Oceans and the Law of the Sea

Report of the Secretary-General

Contribution from the Intergovernmental Oceanographic Commission of UNESCO (IOC)

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Summary

UNESCO's Intergovernmental Oceanographic Commission (IOC) promotes international cooperation and coordinates programmes in marine research, services, observation systems, hazard mitigation, and capacity development in order to understand and effectively manage the resources of the ocean and coastal areas. By applying this knowledge, IOC aims to foster sustainable development of the marine environment, in particular in developing countries, through its activities in the following areas:

(i) Ocean observation requirements for ecosystem-based approaches
IOC coordinates ocean observation and monitoring through a Global Ocean Observing System (GOOS), which aims to providing information and data exchange on the physical, chemical, and biological aspects of the ocean. The development of GOOS is driven by the data and information requirements for sustainable development.

(ii) Ocean assessment to support decision making
As part of a new project: the Development of Information Products and Services for Ocean Assessments (DIPS-4-Ocean Assessments), IOC will develop methods and tools for obtaining indices on marine biodiversity using the IOC's Ocean Biogeographic Information System (OBIS). IOC is also the leading agency for the Large Marine Ecosystems under the Transboundary Waters Assessment Programme (TWAP). In this project, an inter-comparison assessment across the world's 66 LMEs will be released in June 2015 focusing on overfishing, habitat destruction and pollution as well as on socioeconomics and governance aspects.

(iii) Translating knowledge to sustainable management
IOC promotes the use of Marine Spatial Planning (MSP) as a tool to implement ecosystem-based management by finding space for biodiversity conservation and sustainable economic development in marine environments. In this respect, since 2005, the IOC has been instrumental in providing international guidance through collection and sharing of good practices, as demonstrated by IOC's 2009 Guidelines on MSP and newly published 2014 Guidelines on MSP Evaluation.

(iv) Capacity development
The OceanTeacher Global Academy (OTGA) has been developed as a training platform for ocean data/information managers, researchers, and coastal management practitioners. In 2014, it now expanding into a worldwide network of training facility, which will organise training courses related to multiple IOC fields through a network of 10 Regional Training Centers (RTCs) spread across the globe. The Global Ocean Science Report (GOSR) launched in 2014 is envisaged to provide an a tool for mapping the human and institutional capacity of Member States in terms of marine research, observations and data/information management, as well as a global overview of the main fields of research interest, technological developments, capacity building needs for sustainable development.

INITRODUCTION

There are many issues affecting the ocean. The fragile and interconnected nature of ocean ecosystems and human activities has in recent decades become readily apparent. From climate change and its diverse impacts on oceans, through to the destruction of and damage to marine ecosystems, the loss of biodiversity and the degradation of the natural environment, including from overfishing and destructive fishing, human impact on the ocean has been profound.

UNESCO's Intergovernmental Oceanographic Commission (IOC) promotes international cooperation and coordinates programmes in marine research, services, observation systems, hazard mitigation, and capacity development in order to understand and effectively manage the resources of the ocean and coastal areas. By applying this knowledge, the Commission aims to improve the governance, management, institutional capacity, and decision-making processes of its Member States with respect to marine resources and climate variability and to foster sustainable development of the marine environment, in particular in developing countries.

Since 2005, IOC is one of the two United Nations agencies which lead the start-up phase to the Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socio-economic Aspects, called the "assessment of assessments".

IOC was actively engaged in the process of the Rio+20 Conference. IOC brought focus and engaged on discussions on emerging issues of special interest for ocean science and sustainability. The outcome of Rio+20 is of capital importance for the global environment in the coming ten years and IOC is a key player in relation to sustainable development.

The third UN Conference on Small Developing Islands States (SIDS) (1-4 September 2014, Apia, Samoa) was of special interest to the IOC as SIDS are stewards of vast ocean resources and play a key role in efforts to their sustainable management. However because of their close relation to the ocean, they are often the first victims of ocean-related hazards such as sea-level rise, tsunamis and a new threat that has now arisen: ocean acidification. The IOC took part in reviewing and providing input to the zero draft of the outcome document, specifically the parts regarding Climate Change, Disaster preparedness, Oceans and Seas and Biodiversity, since the very beginning of the preparatory process.

In November 2014, the second International Ocean Research Conference was organized, co-sponsored by the Barcelona World Race, IOC, and The Oceanography Society, in order to review progress made in ocean science in the last twenty years, and plan ahead in light of important policy developments such as The Future We Want (UNCSD Rio+20) and Future Earth, and focused on how ocean sciences had progressed in the last 20 years and discussed the coming decade of international collaboration in marine sciences and technology.

