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Ocean and the Law of the Sea

Contribution of the Intergovernmental Oceanographic Commission of UNESCO to the Report of the Secretary-General

Executive Summary.

The Intergovernmental Oceanographic Commission (IOC) acts as the UN system-wide focal point for ocean science and ocean services under the guidance provided by the resolutions, decisions and instructions of the IOC Assembly. The report briefly highlights the main developments in IOC in the field of ocean affairs and the law of the sea. Key activities conducted since the last Secretary-General Report are as follows: **(i) in the field of ocean research**, a global assessment was published in 2015 by GESAMP Working Group 40 on 'Sources, fate and effects of micro-plastics in the marine environment'; the drafting process for the Global Ocean Science Report is underway; the 2nd International Indian Ocean Expedition (IIOE-2) Implementation Strategy and Science Plan were released when the IIOE-2 was launched in December 2015; **(ii) in the field of observing systems and data management**, IOC coordinated its relevant activities through the Global Ocean Observing System, Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology, International Oceanographic Data and Information Exchange including the OceanTeacher Global Academy and Ocean Biogeographic Information System; **(iii) in the field of early warning and services**, continued progress was made in strengthening the four regional tsunami warning systems coordinated by IOC including through tsunami wave exercises, operating tsunami information centres, and holding a conference; continued progress was made in IOC Harmful Algal Bloom activities including through developing a 'Global HAB Status Report'; **(iv) in the field of assessment and information for policy**, IOC provided scientific and technical support leading to the finalization of the 1st World Ocean Assessment; completed the implementation of the Transboundary Water Assessment Programme marine components; **(v) in the area of sustainable management and governance**, IOC has been documenting international practices on Marine Spatial Planning (MSP) advances to update UNESCO Guide to MSP (2009); supported Member States preparatory process on 2030 Agenda for Sustainable Development and co-led a UN Task Force on Sustainable Development Goal 14; coordinated outreach activities on climate change in the perspective of UNFCCC COP21; co-organized, alongside Seychelles and the United Arab Emirates, the 2nd Blue Economy Summit in Abu Dhabi in January 216; and **(vi) in the field of capacity development**; IOC adopted its Capacity Development Strategy (2015-2021) in 2015; has been developing activities on ocean literacy, including participation in EU funded Sea Change project (2015-2018); has implemented a joint DOALOS-IOC training project to assist developing countries in building their MSR capacities.

DEVELOPMENTS IN THE FIELD OF OCEAN AFAIRS AND THE LAW OF THE SEA (PART II)

Pursuant to the resolution 70/235 entitled "Oceans and the law of the sea" adopted by the General Assembly on 23 December 2015, the information below represents the contribution of the Intergovernmental Oceanographic Commission of UNESCO to the report of the Secretary-General.

Ocean research

The IOC continues to engage in climate change and ocean acidification science in particular. IOC is a member of the Executive Council of the Global Ocean Acidification Network (GOA-ON). It provides support and leadership to activities including regional efforts in Latin America, including the establishment of a Latin American Ocean Acidification Network. Two important events in this relation were the meeting on 3–4 December 2015 in Concepcion, Chile and the COLACMAR conference on 19–24 October 2015 in Santa Marta, Colombia. At the global level, IOC co-organized the third GOA-ON workshop on 8–10 May 2016, in order to broaden the global representation and to move forward in the implementation of biological observations of ocean acidification.

IOC sponsors the World Climate Research Programme (WCRP). The allocation of additional regular programme resources at the end of end 2015 allowed IOC to contribute more than was previously foreseen. WCRP has an extensive portfolio of activities at the recent meeting of its Joint Scientific Committee added two topics to their 'Grand Challenges' namely: "Near-Term Climate Prediction" to initiate and issue a "real time" Global Decadal Climate Outlook once per year starting from 2016 and; "Biogeochemical Cycles and Climate Change" which hopefully will link with e.g. IMBER. A WCRP/IOC Conference on future regional sea-level and its impacts is planned for July 2017 in New York, USA.

Marine ecosystems are not only a sink for ocean carbon, they are also a potential source for it. The IOC continued its support for the Blue Carbon Initiative, co-organizing a workshop in Zanzibar, Tanzania, in order to support the measurement programmes and knowledge in Africa.

It is widely recognized that marine debris can have significant ecological, social and economic impacts. The IOC was lead agency in the first cycle of the GESAMP Working Group 40 on "Sources, fate and effects of micro-plastics in the marine environment" and is now co-lead with UNEP in the second cycle. A global assessment was published in the GESAMP Reports & Studies Series, 91 in 2015. WG 40 met in Guayaquil, Ecuador, 3–5 November 2015, with one of its main goals to produce a second report that fills the gaps in the first assessment and to specifically inform the United Nations Environment Assembly meeting in May 2016.

The IOC supports GESAMP Working Group 41 on marine geoengineering under the lead of IMO and supported by WMO. The objective is to better understand the potential environmental (and social/economic) impacts of different marine geoengineering approaches on the marine environment; and to provide advice to the London Protocol Parties in identifying those marine geoengineering techniques that might be sensible to consider for listing in the new Annex 4 of the London Protocol. The IOC is focusing on integrated coastal research and coastal eutrophication and linking nutrient sources to coastal ecosystem effects and management in particular. A key component in the implementation strategy is a five-year Joint UNEP-IOC Global Environment Facility (GEF) Project 'Global foundations for reducing nutrient enrichment and oxygen depletion from land-based pollution', which will be completed by the end of 2016.

