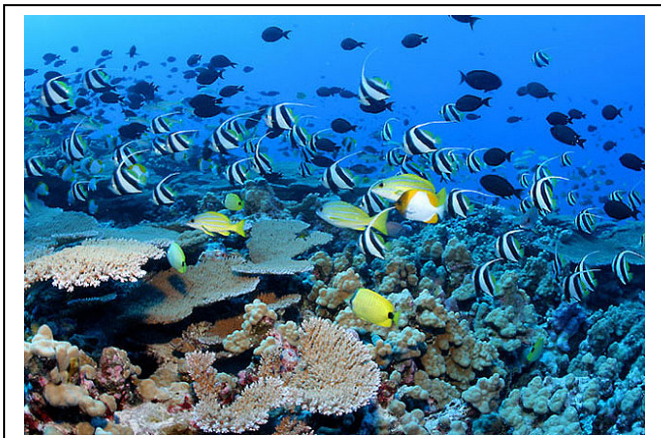




United Nations  
Educational, Scientific and  
Cultural Organization



## ***Ocean Biogeographic Information System***

Schools of colorful pennantfish, pyramid and milletseed butterflyfish live in an atoll in the Northwestern Hawaiian Islands

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|--|---|
| <b>Geographical scope/benefitting country(ies):</b>                | Global                                      |
| <b>Duration (in months):</b>                                       | 48 months                                   |
| <b>Name and unit of project officer</b>                            | Ward Appeltans, UNESCO/IOC/IODE/OBIS        |
| <b>Partner(s) institutions:</b>                                    |   |
| <b>Total estimated budget inclusive of Programme Support costs</b> | US\$ 2.8 million (or US\$ 700,000 annually) |

### ***Rationale and background***

#### *What is the project aiming to achieve?*

Through a fully fledged international OBIS secretariat, this project aims to build the most comprehensive gateway to the World's Ocean Biodiversity and Biogeographic data and information required to address pressing coastal and world ocean concerns. It will achieve this by building and maintaining a global alliance that collaborates with scientific communities to facilitate free and open access to, and application of, biodiversity and biogeographic data and information on marine life.

In June 2009, the IOC Member States adopted the Ocean Biogeographic Information System (OBIS), which was initiated by the decade long Census of Marine Life – a \$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 in all ocean basins and at all depths, provided by 500 institutions in 56 countries. The OBIS secretariat 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.

Jointly with other IOC programs (such as Global Ocean Observing System - GOOS, Integrated Coastal Area Management - ICAM and Harmful Algal Blooms - HAB), OBIS will strive to develop a global ocean observing framework for monitoring the state of marine species diversity, populations and habitats, to assess risks and impacts on ecosystem services and to underpin an ecosystem approach for marine spatial planning and conservation policies for the protection and sustainable management of the ocean.

OBIS will provide the infrastructure and knowledge base necessary to predict or early detect emerging issues such as marine invasive species, harmful algal blooms, shifts in abundance and species distribution ranges, extinction risks of species, species composition or regime shifts, and loss or degradation of marine habitats.

OBIS will further build the historical baseline, against which future change can be measured. It will close the data gap by growing in terms of geographic, taxonomic and temporal coverage, as well as expanding in capturing additional data types and information.

OBIS has the potential to become an important, and unique, marine biodiversity program within the UN system and serves many IOC programs, such as the Global Ocean Observing System (GOOS), the International Oceanographic Data and Information Exchange (IODE), Harmful Algal Bloom (HAB), Marine Spatial Planning, but also UNESCO projects, such as Man and Biosphere, the marine World Heritage Program, and the global Climate Change Initiative. It can also be part of UNESCO's contribution to the recently launched Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES).

#### Why is this project needed?

There is an increased need for more, and more accurate, time-series data on marine biodiversity to monitor the state of the marine environment and to better document the ecosystem processes and potential impacts of global change, in order to more effectively conserve and manage our marine living resources. UNESCO's Resource Mobilization Strategy' (37C/INF.28) states that in order to inform global action on the conservation of marine biodiversity, and to help Member States develop strategies for environmental stewardship, IOC needs support for its Ocean Biogeographic Information System (OBIS). Without a sustainable funding situation for OBIS, IOC risks losing its world leading position in coordinating the network of marine biodiversity science projects, programs and institutions, as is recognized by the UN Convention on Biological Diversity. OBIS fills a unique niche in IOC and has the potential to strengthen several IOC and UNESCO programs.

