



United Nations
Educational, Scientific and
Cultural Organization



Biodiversity, Ecosystem Services and Ocean Wealth

Bigeye soldierfish underneath coral at Rapture Reef, French Frigate Shoals, in the Papahānaumokuākea Marine National Monument.

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Geographical scope/benefitting country(ies):	Global
Duration (in months):	24 months
Name and unit of project officer	Ward Appeltans, UNESCO-IOC/IODE/OBIS
Partner(s) institutions:	Duke University, University of Brittany (UBO)
Total estimated budget inclusive of Programme Support costs	US\$ 1,000,000

Rationale and background

What is the project aiming to achieve?

The project intends to develop knowledge managements systems that will help Member States understand how marine and coastal biodiversity affect the provisioning of ecosystem services and how the benefits of these marine ecosystem services are distributed around the globe. This project will for the first time address issues of ecosystem services in areas beyond national jurisdiction in addition to Exclusive Economic Zones (EEZs) and will specifically assess export fisheries, carbon capture and areas under consideration for deep-sea mining.

Through the United Nations Convention on Biological Diversity and its 2020 Aichi Biodiversity Targets (<http://www.cbd.int/sp/targets>), Member States are required to develop inventories of ecosystem services in their territorial waters and EEZs. Initiatives are also now underway to describe Ecologically or Biologically Significant Areas (EBSAs - <http://www.cbd.int/ebsa/>) in and beyond national jurisdiction. Our ability to assess the ecosystem services provided by these areas is currently limited. Member States need to understand how the management of marine and coastal biodiversity affects the provision of ecosystem services and who benefits

from these services. The information to achieve this understanding for better decision-making for marine management and protection is being developed around the world (see the list below), but it is not integrated. There currently is no way to link data on marine biodiversity, ecosystem services, and the values that are proposed.

This project proposes to create a knowledge system that:

- 1) will link the catalogue and map marine biodiversity data available through UNESCO's IODE/OBIS programme;
- 2) with data being collated by recent efforts to map ecosystem services, including:
 - a. The European Commission's Mapping and Assessment of Ecosystem Services
 - b. The French National Assessment of Ecosystems and Ecosystem Services
 - c. Mapping Ocean Wealth (The Nature Conservancy and the World Bank's Global Partnership for Oceans)
 - d. Marine Ecosystem Services Partnership (a global effort lead by Duke University)
- 3) and will create new methods to quantify ecosystem service values along the entire value chain from production by ecosystems, to intermediate processes, and final consumption. We also will create dynamic maps of selected ecosystem service values that illustrate spatially and temporally the fact that many ecosystem services yield benefits that are far from the ecological source of these services.

This will be done in collaboration with other IOC and UNESCO programmes in order to enlarge impact and visibility.

Why is this project needed?

Current mapping efforts are key steps in providing a knowledge base that will help Member States manage marine biodiversity and ecosystems for the benefit of humankind. Yet, these efforts currently cannot fulfill this need because they are not integrated. Furthermore, there are no rigorous efforts to create value functions and maps that demonstrate how the benefits of ecosystem services flow from ecosystem to the beneficiary states. As a result, Member States cannot adequately manage marine ecosystem services efficiently. Further, without dynamic maps of marine ecosystem service values, the beneficiaries of ecosystem services are often unaware of whence these benefits come. Without this information, it is likely that foreign aid and other sources of funding will not be efficiently directed to better managing these sources of biodiversity and ecosystem services.

One example of an ecosystem service for which this project is needed is "export fisheries." Fish depend on ecosystems that in turn are characterized and depend upon a broader web of organisms. The fish produced on the high seas, near coral reefs, and in many other areas generate market values for fishers. These fish, however, may be processed far from the ecosystems where they are harvested. The processing of these fish, in turn, generates value for the processor. Finally, fish may be shipped to markets that are many kilometers from the processors where they are sold by retailers (which generates a profit) and eaten by consumers (which generates a benefit known as consumer surplus). As a result, a remote ecosystem (e.g. the Sargasso Sea) may generate a series of benefits enjoyed by different Member States.

A second example is carbon capture and sequestration by marine and coastal ecosystems. Carbon captured by these systems is kept from entering the global atmospheric pool of greenhouse gases – as a result, carbon sequestration by marine ecosystem generates a global economic benefit. While carbon may be stored by an ecosystem in an African Member

State, its benefits accrue to Member States around the world – but these benefits may vary tremendously from State to State.