A Global Ocean Oxygen Network (GO2NE) expert meeting took place on 12–13 December 2015 to develop terms of reference and a plan for the continuation of an interdisciplinary IOC-UNESCO network.

With regards to the activites on long-term Biogeochemical Time Series, the IOC International Group for Marine Ecological Time Series (IGMETS) completed its draft report and developed terms of reference for possible work continuation. A workshop organized by the IOC (16–18 November 2015) was used to fill the gaps and improve the analysis presented in the report. While the final

document is envisaged to be published in July 2016, a map prepared with the support by the scientists of IGMETS, highlighting the existing ship-based time series, is already available.

The drafting process for the Global Ocean Science Report (GOSR), which will review ocean science human and technical capacity; ocean science funding situation, and the scientific output, is well underway.

As requested through IOC Resolution XXVIII-1 on IIOE-2, the IOC IIOE-2 Interim Planning Committee (Group of Experts) developed an IIOE-2 Implementation Strategy, released as part of the IIOE-2 launch on 4 December 2015 in Goa, India. The IIOE-2 Science Plan was also released on that occasion, along with the IIOE-2 website www.iioe-2.incois.gov.in. The IIOE-2 Steering Committee, currently being established under the auspices of the IIOE-2 Co-Chairs with support from the IIOE-2 Joint Project Office, provides a range of entry points for Member States in terms of membership to facilitate the realization of the science imperatives of IIOE-2.

A significant objective of the IIOE-2 Science Plan is the characterization and a study of predictability of the Indian Ocean's key oceanic and coupled atmospheric phenomena, which themselves link to extremes that can have profound impacts on humans, including monsoonal effects, waves, storms, precipitation/flooding, droughts, heat waves, etc.

A number of major research initiatives, bringing together stakeholders from multiple countries, are already underway or planned. These include the respective Eastern and Western Indian Ocean Upwelling Research Initiatives and consolidations of many research projects aligned with IIOE-2 through science alliances under IOGOOS, CLIVAR and IMBER. IIOE-2 research cruises have begun (e.g. three to date out of India) and many more are already committed or being considered through the auspices of a growing number of national commitments. IIOE-2 will contribute to Global Ocean Observing System by completing the Indian Ocean Observing System (IndOOS) as originally planned through the Indian Ocean Panel of IOGOOS/CLIVAR and will now be further enhaned under the IIOE-2 science framework.

A major focus of the IIOE-2 is the transfer of knowledge and Capacity Development, as expressed in the IIOE-2 Implementation Strategy (IPC, 2015). This is driven by the Capacity Development Working Group, which includes a component for aspiring and emerging young stakeholders through the IIOE-2 Early Career Scientists Network (ECSN). Important collaboration has been established with the International Oceanographic Data and Information Exchange (IODE) component of the IOC Capacity Development programme, both through the related IOC Ostend office and IODE stakeholders. The early cruises of the IIOE-2 are implementing the IIOE-2's promise to provide explicit opportunities for people from developing countries to participate materially onboard and in the science of IIOE-2 research cruises, as occurred for the first IIOE-2 cruise, Goa-Mauritius, 4–22 December 2015, run by India. Other initiatives have already begun to be implemented, such as the IIOE-2 related training workshop on Research Data Management recently held in Malaysia for participants from the Indian Ocean Rim countries. The emerging Early Career Scientists Network is already developing a framework paper and have established a peer group of practice, including through the use of social media. The engagement of IOCINDIO, IOCAFRICA and WESTPAC with IIOE-2 focuses the transfer of knowledge and capacity throughout their respective constituencies.

Early IIOE-2 scientific symposia are already under planning, including: for Perth, Australia during 30 January to 3 February 2017; and for Cape Town during 27 August to 1 September 2017 in conjunction with the IAPSO-IAGA-IAMAS joint meeting.

Observing system / data management

Tracking of the Global Ocean Observing System (GOOS) targets for climate observations shows that Member States have maintained and slightly improved coverage of the global ocean by *in situ* observations in 2015–16. The GOOS work plan remains focused on: (i) articulating goals and milestones for implementation; (ii) sustaining present observations and expanding to new variables serving new requirements using the Framework for Ocean Observing; (iii) improving implementation through GOOS Regional Alliances; and (iv) developing projects. Despite limited resources from IOC Regular Programme, the work plan remains achievable with a distributed

GOOS Project Office led from IOC HQ, but drawing on in-kind contributions from numerous Member States. The work to expand GOOS with panels for biogeochemical and biology / ecosystems was reinforced with the allocation of additional regular programme resources at the end of 2015. A GOOS five-year plan with targets for implementation will be released in 2016. GOOS has engaged strongly with the Group on Earth Observations (GEO) by serving on its Programme Board and as an observer to its Executive Committee, in order to ensure a strong role for ocean observations in the value chain linking observations, data management, forecasting systems and assessments, to societal benefit for users. Preliminary planning for an OceanObs'19 conference in 2019 has begun.

