consistent, Hierarchical, High-resolution Geography Database</td>
<td></td>
</tr>
<tr>
<td>NCEI Trackline/multibeam</td>
<td>Bathymetry</td>
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</tbody>
</table>

Seamounts
Catalogue of Datasets for the Republic of Mauritius

Catalogue - Format

- Resource abstract:
- Resource language:
- Keyword values:
- Variables available:
- Geographic location:
- Spatial resolution:
- Temporal extent:
- Temporal resolution:
- Depth range/resolution:
- Conditions for access & use:
- Limitations on public access:
- Responsible organization:
- Data via:
- Data format:
- References
- Additional information:
Figure 9: Ocean products webpage of the E.U. Copernicus Marine Service Information

Resource abstract:
Copernicus Marine Environment Monitoring Service (CMEMS) provides a core information service on the global ocean to sectors such as Maritime Safety, Coastal and Marine Environment, Marine Resources, and Weather, Seasonal Forecasting and Climate activities.

Resource language: en
Keyword values: Environmental monitoring facilities; marine; model; in-situ; forecast
Variables available: Temperature, Salinity, Sea surface height, Current velocity, Mixed layer thickness, Wind, Plankton
Geographic location: Global ocean coverage

Spatial resolution:
0.0625 degrees x 0.063 degrees
Temporal extent: 1903-01-01 to 2018-12-25
Temporal resolution: hourly, daily, monthly, 6-hourly, instantaneous
Depth range/resolution: 50 depth levels

Conditions for access & use:
Please read the Service Commitments and Licence prior to using the service:
https://marine.copernicus.eu/services-portfolio/service-commitments-and-licence/
Registration required. Please follow the registration steps:
Copernicus Marine Environment Monitoring Service (CMEMS):

Data via:

References:

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Thank you
MARINE SPATIAL PLANNING
Definition

“Marine Spatial Planning is a public process of analysing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that are usually specified through a political process.”

Definition

Article 3 of European Directive 2014/89

‘Maritime spatial planning’ means a process by which the relevant Member State’s authorities analyse and organise human activities in marine areas to achieve ecological, economic and social objectives.'
Article 192 UNCLOS:
“States have the obligation to protect and preserve the marine environment”.

Article 193 UNCLOS:
“States have the sovereign right to exploit their natural resources pursuant to their environmental policies and in accordance with their duty to protect and preserve the marine environment”.

Sources
Article 3 of the Maritime Zones Act 2005

“Notwithstanding any other enactment, UNCLOS shall have force of law in Mauritius”.
Sources

- UNCLOS does **NOT** contain any provisions relating *expressis verbis* to Marine Spatial Planning.
Policy

- **2013** - Development of an Ocean Economy Roadmap

- **2016** - Development of a marine spatial plan to implement the UN Sustainable Development Goal (SDG14).
Policy

UNITED NATIONS SUSTAINABLE DEVELOPMENT GOAL

- **SDG 14.** Conserve and sustainably use the oceans, seas and marine resources for sustainable development
- **14C.** Enhance the conservation and sustainable use of oceans and their resources by implementing international law as reflected in *UNCLOS*, which provides the legal framework for the conservation and sustainable use of oceans and their resources.
Policy

- Identify the use of marine space
- Consistency with national policy and legislation
- Preservation, protection and restoration of the marine environment
Characteristics

- Identification of possible uses of marine resources
- Rational organization of use of marine space and interactions between its uses
- Introduction of spatial order
- Division of sea space / Fair distribution of marine areas and their resources
- Balancing demands for development with the need to protect marine ecosystems
- Achieving economic, social and environmental objectives;
Characteristics

- UNESCO:
  1. **Ecosystem-based**: balancing social, economic, environmental and governance goals and objectives toward sustainable development;
  2. **Integrated**: across sectors and agencies and among levels of government;
  3. **Place-based or area-based**: defined by spatial boundaries;
  4. **Adaptive**: capable of learning from experience;
  5. **Strategic and anticipatory**: focused on the long-term and future planning; and
  6. **Participatory**: with stakeholders actively involved in the process.
Effects

- Preserves marine ecosystem
- Promotes International cooperation
- Avoid conflicts between sectors of commercial and industrial activity.
- Provides sustainable activities
Guiding Principles: Equity

- MSP should be put into practice following the principles of equity.

- “Well-defined, flexible and transparent instruments of marine sustainable governance at a regional and national level are key tools towards achieving governance goals concerning the global ocean.” (Kingsbury et al. 2005).
Guiding Principles: Legal Certainty

Management and responsibility for the protection of the marine environment in individual areas should be defined:

1. Clearly;
2. Consistently;
3. Flexibly; and
4. Comprehensively.
Guiding Principles: United Nations

- The ecosystem integrity principle;
- The integration principle;
- The public trust principle;
- The transparency principle;
- The precautionary principle; and
- The polluter-pays principle.
Guiding Principles: Applications

1. Guides the government during the development and implementation of a marine spatial plan; and

2. Provides guidance to the court to interpret the law.
IOC ten-step approach to MSP

- Step 1. Establishing authority
- Step 2. Obtaining financial support
- Step 3. Organising the MSP process
- Step 4. Engaging Stakeholders
- Step 5. Analysing Existing Conditions
- Step 6. Analysing Future Conditions
- Step 7. Developing the Plan
- Step 8. Implementing the Plan
- Step 9. Evaluating Performance
- Step 10. Adapting the Process
One size does not fit all

Each country should choose to frame its marine spatial planning law depending on:

- The local context;
- Needs; and
- Existing legal framework.
Amendments

- Maritime Zones Act 2005
- Fisheries and Marine Resources Act 2007
- The Environment Protection Act 2002
- The National Coast Guard Act 1988
- The Merchant Shipping Act 2007
Ocean zoning is defined as “an important regulatory measure to implement comprehensive marine spatial management plans usually through a zoning map or maps and regulations for some or all areas of a marine region”.