A third example is the increasing rate of identification of sites for deep-sea mining and mineral extraction in the open oceans and deep seas. Many of these proposed lease sites are located in areas beyond national jurisdiction and the identification of the access and benefits sharing of these activities is especially important to support international processes. Developing an open-access system for the collection and public dissemination of information on the biological diversity of deep-sea sites will aid in the assessment and transparency of these processes. These activities of the project will be developed in close collaboration with the International Seabed Authority (ISA). We will also coordinate our efforts with the emerging Managing Impacts of Deep-sea Resource exploitation (MIDAS) project.

Why UNESCO ?

The IOC and UNESCO are uniquely suited to integrate the key international efforts to better map marine biodiversity, ecosystem services and values. Furthermore, the data and methods created should become “public.” The IOC is ideally positioned to disseminate the data and methods.

In 2009, The IOC Member States adopted the Ocean Biogeographic Information System (OBIS) from the Census of Marine Life. The Census was a decade-long US\$650 million foundation-led program to document what lived, lives and will live in the ocean. OBIS was the information component of the Census and is an important scientific data legacy that now continues to grow under the auspices of UNESCO. Currently, OBIS holds 38 million observations of 115,000 marine species, from Bacteria to Whales, in all ocean basins and at all depths, provided by 500 institutions in 56 countries. A truly enormous resource of information to serve marine science and marine policy, and one that continues to grow!

The international OBIS secretariat, headed by Mr Ward Appeltans, builds and maintains the central database and online data portal, and provides training and technical assistance, guides new data standards and technical developments, and encourages international cooperation to foster the group benefits of the global network.

This project also fits well with the IOC mission that seeks to develop and apply knowledge to improve management, sustainable development, protection of environment and decision-making.

Why Duke University and the University of West Brittany (UBO)?

Duke University is a leader creating new approaches to using data to inform policy for marine ecosystem and ecosystem services. The principal investigators, Linwood Pendleton and Patrick Halpin, are widely recognized international experts in marine policy, especially policies focused on managing living resources and ecosystems. Linwood Pendleton also has a strong working relationship with UBO and anticipates embarking upon a joint position between UBO's Institute of Marine Law and Economics (AMURE) and Duke University's Nicholas Institute. UBO and AMURE are key institutions in the Pôle Mer of the Brest Technopole that includes UBO, the European University Institute of the Ocean (IUEM), and the PERISCOPE project (an interdisciplinary effort to communicate marine science knowledge.) Dr. Pendleton is the Director of the Marine Ecosystem Services Partnership and a member of the steering committee for the Mapping Ocean Wealth Project. Dr. Halpin is the Director of the Marine Geospatial Ecology Lab (MGEL) that is a world leader in the development and analysis of marine biodiversity data to support marine science and policy research. The Marine Geospatial Ecology Lab is a long-time contributor and partner

institution with the UNESCO IOC/IODE Ocean Biogeographic Information System (OBIS) program. Dr. Halpin sits on the Steering Group for this program and is also the Chair of the Science Advisory Committee for OBIS. The MGEL lab maintains the OBIS-SEAMAP node of the OBIS network and contributes direct, in-kind technical support to the OBIS portal administered by IOC/IODE. The MGEL lab directly provides scientific and technical support to several international marine policy processes including the Convention on Biological Diversity, Ecologically or Biologically Significant Areas (EBSA) identification process as well as the Convention on Migratory Species process. MGEL is an active member of the Global Oceans Biodiversity Initiative (GOBI).

Overall Goal/Objective

The overall goal of this project is to develop and implement a single, coherent information system to allow States to directly assess the allocation of ecosystem services and resource benefits derived from ocean resources. Member States are now being asked to make decisions on access and benefit sharing issues in ocean areas including Areas Beyond National Jurisdiction (ABNJ). Currently no internationally accepted program exists to provide reliable information on the allocation of ecosystem services and ocean wealth. This project will aggregate the best available information on ocean biodiversity, ecosystem services and ocean wealth into a single, authoritative resource for Member States and the international community to use in the evaluation of access and benefit sharing and ocean resource tracking.

Main expected results

Expected Result 1

Improve the dissemination of information on biological diversity and ecosystem services

Activities and outputs/deliverables relating to the achievement of expected results

What are the key activities to be carried out in order to produce the expected results?

The key activity of this initiative will be the development of a new information system framework within the IOC/IODE infrastructure to aggregate the best available information on ocean biodiversity, ecosystem services and ocean wealth. This information system will be built to augment the existing Ocean Biogeographic Information System (OBIS) to provide relevant information to support international decision making on access and benefits sharing, ecosystems services and ocean wealth accounting. This information system will provide the authoritative, open-access source for Member States and international organizations to support decision making in the ocean policy and management.