Responding to increasing requirements to monitor ocean health, supporting sustainable exploitation of ocean ecosystem services, the GOOS Biology and Ecosystems Panel met in February 2016, and has taken a dual approach to defining Essential Ocean Variables (EOVs) and an observing approach, based on analysis of the monitoring needs of global and regional conventions, such as the Convention on Biological Diversity (CBD), as well as a survey of present long-term observing infrastructure for biological and ecosystems variables.

The Tropical Pacific in 2020 Project (tpos2020.org) is producing an interim report for publication in July 2016, which will provide Member States with options to review for a redesigned and refined tropical Pacific observing system monitoring the El Niño / Southern Oscillation system. IOC continues leading work for the European Commission Horizon 2020 AtlantOS Project, which will deliver a more integrated, user-driven, and sustainable Atlantic Ocean observing system by 2019.

The Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) remains a focal point for joint work in observations, data management, and services between the IOC and WMO. At its Management Committee meeting (17–20 October 2015, Bologna, Italy) it reviewed progress in preparation for a Fifth Session of the Commission to be held in October 2017 in Indonesia. The JCOMM Observations Coordination Group, with representation from major global observing networks, is a core contributor to implementation of GOOS, and continues its work programme focused on refining observing requirements, targets for implementation, best practices and standards, interfacing with data management and improving interoperability, and managing common technical coordination of *in situ* observing networks through the JCOMM Observing Programme Support Centre (JCOMMOPS). JCOMMOPS is hosted by Ifremer in Brest, France and supported entirely on extrabudgetary funding, providing direct technical coordination to most of the JCOMM *in situ* observing programmes. It is completing the development of a web-based services platform providing tools for the management of observing networks (www.jcommops.org), as well as continuing the daily tasks of support to operators of ocean observing systems. The Group of Experts for the Global Sea Level Observing System met on 19–23 October 2015 in Dona Paula, India, and reviewed the status of the Core Network and agreed to actions to improve tracking and data availability. A new JCOMM Task Team has started work on the integration of oceanographic data systems, including data from observing networks and forecast systems, into the WMO Information System (WIS).

The JCOMM Services and Forecast Systems Programme Area has continued coordination of service delivery across IOC and WMO teams, with a focus on best practices and standards. The JCOMM Expert Team on Operational Ocean Forecast Systems (ETOOFS) will publish its Guide by the end of 2016, forming a basis for the development of new ocean forecast systems and delivery of local services.

The links between GOOS and the WMO-IOC-ICSU-UNEP Global Climate Observing System (GCOS) remain strong, through its joint Ocean Observations Panel for Climate (OOPC), and the work on improving the observations of Essential Climate Variables (climate-relevant Essential Ocean Variables). GCOS is seen by the UNFCCC's Subsidiary Body for Scientific and Technical Advice (SBSTA) as its main partner in work supporting the Party's needs for "systematic observations", language that was retained in the Paris Agreement adopted at COP-21 in December 2015. At COP-21, GCOS delivered to UNFCCC Subsidiary Body for Scientific and Technological Advice (SBSTA) a report on the "Status of the Global Observing System for Climate (GCOS-194, GCOS-195), and has worked in collaboration with all three GOOS Panels (physics, biogeochemistry, biology and ecosystems) to develop a new Implementation Plan for climate

observations that will be submitted to the UNFCCC/SBSTA at COP-22. A draft plan will be issued for comment in July 2016, and will incorporate additional attention to the major climate cycles (energy, water, carbon) as well as the needs for monitoring to support both mitigation and adaptation to climate change.

Several Ocean Data and Information Networks (ODINs) held their steering group meetings during the inter-sessional period: (i) the ODIN for European Countries in Economic Transition (ODINECET) met in Rome, Italy on 7 September 2015; (ii) the ODIN for the Black Sea region (ODINBLACKSEA) met in Varna between 28 September – 1 October. The meeting designated Mr Murat Elge (Turkey) as its new Chair; (iii) the ODIN for the WESTPAC region held an advisory group meeting in Tianjin, China on 27–28 January 2016. It is expected that the IODE ODIN projects will now be re-invigorated taking into account the need for IODE to serve the other IOC functions.

The joint IAMSLIC/IODE Group of Experts on Marine Information Management met for its first session in Rome, Italy on 4–5 September. IAMSLIC is the International Association of Aquatic and Marine Science Libraries and Information Centres, an important professional association grouping hundreds of marine and freshwater librarians, now assuming the role of information managers, or knowledge brokers.

In this regard, the first session of the IODE Steering Group for the OceanKnowledge project met in Ostend (IODE Office) on 12–14 October 2015. The OceanKnowledge Platform will offer the user a single access point to various linked IODE information and data products such as researcher profiles, publications, data, learning objects, etc. and will furthermore facilitate social networking between specialized research communities.

The IODE Officers met in Ostend, Belgium on 20–22 January 2016. They reviewed progress with the IODE-XXIII work plan and revised the work plan and budget based upon updated information on available resources for the 2016–2017 biennium.