In this context, IOC implements various activities which contribute to fostering an integration of the three dimensions of sustainable development, namely, environmental, social and economic, with regard to oceans. These activities of IOC can be divided into four categories: ocean observation requirements, ocean assessment, translating knowledge to management, and capacity development, as described on the following pages.

IOC ACTIVITIES

1. Ocean observation requirements for sustainable development

Keeping the world's ocean and seas under continuing review by integrating existing information from different disciplines will help to improve the responses from national governments and the international community to the

unprecedented environmental changes now occurring. It depends on sustained and integrated observations of essential indicators of ecosystem states which are sensitive to pressures associated with human expansion and global climate change whether changes in ecosystem states are rapidly detected and their impact is timely anticipated[1].

The mandate to establish a Global Ocean Observing System (GOOS) was articulated and ratified as an international consensus in 1992 at the UN Conference on Environment and Development (UNCED) in Rio de Janeiro. In particular, Agenda 21 calls for the establishment of a global ocean observing system that will enable effective management of the marine environment and sustainable utilization of its natural resources. IOC coordinates ocean observation and monitoring through GOOS which aims to develop a unified network providing information and data exchange on the physical, chemical, and biological aspects of the ocean. Governments, industry, scientists, and the public use this information to act on marine issues.

GOOS is entering a new phase, which brings some new challenges as to how we develop, sustain and improve the ocean observing system to meet requirements. Some aspects of the observing system are highly mature and the challenge is to strengthen and sustain, while considering new requirements and technologies; while the expansion into sustained observations for ocean biogeochemistry and biology presents new challenges.

Rapid detection of changes in ecosystem states and timely anticipation of their impacts depend on sustained and integrated observations of key (essential) indicators of ecosystem states that are sensitive to pressures associated with human expansion and global climate change. The Global ocean observing system (GOOS) is developing to provide data and data-products for more accurate and timely predictions (hindcasts, nowcasts, forecasts and long-term predictions) of weather, climate, ocean states, and natural hazards; safe and efficient maritime operations; more effective management of human uses of marine ecosystem services; and advancing the Earth sciences. In short, the development of GOOS is (or should be) driven by the data and information requirements for sustainable development. To date, GOOS implementation has focused on the “essential” geophysical variables required to understand, detect and anticipate changes in the ocean-climate system. This reflects both the availability of proven technologies and models and the high international priority for understanding, detecting and predicting changes in the ocean-climate system. Over the last decade, autonomous technologies for measuring the essential geophysical variables have revolutionized our ability to observe the ocean's from above and from within in near real-time. By integrating data from both remote sensing and in situ measurements, observations of atmospheric and upper ocean geophysics are now made continuously in 4-dimensions; data are transmitted to data assembly centers; nowcasts and forecasts of atmospheric and upper ocean physical states are made routinely using data assimilation techniques and coupled atmospheric–hydrodynamic models; and the skill of long-term predictions of changes in the ocean-climate system is improving. Similar capabilities for essential chemical and biological variables (indicators) needed to implement EBAs are rapidly becoming available.

2. Ocean assessment contributing to sustainable development: Development of Information Products and Services for Ocean Assessments (DIPS-4-Ocean Assessments) and Transboundary Waters Assessment Programme.

In addition to producing half of the oxygen in the earth’s atmosphere, marine phytoplankton produce the organic matter that determines the carrying capacity of the ecosystem which sustains the food web up to fish and marine mammals, and ultimately human consumption. Biodiversity and habitat protection and restoration are of fundamental importance to maintaining resilience of ocean ecosystems.

High species diversity is essential for maintaining ecosystem functioning (also called the biological insurance), and therefore is one of the most important indicators on ocean's health. However, indicators of the state of biodiversity

[1] T.C. Malone et al. / Marine Policy 43 (2014) 262–272

have typically focused on well-studied vertebrate taxa, because these are the species for which we have sufficient data to robustly detect trends. While such indices have proved to be useful scientific and policy tools, they ignore most of Earth's biodiversity that exists in poorly studied taxonomic groups.

As part of a new project called the Development of Information Products and Services for Ocean Assessments (DIPS-4-Ocean Assessments) under the framework of the UNESCO/Flanders Fund-in-Trust for the support of UNESCO's activities in the field of Science (FUST), IOC will develop methods and tools for obtaining indices on marine biodiversity using the largest open-access database on the diversity, distribution and abundance of all marine life forms, the IOC-UNESCO's Ocean Biogeographic Information System (OBIS). The information resulting from this project will serve major global assessments on the state of the marine environment, such as the UN World Ocean Assessment and those that are planned as part of the recently established Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services (IPBES).