Activity 1 – expected result 1
Output/deliverable 1.1 Stakeholder needs assessment
Output/deliverable 1.2 Development of prototype information system framework

Output/deliverable 1.3

Assessment of prototype information system for full implementation

Beneficiaries and stakeholders

Member States and the international ocean policy and management decision processes that Member States participate in will be the primary beneficiaries and stakeholders in the development of this information system.

Implementation strategy

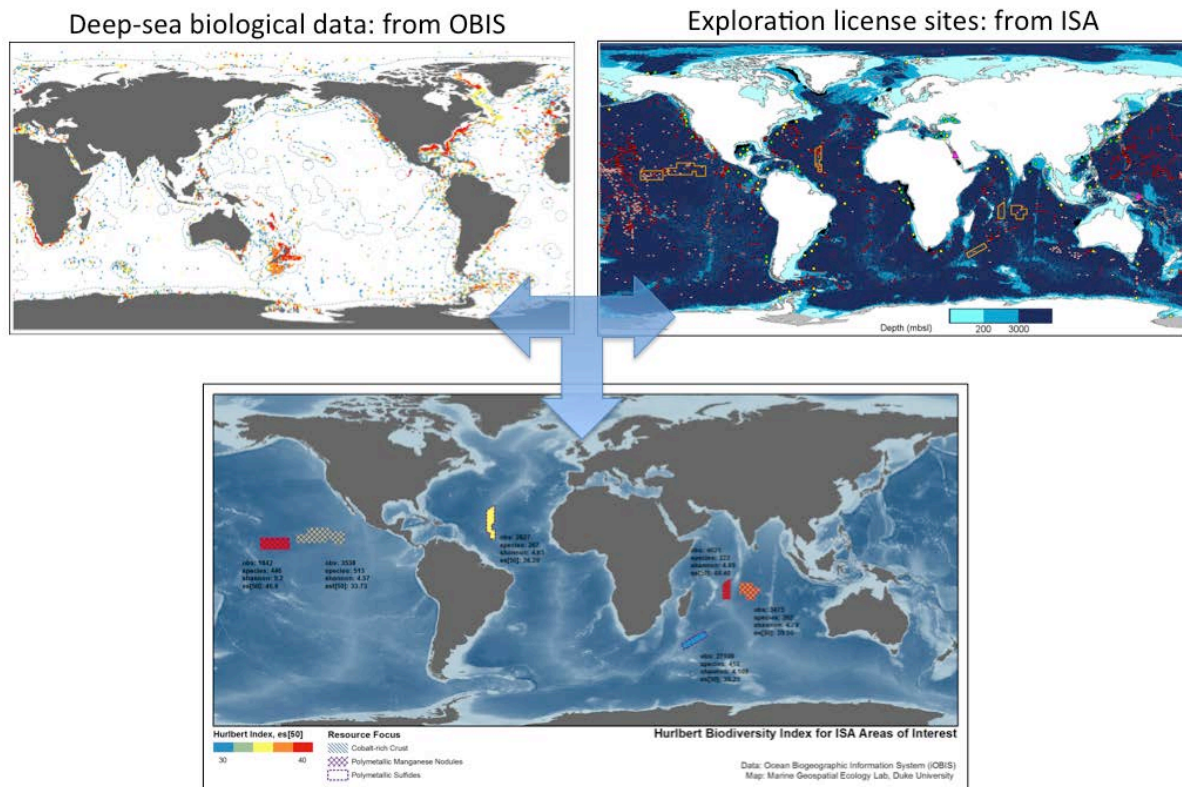
The Ocean Biodiversity, Ecosystem Services and Ocean Wealth information system will be implemented in a series of stages:

- Framework planning and stakeholder input;
- Assessment of existing information resources;
- Research and development of information products;
- Database and web services design;
- Development of information system interface and query tools;
- Assessment of prototype design for full implementation

These activities will be conducted with appropriate IOC/UNESCO programs and staff from IODE and OBIS.

Sustainability and exit strategy

Proposed activities are in partnership with (i) relevant national institutions and are anchored in these; and (ii) relevant regional bodies that link and anchor with national ministries of foreign affairs.



Comparative biological diversity estimates for deep-sea exploration license areas

Figure 1. Example application combining information from the OBIS information system with deep-sea exploration license areas from ISA to provide comparative information on biological diversity for the evaluation of deep-sea ecosystem services and valuation.