The Steering Group for the Caribbean Marine Atlas Phase 2 project held its second session in Cartagena, Colombia on 3–5 February 2016 where it further detailed its work plan and also demonstrated the first version of the new online Atlas.

The OceanTeacher Global Academy project held its second annual steering group meeting in Ostend, Belgium on 8–11 March 2016. The meeting designated INVEMAR (Colombia), KMFRI (Kenya), INCOIS (India) and INOS-UMT (Malaysia) as OceanTeacher Global Academy Regional Training Centres after they successfully implemented their first OTGA training courses in 2015. Another five Regional Training Centres kept their candidate status until the next performance assessment [NCOSM-NMDIS (China), ESCCM-UEM (Mozambique), ISRA-CRODT (Senegal), AfriCOG (South Africa), NSU (USA)]. Between July 2015 and April 2016 a total of 12 training courses were held, organized by or in cooperation with the OceanTeacher Global Academy.

Data management activities require the coordination and planning not only during the data acquisition phase but the subsequent assembly and curation of the data. IODE therefore published the *Guidelines for a Data Management Plan* (IOC Manuals and Guides, 73) which provides guidance on steps to prepare a data management plan, the activities to consider and suggested actions.

During the inter-sessional period IODE continued its re-organization focusing on product and service-oriented projects both of global and regional focus. IODE now implements (or collaborates in) 21 global projects and also continues the development and implementation of seven regional projects (the ODINs). IODE also continues its restructuring that started with the Associate Data Units (ADUs). IODE-XXIII established three inter-sessional working groups that will lead to a more streamlined and result oriented IODE. The aim is to evolve IODE into a lean but highly efficient international oceanographic data and information coordination and sharing mechanism involving both its traditional communities as well as the wider ocean science and observation communities which increasingly manage and serve their own data.

The IOC Project Office for IODE is continuing to assist all IOC programmes with the hosting and technical management of their web sites and associated tools and products such as OceanExpert, OceanDocs, OceanDataPractices, OceanDataStandards, OceanDataPortal, etc.

In 2014 the Ocean Biogeographic Information System (OBIS) grew, with 3.5 million records between July 2015 and April 2016, to a total of 46 million records. Not less than 29 publications have cited OBIS in the first three months of 2016. OBIS is organized around national, regional and thematic OBIS nodes, which are responsible for the data flow from data providers to the central OBIS node, including ensuring the quality of the data. The OBIS secretariat at the IODE Project Office integrates all the data in a central open-access database. Two important new OBIS nodes were established. The international secretariat of the Conservation of Arctic Flora and Fauna (CAFF) has become the Arctic node of OBIS. CAFF (www.caff.is) is the biodiversity working group of the Arctic Council and has the mandate in the Arctic region to coordinate and support open access to marine biodiversity data and to support marine biodiversity assessments and monitoring. The other group that joined OBIS is the Oceans Past Initiative (OPI), which is a global research network for marine historical research. Their goal is to enhance knowledge and understanding of how the diversity, distribution and abundance of marine life in the world's oceans has changed over the long-term to better indicate future changes and possibilities, and to contribute to the sustainable use of marine systems.

The 23rd session of the IOC Committee on IODE (March 2015, Bruges) recognized the need to develop procedures and guidelines for managing and sharing datasets that hold both species occurrences as well as environmental measurements and therefore established a 2-year pilot project "Expanding OBIS with environmental data (OBIS-ENV-DATA). OBIS-ENV-DATA involves an international network of 11 institutions from 10 countries in North America, South America, Europe, Africa and Oceania. Their first workshop took place on 5–7 October 2015 in Ostend (Belgium). A new data standard to manage and exchange these "combined" datasets will be published in a peer-review paper and be presented for adoption at the next session of the IOC Committee for IODE in 2017.

IOC is also involved in the European Commission Horizon 2020 ECOPOTENTIAL project Making Earth Observation and Monitoring Data usable for ecosystem modelling and services. This project is Europe's contribution to GEO Ecosystems, one of the nine social benefit areas of the Group on Earth Observations (GEO). The IOC, together with the University of Western Brittany (France) and other partners, are building a pilot study based on the distribution of cetacean populations and associated benefits to humans in the Pelagos Sanctuary (Mediterranean). The Ocean Biogeographic Information System (OBIS) plays an important role in data and information management and acts as a data sharing facility.

Early warning and services

The main elements of the Tsunami Programme focus on: (i) secretariat support to the Intergovernmental Coordination Groups (ICG) and respective technical working groups and task teams under the four regional Tsunami Warning and Mitigation Systems in the Caribbean, Indian Ocean, Pacific and North-East Atlantic, Mediterranean and connected seas; and (ii) preparedness and awareness course and workshops.

The intergovernmental coordination process raises awareness about the tsunami threat and provides advocacy for nations' investments in early warning systems. Two ICG sessions were held: 12th session of ICG of the North East Atlantic and Mediterranean Tsunami Warning and Mitigation System (ICG/NEAMTWS) in Dublin, Ireland (IOC/ICG/NEAMTWS-XII/3), and; 11th Session of the ICG for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions in Cartagena, Colombia (IOC/ICG/CARIBE-EWS-XI/3s).