In addition, this project will also provide the framework for the publication of the IOC-UNESCO Global Harmful Algal Bloom Status Report. Given that HAB problems expand, we need to know what is required for efficient management of affected marine ecosystems that simultaneously protects public and ecosystem health, encourages and supports aquaculture development, and contributes to policy decisions on coastal zone issues, such as wastewater disposal, aquaculture development, and dredging. The answers to these practical questions require easy access to a large pool of reliable existing data. So to ensure the publication of the first IOC-UNESCO Global HAB Status Report, we will establish a network of data providers, a data flow structure (data compilation; publishing data online), online tools for information products, and an Editorial Team to write the Report.

The Transboundary Waters Assessment Programme (TWAP) is an international initiative to develop a scientifically sound methodology for assessing the status and changing conditions of the world's major shared freshwater and marine water bodies (groundwater, lakes/reservoirs, rivers, large marine ecosystems and open ocean areas) and to catalyze a partnership and institutional arrangements among relevant agencies and organisations to conduct an integrated global assessment using this methodology. IOC is the leading agency for the LMEs and Open Ocean components of the TWAP.

The global coastal ocean is divided into 66 Large Marine Ecosystems, which encompass waters from river basins and estuaries to the seaward boundaries of continental shelves and margins of coastal currents and water masses (Sherman 1994). Their contribution of trillions of dollars annually to the global economy highlights the critical importance of LMEs (Costanza et al 1997). However, this is threatened by a burgeoning coastal human population and other human pressures as well as by climate change, whose dramatic impacts on marine ecosystems and coastal communities are increasingly evident across the globe.

The assessment will focus on overfishing, habitat destruction and pollution as well as on productivity, socioeconomics and governance. For each theme, a number of indicators and metrics are being used in the global baseline comparative assessment of LMEs. Main indicators are Primary productivity (Chlorophyll a, Primary productivity, Sea surface temperature), Fisheries (Annual catch, catch value, marine trophic index, fishing in balance index, stock status, catch from bottom impacting gear, fishing effort), Pollution and Ecosystem Health (Nutrients (N, P, Si), coastal eutrophication potential, POPs in plastic pellets, plastic debris density, change in MPA coverage, reefs at risk index, mangrove extent, coral reef extent, cumulative human impacts, delta vulnerability index), Socio-economics (%GDP fisheries, %GDP international tourism, coastal population, human development index, deaths caused by climate related natural disasters), and Governance (Governance architecture).

The main target audience of the TWAP LMEs assessment will be the Global Environment Facility (GEF) Secretariat, who requested the assessment of transboundary waters. Among other key stakeholders will be countries involved in the management of LME projects as well as UN organizations and others with global and regional programmes on

assessment and management of the marine environment such as the World Ocean Assessment and Regional Seas Programmes.

All assessment products will be available in June 2015, including spatial information and statistics, indicators factsheets and accessible metrics by theme, a synthesis report, a summary for decision makers and tecnical thematic reports.

3. Translating knowledge to sustainable management - Marine Spatial Planning (MSP) as a tool to operationalize the sustainable development of oceans and coasts.

Marine areas or ecosystems are affected by human activities in terms of demands for the use of the resources of the area to produce desired goods and services. Demands for goods and services from a marine area usually exceed its capacity to meet all of the demands simultaneously. Marine spatial planning (MSP) can help decide what mix of goods and services will be produced from the marine area.

MSP is a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic, and social objectives that usually have been specified through a political process. MSP is not an end in itself, but a practical way to create and establish a more rational use of marine space and the interactions between its uses, to balance demands for development with the need to protect the environment, and to achieve social and economic objectives in an open and planned way. Characteristics of MSP include ecosystem-based, area-based, integrated, adaptive, strategic and participatory.

When developed properly, MSP can have significant economic, social, and environmental benefits. Those benefits include: identification of biological and ecological important areas, greater certainty of access to desirable areas for new private sector investments, frequently amortized over 20-30 years, and improved opportunities for community and citizen participation.

MSP process usually results in a comprehensive plan or vision for a marine region, which provides an integrated framework for management that provides a guide for, but does not replace, single-sector planning. MSP is one element of ocean or sea use management; zoning plans and regulations are one of a set of management measures for implementing MSP. Zoning plans can then guide the granting or denial of individual permits for the use of marine space.