- Each zone included in the plan is intended to prioritize a particular ocean use or set of uses, often to the exclusion of other uses.
Ocean Zoning: Types

- Conservation;
- Fisheries;
- Shipping;
- Recreational;
- Tourism; and
- Mixed use.
Scope of MSP: Geographical

At the national level, MSP can cover:

- Internal waters;
- Territorial seas;
- Exclusive economic zones; and
- Continental shelf areas; or
- Any combination of these maritime zones.
Scope of MSP: Dimensional

MSP operates within three dimensions, addressing activities:

(a) On the sea bed;

(b) In the water column; and

(c) On the surface.
Marine Areas: Classification

On the basis of their legal status, UNCLOS divides marine areas into three categories:

1. Marine areas included in the territory of a State;
2. Marine areas which are subject to limited jurisdiction and in which a coastal State enjoys sovereign rights; and
3. Marine areas located beyond national jurisdiction.
Marine Areas: Unlimited jurisdiction

The marine areas included in the territory of a coastal State are:

- Internal waters (Article 8 UNCLOS),
- Territorial sea, (Article 3–4 UNCLOS) and
- Archipelagic waters (Articles 46–54 UNCLOS).
The marine areas under limited jurisdiction in which the coastal State has sovereign rights include:

- The EEZ (Articles 55–75 UNCLOS),
- The continental shelf (Articles 76–85 UNCLOS) and
- The contiguous zone (Article 33 UNCLOS).
Within EEZ, the coastal State has the right to exploit:

- The water column;

- The seabed; and

- The subsoil.
Scope of MSP within EEZ

Within the EEZ a Coastal State has sovereign rights in the field of:

- Exploration of natural resources;
- Exploitation of natural resources;
- Conservation of living and non-living natural resources (e.g. fish and hydrocarbon);
- Management of living and non-living natural resources;
- Other activities such as production of energy from the water, currents and winds.
Within the EEZ, the coastal State also has jurisdiction with regards to:

- Artificial islands;
- Installations and structures;
- Marine scientific research; and
- Protection of the environment.
Scope of MSP within Continental Shelf

- A coastal State has sovereign rights for the purpose of exploring and exploiting its natural resources, living and non-living resources on the seabed (e.g. harvesting of sedentary fish species, drilling, tunneling etc.)
- The right to undertake MSP is restricted to certain activities that relate to sovereign rights.
- Navigation and laying of cables amount to a restriction to exercising sovereignty rights.
Scope of MSP within the High Seas

- No coastal State has the requisite legal capacity to give unilateral effect to MSP.
- A coastal state can only regulate the activities on the high seas with regards to its nationals and vessels that fly its flag.
- The planning of maritime space on the high seas requires international cooperation.
Scope of MSP within Territorial Sea

UNCLOS confers the power on coastal States to adopt laws and regulations on the safety of navigation and the regulation of maritime traffic in its territorial sea, in respect to, inter alia, the conservation of the sea’s living resources (Article 21(1)(d)), the preservation of the coastal State’s environment and the prevention, reduction and control of pollution (Article 21(1)(f)).
MSP: Restrictions

MSP may involve:

1. Prohibition of fishing;
2. Regulation of navigation;
3. Consultation with neighboring states where MSP may result in significant adverse environmental impacts across borders;
4. Temporal or zonal restrictions to avoid conflicts.
Ensuring the right balance between socioeconomic development and environmental protection is one of the major challenges for MSP.

Given the increasing effects of climate change on ocean resources, which might require adjusting uses or locations of the zones set forth in the marine spatial plan, it is also useful to mention climate change in the criteria.

Environmental impact assessments must be carried out at each stage of the process.
Foreign Legislations

- **Australia**
  1. Marine and Coastal Act 2018
  2. Environment Protection and Biodiversity Conservation Act 1999

- **Barbuda**
  The Barbuda (Coastal Zoning and Management) Regulations 2014

- **Belize**
  Coastal Zone Management Act 2000
Foreign Legislations

- **Canada**
  Oceans Act 1996

- **China**
  1. Spatial Planning Act 2016
  2. Coastal Zone Management Act 2015

- **Cook Islands**
  Marae Moana Act 2017
Foreign Legislation

- **European Union**

- **France**
  Loi no. 2016-1087 du 8 aout 2016 pour la reconquete de la biodiversité, de la nature et des paysages

- **Germany**
  Spatial Planning Act 2008

- **Ghana**
  Land Use and Spatial Planning Act 2016
Foreign Legislations

- Indonesia
  Law on the sea 2014

- Malta
  Marine Spatial Planning Regulations 2016

- Netherlands
  Spatial Planning Act 2006

- South Africa
  Marine Spatial Planning Act 2018
Foreign Legislations

- **Thailand**
  - Act on the Promotion of Marine and Coastal Resources Management

- **United Kingdom**
  - Marine and Coastal Access Act 2009
  - Marine (Scotland) Act 2010
  - Environment (Maritime and Spatial Planning) Regulations 2016
Foreign Legislations

- **United States**
  - National Marine Sanctuaries Act
  - An Act relative to Oceans
  - Oregon Ocean Resources Management Act
  - Marine Waters Planning and Management Act

- **Vietnam**
  - Elaboration on the Law of Planning
  - The Law on Marine and Island Resources and Environment