Inter-ICG coordination and harmonization takes place in the Working Group on Tsunami and other Hazards related to Sea-Level Warning and Mitigation Systems (TOWS-WG) which met on 25–26 February 2016 in Paris (IOC/TOWS-WG-IX/3). Major outcomes of that meeting included completion of a Standard Operating Procedure Manual and the Global Service Definition Document.

The Tsunami Unit organized or co-organised 19 preparedness and awareness activities over the past year. Several in-country trainings on Tsunami Warning and Emergency Response and use of the PTWC Enhanced Products for National Tsunami Threat Decision-Making took place in the South West Pacific, specifically in Tonga (24–27 August 2015), Solomon Islands (22–25 September 2015) and Cook Islands (16–19 November 2015). Several workshops on tsunami hazard assessment designed to provide the best available scientific advice towards tsunami preparedness were organized(16 - 18 November 2015, Xiamen, China; (6-7 May 2016, Santo Domingo, Dominican Republic; 23 - 24 June 2016, San Jose, Costa Rica).

The Indian Ocean Tsunami Warning and Mitigation System (IOTWMS) is focusing more attention on developing capacity in risk assessment and management and on community awareness and preparedness to help ensure more appropriate responses to tsunami warning information. To this end, IOC organised two regional workshops on coastal hazard and risk assessment in Colombo, Sri Lanka and in Seychelles. A regional workshop on training modules for tsunami exercise policy support was also organised in Jakarta, Indonesia.

A sub-regional Working Group under ICG/IOTWMS was established for the North West Indian Ocean to enhance regional cooperation on end-to-end tsunami warning and mitigation between the countries at potential risk from the Makran subduction zone. The group held its inaugural meeting in Muscat, Oman in October 2015 and was attended by 28 participants and observers from the four regional Member States and other organisations.

The 70th anniversary of the 1945 Makran earthquake and tsunami was commemorated on 28th November 2015. IOC and the Indian Ocean Tsunami Information Centre (IOTIC) assisted the countries of the region: India, Iran, Oman and Pakistan to commemorate the event by developing and producing 1945 Makran tsunami exhibition panels in Urdu, Farsi, Arabic and English languages.

Two tsunami wave exercises have been carried out over the past year. The exercises are designed to assess the effectiveness of communication flows among the stakeholders involved, country readiness, and the efficiency of emergency procedures. The exercises also create considerable awareness in the public. The Tsunami Wave exercises: (i) PacWave16, Exercise Pacific Wave 16, for the Pacific Ocean took place on 1–5 February 2016; and (ii) CaribeWave 16 for the Caribbean and Adjacent Regions took place on 17 March 2016.

A number of Task Teams, working groups and activities are operating and reporting to the IOC Intergovernmental Panel on HABs (IPHAB). Several of the groups contribute to the development of a '*Global HAB Status Report*' with the aims of compiling an overview of HAB events and their societal impacts; providing a worldwide appraisal of the occurrence of toxin-producing microalgae; and assessing the status and probability of change in HAB frequencies, intensities, and range resulting from environmental changes at the local and global scale. The development of this report is intimately linked with the systematic compilation of HAB data in OBIS and the IOC Harmful Algal Event Data base (HAEDAT) and is funded by Flanders (Belgium) and cosponsored by IAEA.

Another key activity under IPHAB is on Ciguatera Fish Poisoning (CFP), which is the most extensive human illness caused by harmful algae. The IPHAB has initiated the development of a UN Coordinated Ciguatera Strategy involving the Food and Agriculture Organization of the United Nations (FAO), the International Atomic Energy Agency (IAEA), and the World Health Organization (WHO).

The long-term focus of the IOC Harmful Algal Bloom (HAB) programme is to improve understanding of the factors controlling HAB events and thereby improve their management and mitigation options. The scientific key questions were for a decade addressed through the joint IOC-Scientific Committee on Oceanic Research (SCOR) research programme GEOHAB (Global Ecology and Oceanography of HAB), which through IOC decision IOC-XXVIII/8.3 was transformed and continued as a new decadal research programme jointly with SCOR to meet societal needs in a changing world. This initiative, entitled GlobalHAB, held its first Scientific Steering Committee meeting in Oban, UK, in March 2016 and is now developing its implementation plan as well as already implementing some activities.

In recent years mass occurrences of the brown algae genus *Sargassum* have been increasing and pose a major problem to coastal States in the Americas, especially in the Wider Caribbean and West Africa, affecting fisheries, tourism and other ecosystem services. Aware that the IOC Member States have an urgent need for enhancing their capacity to manage and mitigate *Sargassum* mass occurrences and landings, IOC proposes developing a project with two main components: (i) identification of research priorities to understand *Sagassum* growth dynamics and to develop improved management and mitigation technologies for *Sargassum* landing; and (ii) targeted capacity enhancement for *Sargassum* landing management and mitigation in affected Member States.

Assessment and Information for policy

The 1st World Ocean Assessment report under the United Nations was finalized in December 2015. IOC contributed to this effort by providing scientific and technical support throughout this five-year process. A new cycle of assessment (2016–2020) was endorsed by the UNGA in December 2015. As solicited by the co-chairs of the Ad Hoc Working group (governing body of WOA), IOC provided its assessment on lessons learned in the implementation of the first cycle.