The IOC promotes development of management procedures and policies leading to the sustainability of marine environments, as well as the capacity-building necessary for maintenance of healthy ocean ecosystems. Since 2005, the IOC has been instrumental in promoting MSP and in providing international guidance through collection and sharing of good practices, as demonstrated by IOC's 2009 Guidelines: 'Marine Spatial Planning: a step-by-step approach toward ecosystem-based management' (IOC M&G No 53) which have inspired the development of national MSP processes in more than 20 countries around the world. Also, in 2014, IOC published a new guide entitled "A guide to Evaluating Marine Spatial Plans" (IOC Manuals and Guides, No 70, ICAM Dossier No 8), which serves to assist ocean planners and managers to establish steps towards monitoring and evaluating the performance of marine spatial plans, and ultimately to define and measure "how successful" a given MSP process is.

A new project to be funded by the Moore Foundation will be implemented by IOC from 2015 to 2017. Its goal is to document ocean planning practice world-wide, summarize "lessons learned" from over 40-50 global initiatives and an online update of the UNESCO Guide to MSP (2009) and (3) and establish an international network of MSP practitioners strengthened through the convening of the second international UNESCO conference on MSP in 2016.

4. Capacity development contributing to sustainable development

IOC's capacity development activities aim to empower developing countries to sustainably use their coastal and marine resources by encouraging 'self-driven' capacity-development. The risks of not immediately building relevant capacity in marine management and research will result in greater risk of destruction from ocean hazards, irreversible damage to ocean resources, and loss of sources of wealth for future generations. IOC has successfully developed a unique network with the most talented scientists across the world and with research institutes in all regions, and is playing an essential role in addressing the critically urgent issues related to the protection and sustainable development of the ocean and coasts.

A) OceanTeacher

The IODE OceanTeacher (OT) has been developed as a training platform for ocean data managers (working in ocean data centres), marine information managers (marine librarians) as well as for marine researchers who wish to acquire knowledge on data and/or information for planning and management. Since 2005, more than a thousand students from over a hundred countries attended courses at the IOC Project Office for IODE, based in Oostende, Belgium, as well as other venues in the context of regional projects. The "Global Academy" component of OT (OTGA) will expand the program into a worldwide network of training facility, which will organise training courses related to multiple IOC fields (from ICAM to Tsunami Alert Systems) through a network of several Regional Training Centers (RTCs) spread across the globe (see introductory videos on https://vimeo.com/album/2855369) , all of them working in close collaboration using advanced information technology and sharing training resources via the OceanTeacher Learning Management System. English, Spanish, French and other national languages will be used depending on the regional and national context. Most interestingly, OTGA will change training from a "north to south" culture to a north-south, south-south, and south-north model by promoting the expertise already available in developing countries. OTGA will also facilitate the use of expertise across regions through distance lecturing (video conferencing technology) and recording lectures and making them available over the Web.

B) Global Ocean Science Report (GOSR)

As part of its voluntary commitment to the Rio+20 process and its outcome document The Future We Want, the IOC will play a leading role in facilitating the development and implementation of a global strategy to build national and regional capacity in ocean scientific affairs. The commitment is in the support of the cross-cutting activities addressed in the inter-United Nations agency publication, A Blueprint for Ocean and Coastal Sustainability. As stated in Article 2 of the IOC Statutes and in its Medium-Term Strategy, 2014-2021 (IOC/INF-1314, 2014), the IOC mission includes a mandate,1 "to coordinate marine scientific research for sustainable development". The Global Ocean Science Report (GOSR) outcomes would be most valuable toward implementing the relevant provisions of Part XIII of the United Nations Convention on the Law of the Sea (UNCLOS) as well as to identify ways to facilitate the transfer of marine technology.

The IOC recognizes that a mechanism is needed to assess on a regular basis nations' needs and investments on these issues. The GOSR can serve as a tool for a possible Sustainable Development Goal and/or targets on the Ocean, in order to optimize the sustainable use of marine resources, with due regard to the needs of developing countries, including capacity-building and transfer of knowledge and technology.

The GOSR is envisaged to provide an overview on nations' (i) investments, (ii) resources, and (iii) scientific productivity in Ocean Science. It would provide a tool for mapping and evaluating the human and institutional capacity of Member States in terms of marine research, observations and data/information management, as well as a global overview of the main fields of research interest, technological developments, capacity building needs and overall trends.