Also the UN General Assembly (A/RES/63/111) expressed its serious concern over the current and projected adverse effects of climate change on the marine environment and marine biodiversity. However, without accurate, repeatable and timely biological data, it is impossible to adequately address the global ocean environmental issues of pollution, climate impact and mitigation, ocean acidification, ecosystem management, biodiversity loss, and habitat destruction.

The ocean provides important services such as protein provision, absorbing heat and regulating climate, absorbing CO<sub>2</sub> and providing 50% of the oxygen we breathe and is crucial in nutrient recycling and waste detoxification. Biodiversity (*i.e.*, species richness, species composition, genetic diversity and habitat diversity) is our natural capital and life insurance. Higher biodiversity means more stable, productive and resilient ecosystems that can better cope and recover from human-induced or natural catastrophes. In order to secure ecosystem

serves and a healthy ocean for future generations, biodiversity conservation should be a central management goal for all stakeholders concerned.

Since the World Summit on Sustainable Development in 2002 in Johannesburg, the political leaders recognize the benefits of biodiversity to society and its importance to alleviate poverty. The ocean in particular will play a very important role in the future provision of ecosystem services to sustain a planet with 10 billion people. As a result of this summit, the UN set up a regular process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects, also called the World Ocean Assessment. The aim is to provide a sound, scientific basis for decisions at the global level on the world's oceans and seas, and create a framework for national and regional assessments and management decisions. The 1<sup>st</sup> World Ocean Assessment will have 7 sections of which one will deal entirely with Marine Biodiversity.

During the United Nations Conference on Sustainable Development (Rio+20) in 2012, the following two documents were published: "The future we want" and the "Blueprint for Ocean and Coastal Sustainability". They address four major focal areas: i) maintain or restore the structure and function of marine ecosystems, ii) adapt to and mitigate Ocean Acidification, iii) protect and restore vital ocean and coastal habitats and iv) address the issue of aquatic invasive species. Clearly all four components cannot be effectively addressed without sound scientific knowledge - something OBIS delivers.

## Why UNESCO ?

It is part of IOC's mandate to increase the capacity of its 146 Member States to sustainably manage their coasts and marine living resources.

Before 2009, IOC Member States have repeatedly identified the need to acquire ocean biogeographic data for national ocean and coastal resource management and in 2009, UNESCO-IOC took the opportunity to adopt an existing global database and to attract the associated research community of OBIS that can and should be a continuous part of the Commission's ocean mandate. The Member States also agreed that knowledge of the oceans biodiversity is of such importance to national and global environmental issues that governments should assume the responsibility for its continuing success.

During the 27<sup>th</sup> IOC Assembly (June 2013), the Member States expressed their appreciation to the OBIS Secretariat for the significant achievements so far and stressed the importance of OBIS as a priority and flagship project of the Commission, serving all IOC programs. The Assembly recognized that OBIS is the world's largest database on marine biodiversity and is needed for global reporting on the state of our ocean, such as the UN World Ocean Assessment, and is key for setting standards and best practices in marine biodiversity data management and data exchange as part of the IODE program. The Assembly recognized that it cannot afford to lose one of its most important activities and urged all Member States to support OBIS. The Member States at the IOC Assembly also agreed that without direct funding from UNESCO's regular program, Member States would need to take up responsibility to enable the IOC to fulfill the commitment it made to the continuation and further development of OBIS (IOC-XXVII/Dec.5.3.4.1).

The 193 parties to the Convention on Biological Diversity (CBD COP10/29 paragraphs 10 and 35; October 2010), requested Member States to further enhance globally networked scientific efforts such as OBIS, to continue to update a comprehensive and accessible global database of all life forms in the sea, and to further assess and map the distribution and abundance of species in the sea. They also explicitly called upon IOC-UNESCO to further facilitate availability and interoperability of the best available marine and coastal biodiversity

datasets and information across global, regional and national scales. CBD COP-10 also adopted the Strategic Plan for Biodiversity 2011-2020 with 5 strategic goals and 20 (Aichi) biodiversity targets. One of them, target 11, envisions that at least 10 per cent of marine and coastal areas should be conserved by 2020. To support this target, the CBD convenes a process to identify Ecologically or Biologically Significant Areas (EBSAs). The CBD progress report on Marine and Coastal Biodiversity: Use of Scientific and Technical Information for Describing Ecologically or Biologically Significant Marine Areas (EBSAs) [<http://www.cbd.int/doc/meetings/sbstta/sbstta-17/information/sbstta-17-inf-03-en.pdf>] specifically refers to OBIS as its major biological data source.