IOC completed the implementation of the marine components of the Transboundary Water Assessment Programme (TWAP) funded by GEF. The project started in March 2013 with the establishment of technical expert groups for Open Ocean and Large Marine Ecosystems. The project provides a number of core ecological, socio-economic and governance indicators for the marine environment (66 Large Marine Ecosystems and Open Ocean areas) using globally available datasets. To achieve this integrated assessment, IOC has created a partnership with a number of scientific institutions that are providing technical inputs and indicator-based products (NOAA, GESAMP, International Geosphere-Biosphere Programme (IGBP), University of British Colombia, UNEP, World Conservation Monitoring Center (WCMC), Centre for Resource Management and Environmental Studies (CERMES), amongst others). These assessment product (technical reports and data) are available on http://onesharedocean.org and have been unveiled at the recent GEF International Water Conference (May 2016, Sri Lanka) and UN Environment Assembly (Nairobi, May 2016).

OBIS contributes to several ocean assessments. Data from OBIS was used in three chapters of the World Ocean Assessment and provided a baseline information biodiversity knowledge for the GEF Transboundary Water Assessment. OBIS is recognized as a key source of information for the upcoming global (including the ocean) assessment as part of the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES). OBIS is also recognized by the Parties of the Convention on Biological Diversity as a primary source of data for the identification of Ecologically or Biologically Significant Areas. Through DIPS-4-Ocean Assessments project (a Flanders' UNESCO Science Trust-Fund project), more indicators and products on OBIS are currently under development. They will support Member States in their reporting obligations on progress towards the Aichi Biodiversity targets.

Sustainable management and governance

Marine Policy and Regional Coordination Section of IOC-UNESCO (IOC-MPR) is currently documenting the international practices on MSP advances. This involves documentation of ocean planning practice world-wide through a detailed survey sent to more than 300 national experts involved in marine policy making. A summary of "lessons learned" from over 40-50 global initiatives will serve as the basis for an online update of the UNESCO/IOC Manuals and Guides, 53 on MSP (2009) including a remodeling of the UNESCO website dedicated to MSP.

The partners of the Southeast Pacific data and Information Network in support to Integrated Coastal Area Management (SPINCAM-II) project have commonly developed during the last year an agreed core set of indicators on population dynamics, traditional fisheries sustainability, coastal infrastructures, key coastal ecosystems, coastal economy and coastal vulnerability. The indicators will inform the implementation of national and regional coastal management policies. The indicators have been implemented at national level in order to provide a homogenous regional overview on the state of the coastal and marine environment in the Southeast Pacific. The

SPINCAM Regional Atlas (http://www.atlasspincam.net) has been completed and wll be sustained in the future by the Permanent Commission for the South East Pacific (CPPS), the regional partner of the project (www.atlasspincam.net).

IOC is participating in the consortium of AQUACROSS (2015–2019) funded by the European Commission (H2020). IOC-MPR is leading the design and implementation of the information platform as a support to the scientific knowledge pillar of the project by providing a single point of access to both the internally produced and external data compiled by project partners, scientists and general public. Together with the Government of Andalusia (Spain) and the Moroccan authorities, IOC is developing the pilot case study at the Intercontinental Biosphere Reserve of the Mediterranean, Andalusia (Spain)-Morocco, with the objective to identify nature-based solutions to establish a strong network of green and blue infrastructures.

The LME:Learn project led by IOC and UNDP was funded by the Global Environmental Facility. It will create a new Community of Practice dedicated to Large Marine Ecosystems (LME). LME:Learn will be implemented by IOC in partnership with NOAA, ICES, UNDP, IUCN, and Conservation International in the next three years. In March 2016 IOC together with the GEF IW:Learn project organized the kick-off meeting of the project to define the work agenda and the immediate common actions. A dedicated technical secretariat has been established at IOC to facilitate the sharing of knowledge related to transboundary water management, the building of technical capacity, as well as supporting South-to-South and North-to-South learning through effective regional networks of freshwater and marine practitioners. With regards to the IOC role as Secretariat of the LME Community, the IOC-MPR organized the 17th Annual LME Meeting in Paris in September 2015 with the participation of 92 experts and LME practitioners from Africa, Arctic, Asia, Latin America, the Caribbean and Pacific SIDS.

In September 2015, UN Member States adopted the new 2030 Agenda for Sustainable Development, and in particular the Sustainable Development Goal #14 calling to "converse and sustainably use the oceans, seas and marine resources for sustainable development". This new international framework constitutes an essential point of reference for IOC's engagement with its Member States as well as for its programmatic presence at the global, regional and country levels.

Several targets of SDG 14 are directly relevant to the work IOC, particularly in the area of marine pollution, ocean acidification, ecosystem based management, and marine research capacity and transfer marine technology, as a cross-cutting element to all SDG 14 targets. IOC has supported the Member States preparatory process and co-led a dedicated UN Task Force on SDG 14. The Commission is also playing an active role in the definition of a global indicator framework for specific targets (14.1, 14.2, 14.3, and 14.a) where it has been identified as a possible 'custodian agency'. IOC is also providing technical advice to Fiji and Sweden, the co-hosts of the UN Conference on Oceans and Seas to be held from 5 to 9 June 2017 in Fiji.

Building on the outcome of 2015 World Oceans Day, the Commission placed much programmatic and outreach focus around climate change in the perspective of the UNFCCC COP 21 held in Paris (30 November–11 December 2015). A strong mobilization of scientific and civil society institutions occurred around ocean and climate science and awareness-building. IOC and its partners, the ocean and climate platform and the Global Ocean Forum organized a series of events including: eight official UNFCCC side events targeted at negotiators and policy-makers; three flagship events hosted in the civil society zone of Conference, including two full days devoted to the Ocean (Ocean and Climate Forum and Ocean Day at UNFCCC). Two exhibits featuring scientific and policy-oriented publications where organized and the IOC Executive Secretary took part in several events including the UNFCCC Subsidiary Body for Scientific and Technological Advice (SBSTA) to highlight IOC's contributions in ocean observation. IOC also supported, together with a number of Member States, a proposal for an IPCC Special Report on the Ocean.

IOC co-organized, alongside the Governments of Seychelles and the United Arab Emirates, the Second Blue Economy Summit (Abu Dhabi, 19 January 2016), where Heads of State and Government, as well as representatives of international organizations, business and civil society, met to discuss how to develop and implement the Blue Economy concept in support of the implementation of the Paris Climate Change Agreement and the realization of Sustainable

Development Goal 14. IOC highlighted the role of science and ocean observation in informing sustainable marine economic development.

Through an international network of scientists and data centres, OBIS provides a global data and information sharing platform and a data clearing house mechanism for marine biodiversity research data in all ocean basins. Important to note are the negotiations at the United Nations on the development of a new legally-binding instrument under the UN Convention on the Law of the Sea (UNCLOS) to conserve and sustainably use marine biodiversity in areas beyond national jurisdiction (BBNJ), which have started under a Preparatory Committee, established by UNGA resolution 69/292 of 19 June 2015.

Capacity Development

The IOC Assembly adopted at its 28th Session the IOC Capacity Development Strategy, 2014–2021 through Resolution XXVIII-2. The Strategy was published as IOC/INF-1332.

An IOC web site on Capacity Development has been launched in April 2016 at http://www.ioc-cd.org. The web site provides full information on the strategy and its expected outputs but will also offer a wealth of links to capacity development opportunities addressing all six outputs.

An "IOC Capacity Development Fund" is being launched as a resource mobilization mechanism. It will enable Member States to financially support very specific activities with a strong capacity development focus such as training courses, equipment provision, expert missions or any other activity responding to the Strategy outputs. In order to provide the highest possible flexibility, the maximum budget of each proposal is set to $100,000. Proposals are invited from the regional sub-commissions and committee and global programmes.

As part of the implementation of the IOC Capacity Development Strategy, the IOC is developing activities on ocean literacy. In particular, the IOC is participating in the successfully created consortium of Sea Change (2015–2018), part of the European Union's Horizon 2020 programme, led by the Marine Biological Association (United Kingdom), which supports the implementation of the Trans-Atlantic Ocean Research Alliance.

UN-DOALOS and IOC launched a partnership for a training project to assist developing countries, especially SIDS, in building their capacities in MSR. A five-day training course was organized by DOALOS and IOC in cooperation with the Pacific Community (SPC) and with support from the Korea Maritime Institute (KMI) for trainees from Pacific SIDS countries as part of the DOALOS-IOC joint initiative (7–11 December 2015, Busan, Republic of Korea).

Capacity Development continues to be a priority area for IOC Sub-Commission for Africa and the Adjacent Island States (IOCAFRICA), with training workshops organized and support provided to experts from the region to participate in courses within and outside the region on a wide range of topics, including ocean forecasting, marine GIS, application of remote sensing to coastal management, and marine spatial planning. IOCAFRICA continues to support the strengthening in the region of the UNESCO Chairs in ocean sciences, as well as the Ocean Teacher Academy Regional Training Centres. IOCAFRICA is working with Mauritius on the development of a proposal for the establishment of a UNESCO Category-2 Centre for Ocean Sciences and Innovation in Mauritius.

IOC Sub-Commission for the Western Pacific (WESTPAC) had contributed to the development of IOC Capacity Building Strategy through sharing its capacity building practices in the region and evalution of lessons learnt from the past. As a primary regional mechanism in the implementation of the new strategy, WESTPAC continues to employ its adaptive and self-driven approaches to meeting regional and national requirements for capacity building, and to linking trainings to the attainment of research goals for sustainable development in the region. WESTPAC has been endeavouring to develop the IOC Regional Network of Training and Research Centres (RTRCs) on Marine Sciences, as demonstrated by the renewed commitment of the IOC Regional Training and

Research Center (RTRC) on Ocean Dynamics and Climate for the next six years (2015–2020), and the proposals with associated commitments made by Indonesia and Malaysia to host RTRC, respectively on Marine Taxonomy and Ecosystem Health, and Harmful Algal Blooms.

Since the 28th Session of the IOC Assembly there have been advances in the development of the UNESCO Category-2 Centres for oceanography. The Regional Educational Centre for Oceanography for Western Asia under the auspices of the Iranian National Institute for Oceanographic and Atmospheric Science in Iran has reported its plans to become fully operational in July-August of this year after the first meeting of the Centre Governing Board.