The Global Biodiversity Outlook of the CBD will report on the progress of the 20 Aichi biodiversity targets. The Biodiversity Indicators Partnership (BIP) coordinates the generation of information on biodiversity indicators, such as trends in species distribution and abundance and extinction risk of species. It tries to address questions like “does the global protected area system cover a representative sample of the world’s biodiversity (including threatened species), and is it targeting the most important sites for biodiversity?”. The Biodiversity Observation Network of the Group on Earth Observations (GEO BON) supports this process through identifying Essential Biodiversity Variables and developing biodiversity indicators. OBIS provides essential data to serve these CBD biodiversity indicators.

The Ad Hoc Open-ended Informal Working Group to study issues relating to the conservation and sustainable use of marine biological diversity beyond areas of national jurisdiction, established by the UN General Assembly (RES 60/30 of 29 November 2005), met in May 2013 and identified the need for unbiased, open-access biological data. They stressed the global role of IOC-UNESCO and recognized the potential role of IOC-UNESCO in data and information sharing, and considered the Ocean Biogeographic Information System (OBIS) as an appropriate mechanism for the management of biodiversity data in areas beyond national jurisdiction (ABNJ). OBIS currently holds over 6 million observations from 74,000 marine species, of which 17,000 are unique to the ABNJ. In addition, 35,000 marine species live exclusively at a depth below 200 meters.

In line with the UN General Assembly (RES 61/105) and to ensure a long-term conservation and sustainable use of marine living resources in the deep seas and to prevent significant adverse impacts on vulnerable marine ecosystems (VMEs), the Food and Agriculture Organization (FAO) of the United Nations started a process to identify Vulnerable Marine Ecosystems (VMEs). The FAO uses data from OBIS to identify Vulnerable Marine Ecosystems.

In 2011, the UN General Assembly invited the IOC to provide scientific and technical support to the Regular Process (Resolution A/RES/66/231). Several biodiversity data and summary maps from OBIS will be used in the World Ocean Assessment to assess the current knowledge and gaps in geographic and taxonomic coverage.

The Global Environment Facility established a Transboundary Waters Assessment Programme (GEF-TWA). IOC-UNESCO coordinates two components (global ocean and large marine ecosystems). OBIS contributes to the GEF-TWA by providing data and maps on global biodiversity and climate change indicators.

The Global Ocean Observing System (GOOS) is in the process of developing a framework for biological and biogeochemical ocean observing systems. Data and information systems are a key component of the GOOS global framework for biological ocean observing systems and IODE/OBIS will contribute to this by playing a role in providing data infrastructure and guidelines and best practices in marine biodiversity data management.

## ***Overall Goal/Objective***

OBIS will:

- Provide the world's largest scientific knowledge base on the diversity, distribution and abundance of all marine organisms in an integrated and standardized format.
- Facilitate the integration of biogeographic information with physical and chemical environmental data, in collaboration with IOC/IODE's Ocean Data Portal.
- Contribute to a concerted global approach to marine biodiversity and ecosystem monitoring through guidelines on standards and best practices, including globally agreed Essential Ocean Variables, observing plans, and indicators in collaboration with other IOC programs (such as GOOS).
- Support the assessment of the state of marine biological diversity to better inform policy makers, and respond to the needs of regional and global processes such as the World Ocean Assessment (WOA) and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystems Services (IPBES).
- Provide information and guidance on the use of biodiversity data for education and research and provide state of the art web services to society including decision makers.
- Provide data, information and tools to support the identification of biologically important or vulnerable marine and coastal habitats, for the development of marine spatial plans and other area-based management actions.
- Increase Member States, institutional and professional capacity in marine biodiversity and ecosystem data collection, management, analysis and reporting tools, as part of the IODE's Ocean Teacher Global Academy project.
- Provide a platform for international collaboration between national and regional marine biodiversity and ecosystem monitoring programmes, enhancing Member States and global contributions to inter alia, the Global Ocean Observing System (GOOS) and the Global Earth Observing System of Systems (GEOSS).

## ***Main expected results***

### **Expected Result 1**

Making OBIS a highly successful UNESCO and IOC flagship and world leader in serving high quality data, information and tools for marine biodiversity and ecosystem management.