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Contribution to the second part of the report of the Secretary-General on oceans and the law of the sea, pursuant to United Nations General Assembly Resolution 70/235 of 23 December 2015, entitled "Oceans and the law of the sea"

Executive Summary

The UNESCO 2001 Convention on the Protection of the Underwater Cultural Heritage has been ratified by an additional seven States since January 2015. Numerous national laws have been adopted or revised in conformity with it. Capacity-building and awareness-raising activities have been organized to support States Parties.

Practical assistance given under the Convention by UNESCO's purpose-created Scientific and Technical Advisory Body, which concerned emergency cases of treasure-hunters damaging underwater heritage sites drew wide public attention and acknowledgement in 2015.

Full Submission

The Convention on the Protection of the Underwater Cultural Heritage was adopted in 2001 to combat the extensive pillage, commercial exploitation and illicit traffic of underwater cultural heritage. It fully addresses these issues in all waters and considerably increases the legal protection of sites *in situ*, while prohibiting the illicit or unethical recovery and traffic of artefacts. The Convention also responds to the need for scientific guidance and the facilitation of State cooperation. It does not address ownership of heritage nor does it change maritime zones. The Convention is drafted in harmony with UNCLOS, as expressly stressed in its Article 3.

The content of the Convention has become increasingly relevant at a time when the pillage and commercial exploitation of underwater cultural heritage, as well the industrialization of the seabed and the corresponding destructive impacts on heritage sites, are major issues that have not yet been appropriately resolved in many regions of the world.

Its programme, in 2015, has shown considerable practical impact with tangible results. Challenges, such as the adaptation of national laws, the augmentation of capacities and the increase of public awareness have been addressed by numerous activities. A session of the Meeting of States Parties, a session of the Scientific and Technical Advisory Body as well as three emergency missions of the latter have been organized. Experts have been trained in several courses and two major UNESCO capacity-building manuals have been promoted in addition to many other publications, a children's Programme and a seven-language website. Several regional and national meetings, organized all over the world, have increased government awareness of underwater heritage.

The above has led to the Convention, since January 2015, being ratified by an additional seven States, and several national laws have been harmonized with it. Legislative impact has even been observed in several countries that have not yet ratified the Convention. Of particular influence was the Annex of the Convention. The "Rules for Activities directed at Underwater Cultural Heritage" have become the standard for work in underwater archaeology and embodies the best practice of scientific underwater archaeology. The UNESCO Manual relating to the Rules was also translated by States not yet Parties to the 2001 Convention, such as the People's Republic of China and the Republic of Korea.

The 2001 Convention's Programme has also been crucial in setting new standards and leading the way in the future of underwater heritage, by promoting responsible heritage

access, fostering investment into research and promoting peace through heritage understanding by publishing the education initiative "Heritage for Peace and Reconciliation" focusing on the shipwrecks of World War I. The Latin-American region has seen a considerable increase in the set-up of underwater heritage specialized units, thanks to UNESCO's support, made possible by extra-budgetary contributions from Spain. An issue to be addressed more comprehensively is the stopping of pillage and an increased site protection.

The aforementioned impact of the Convention also results from the comparative advantage of the 2001 Convention in comparison with other existing standard setting instruments. The Convention is central in underwater archaeology, and receives a high level of support from the scientific community and relies on an established network spanning the whole of the underwater heritage domain (15 accredited NGOs, more than 20 connected universities, a UNESCO Category 2 center and a UNESCO Chair).

The practical assistance in emergency cases extended by the UNESCO Scientific and Technical Advisory Body in 2015 drew much public attention and appreciation. In June 2015, UNESCO sent an expert mission to assess the state of the wrecks lying off Sainte-Marie Island (Madagascar) suggested by a treasure-hunter to be the wreck of the *Adventure Galley* of the pirate Captain Kidd. Two missions visited Panama in July, and then again in October 2015 to examine the state of the site of the *San José* shipwreck, a Spanish galleon that sank in the archipelago of Las Perlas in the 17th century. A commercial company had been salvaging the shipwreck since 2003.

A main challenge for the Programme in 2015 remained the need for increased involvement of Member States and other organizations within the UN system. The Convention is strongly supported by underwater archaeologists and their associations. However, its universal ratification and implementation have yet to be achieved. The Convention had a relatively slow start during the period 2001 to 2007. It only entered into force on 2 January 2009 with twenty ratifications. This has improved greatly. It has now already been ratified by 55 States. More States need to adhere however. Central and Eastern European as well as the Latin-American and Caribbean regions have ratified the Convention more widely than other regions. The lowest number of ratifications is observed in the Asia-Pacific region. The issues impeding ratification vary, ranging from a very low development of underwater archaeology to commercial exploitation of heritage.

The Convention's Secretariat presented its activities at the UN Conferences on SIDS in 2014 and the COP21 in 2015. The Secretariat also adhered to the UN Oceans network in 2015. The inclusion of underwater cultural heritage in global Ocean Literacy initiatives, Climate Change discussions and other ocean related initiatives however is yet to be improved.