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

- Expanding the global network and partnership, through organization of meetings, scientific conferences and data analysis workshops, signing cooperation agreements, participation in boards and networking activities.
- Producing guidelines for OBIS nodes (terms of reference, the procedure to establish OBIS nodes, standards and best practices (OBIS cookbook) and a section on quality assurance, criteria and evaluation of OBIS nodes.
- Training scientists and data managers in applying standards and best practices of biological data collection, sample processing, data management (including quality control), data storage and sharing, and data publication processes.
- Providing scientific data and information for the selection of sites that need special attention and development of marine spatial plans.

- Development of information products (e.g., indices and trends in global to local species diversity, and community composition as well as shifts in species distribution ranges) suitable for end users and decision makers.

#### Output:

- Increased number of institutions sharing data with OBIS.
- OBIS continues to grow in geographic, taxonomic and temporal coverage and improved baseline by increasing the amount of historical data, currently only available on paper, digitized and available through OBIS.
- OBIS data quality improved.
- OBIS continues to be used by the scientific community, e.g. in climate change impact studies.
- Biodiversity information on Ecologically or Biologically Significant Areas (EBSAs), Vulnerable Marine Ecosystems (VMEs), World Heritage Sites and other important sites made available through the OBIS portal and updated on a regular basis.
- Member states' decision-making capacity increased by improved access to ocean data and information through OBIS.
- Biodiversity knowledge improved to support national, regional and global reporting processes such as those of the Convention on Biological Diversity (CBD), the World Ocean Assessment (WOA) of the United Nations Regular Process and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystems Services (IPBES).

### **Beneficiaries and stakeholders**

The scientific community is by far the largest user community of OBIS. More than 900 scientific publications, as well as not less than 163 books, have used data from OBIS or mentioned OBIS, including papers in *Science and Nature* (source Google Scholar). On average 7-8 papers are added to this list on a monthly basis. In the past two years (November 2011-2013), the OBIS website received 186,630 visits, with an average of  $\pm 400$  on a regular working day (source Google Analytics). There were 123,287 unique visitors (based on IP-address) and 34.6% of these are returning visitors. The USA is by far OBIS' most visiting country (>25%). There is a trend of an increasing number of visitors to the OBIS website from Asian countries.

More and more are Member States asked to deliver statistics on the status of the environment, including biodiversity, for assessments and reporting obligations as part of national legislation, regional or global conventions and directives.

As outlined in the previous sections, other beneficiaries and stakeholders are UN organizations, such as the secretariat of the Convention on Biological Diversity and the United Nations Food and Agricultural Organization, but also international projects such as the Biodiversity Indicators Partnership, the World Ocean Assessment, the Biodiversity Observation Network of the Group on Earth Observations, The Global Biodiversity Information Facility, the Global Environment Facility etc.

### **Implementation strategy**

OBIS brings new expertise and resources to IODE and IOC and will help it address current gaps in both content (data) and capacity. This project will be implemented on the basis of IOC's six key functions:

### **1. Ocean research: Foster research to strengthen knowledge of ecosystem processes and human impacts upon them.**

The ocean is composed of intertwined, complex systems. OBIS works at the data and science interface. A large well-integrated, high quality and ever more comprehensive database can aid scientists in improving our understanding of the ocean and its living organisms. This “big data” approach will require new education and training programs to assist students and scientists in using the most advanced technologies for data collection, management and applications; every component of the field of informatics and its implementation toward marine biological data. OBIS will participate in helping to advance science and aid/improve our understanding of oceans and their complex ecosystems.

### **2. Observing system/data management: Maintain, strengthen and integrate global ocean observing, data and information systems**

The OBIS data nodes will continue to maintain and expand the current global data infrastructure to facilitate the publication/distribution of marine biogeographic data. This infrastructure will consider all elements of the data life cycle, be standards-based and allow for data discovery, evaluation and application. This infrastructure is comprised of three critical elements:

(i) Network – This consists of the OBIS nodes, both the organizational elements and their staff and then extends beyond OBIS to include individuals and organizations that collect data or use the data to advance knowledge, sustainably manage resources or protect the environment and the world’s citizens.

(ii) Technology – This includes the current hardware and software employed by the network, but also would consider extensions into new priority areas such as monitoring and ocean observation. An area that has not typically included biodiversity data and yet these data are critical for ecosystem based management and understanding/managing our changing oceans.

(iii) Standards – The advancement of standards for biogeographic data has been critical to capturing, describing and sharing the data over the past decade. It is standards, applied throughout the data life cycle, that allow for improved management of applications of ever-richer biological data. Data that can and must be integrated with other oceanographic data to provide a complete picture of the global ocean.

### **3. Early warning and services: Develop early warning systems, services, and preparedness to mitigate the risks of tsunamis and ocean-related hazards.**

OBIS will support IOC’s Harmful Algal Bloom (HAB) Program with the management of HAB data and the development of information products for a Global HAB status report (IOC-XXVII/Dec.5.4.2). Alongside, emerging techniques using ROVs (Remotely Operated Vehicles) or AUVs (Autonomous Underwater Vehicles) have a promising potential in feeding data systems such as OBIS. It will provide near real-time information that can be used to assess ocean-related hazards impacts on marine ecosystems, including those providing valuable services to human communities.

### **4. Assessment and Information for policy: Support assessment and information to improve the science-policy interface**

Key to helping address societal problems is an ability to support decision-making. OBIS will contribute to the science-policy interface by supporting global and local assessments and contribute data for global ocean decision-making. As scientists are called upon to inform decision makers, analytical tools and products will be necessary to aid in analysis and forecasting. These tools may use emerging technical developments to enhance visualizing data, provide up-to-date data on the changing conditions of marine biota and highlight new areas for investigation to fill critical data gaps as new issues emerge. OBIS will work together with IODE projects such as the International Coastal Atlas Network (ICAN) by creating maps and products for use in marine spatial planning and environmental assessments. Other

possible developments include the setup of indicators, which can be re-evaluated or fine-tuned using the data system content, in a dynamic fashion.

#### **5. Sustainable management and governance: Enhance the global ocean governance framework through a shared knowledge base and improved regional cooperation**

There is a central theme that is an integral part of OBIS, collaboration. From its beginning OBIS has been an evolving community of collaborators sharing data, expertise and resources to achieve a common vision. Nearly 500 institutions in 56 countries have been contributing data to OBIS so far. National, regional or thematic OBIS nodes coordinate the data collection. It is important that the OBIS network further grows and that OBIS become part of the institutional and national strategic work plans. Any institution, program or project can become an OBIS node by submitting an application form to become an IODE Associate Data Unit (ADU) or in case of existing IODE National Oceanographic Data Centres (NODCs) by sending a letter indicating their OBIS work fall under the activities of the NODC.

In addition, there is a recognized need to extend collaboration with other UNESCO projects/programs, national and international partners and members of the worldwide ocean community. Partnerships will also be formed with organizations that can help advance OBIS through expertise, data or technology.

#### **6. Capacity Development: Develop the institutional capacity in all of the functions above, as a cross-cutting function.**

OBIS would help to advance expertise and technical capacity of IOC member states and the oceanographic community as a whole to collect, manage and share/publish marine biogeographic data (operational biogeography). This is an area in which IODE already excels (through IODE's projects such as Ocean Teacher Academy and Ocean Data Standards and Best Practices), and one that OBIS can substantially contribute by providing training in biodiversity data management. If successful this could also result in an expanded OBIS network to include less represented geographic regions or new taxonomic areas which will enhance both access to new data and/or further the application of data by organizations that do not currently possess the ability to use the data.

### ***Sustainability and exit strategy***

Two core positions (a coordinator and data manager) are required to maintain the basic functions of the OBIS secretariat (which would cost ±300,000 US\$ annually). In order to meet the high expectations of our user community, to scale-up and to build a fully application serving system, extra resources and staffing are needed (an IT developer, a science policy/communication officer and a part-time administration assistant). Altogether, this would cost 700,000 US\$ annually. Currently none of this is secured and UNESCO and IOC risks losing this new and unique flagship. Ideally the two core positions should be funded by UNESCO's regular budget, but under the current financial situation of UNESCO, this seems unlikely (although efforts are made to secure one position). This means that OBIS continues to rely almost entirely on extra budgetary funds, which is not ideal because it takes away staff from mission critical activities. However, there seems no alternative at least until the sky clears up again. If UNESCO and IOC are not in a position to find the necessary resources (regular or extra budgetary) to sustain the two core positions, the data collected so far will be archived and a new home will need to be sought to take over stewardship and further development of OBIS.