IOC-XXIX/2 Annex 10 Rev.

Paris, 23 June 2017 Original: English



INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (of UNESCO)

Twenty-ninth Session of the Assembly UNESCO, Paris, 21–29 June 2017

Item 5.1 of the Provisional Agenda

GLOBAL OCEAN SCIENCE REPORT: PERSPECTIVES AND DEVELOPMENT

<u>Summary</u>

Through Decisions EC-XLVII/6.2 and XXVIII/5.1, IOC decided to establish an Intersessional Working Group and to support the production of the Global Ocean Science Report, which presents baseline information on human and technical capacities, infrastructure and investment, as well as impacts of ocean science at the global and national level.

The *Global Ocean Science Report* (GOSR) was published in June 2017 where the Executive Secretary launched it at the United Nations "Oceans Conference" on 8 June 2017 in six languages. It includes information gathered from Member States via questionnaires, a bibliometric analysis, as well as other published resources.

As acknowledged by the Inter-agency Expert Group on SDG Indicators (IAEG-SDG), part of the information provided in the GOSR contains the data needed to report towards the SDG target 14.a for increasing scientific knowledge, develop research capacity and transfer marine technology, and IOC was decided to be the custodian agency for the indicator 14.a.1.

Continued support by IOC Member States would allow assessing the status of ocean science capacities, infrastructure and output in a regular analysis (each 4-5 years). In addition an endorsement by the IOC Assembly will enable and support Member States to submit and access the national data through the development of a GOSR data repository and data portal.

<u>Financial and administrative implications</u>: See paragraph 22. The budget for the development of GOSR will be defined within the overall decision on budgetary allocation as part of the overall IOC Programme and Budget draft resolution XXIX-(11.1).

<u>The proposed decision</u> is referenced IOC-XXIX/Dec.5.1 in the Action Paper (document IOC-XXIX/2 Prov.)

Background

1. In pursuance of Decisions EC-XLVII/Dec.6.2 and XXVIII/Dec.5.1, adopted by the IOC Executive Council at its 47th session (Paris, 1-4 July 2014) and the IOC Assembly at its 28th session (Paris 18-25 June 2015), the IOC has incorporated as part of its mandate the publication of the first *Global Ocean Science Report* (GOSR).

2. The report was developed to assist local and national governments, academic and research institutions, as well as international organizations and donors, in making informed decisions, e.g. on future ocean research investment. In brief, the GOSR will inform of where marine technology and human capacity exist to address present marine environmental challenges.

3. An international independent group of experts, established as the Editorial Board, comprising various disciplines, guides the preparation process and analysis of the received (GOSR questionnaire) and obtained data. In October 2016 the second GOSR Editorial Board meeting, held in Seoul, Republic of Korea, was used to further develop the visualization of results presented in the GOSR with respect to the 2030 Agenda. The discussion focused on how GOSR data can be used to report towards the SDG target 14.a. Until present, there was no global mechanism for assessing and reporting the level of capacity, investments, and needs of nations in ocean science, observation and services.

Data collection

4. A suite of complementary approaches and methods were used to underpin the information presented and discussed in the GOSR. The chosen methodologies allow information to be captured about different aspects of ocean science, including research funding, human and technical capacities and outputs (e.g. publications), as well as supporting organizations and facilities.

5. A variety of open source and quality-controlled resources, together with targeted surveys, were used to collect the data and information that provide the foundation for this report. The *Global Ocean Science Report* combines quantitative data such as the number of peer-reviewed publications, research vessels and the extent of national funding with qualitative data, e.g. the existence of ocean science national strategies. Many of the results presented in the report are compared to natural sciences, and/or research and development (R&D) in general, and present the results of the analysis of ocean science to benchmark the outcomes.

6. Data compilation tools include: (i) tailored questionnaires; (ii) peer-reviewed literature, national reports, web-based sources; and (iii) bibliometrics based on international literature databases. Access to some types of quantitative measurements is limited or unavailable. Currently, national reporting mechanisms to obtain the type of information requested in the *Global Ocean Science Report* questionnaire are often not in place.

7. The IOC Secretariat received 34 national replies to the GOSR questionnaire (through IOC Circular Letter 2506) (23% of IOC Member States). These countries produced about 75% of ocean science publications during the time-period 2010–2014 (Figure 1). On average, the countries answered 77.4% of the questions.



Figure 1. Global map indicating the Member States that responded to the questionnaire (blue).

8. By adopting a standardized approach as developed in the first edition of this report, an important step is made towards systematic reporting on global ocean science.

Major Findings of the GOSR

- 9. The Executive Summary of the GOSR summarized the following major findings:
 - (a) Global ocean science is "big science". Conducting ocean science requires numerous staff and large and costly equipment such as ships, ocean installations and laboratories located on the coast. These resources are distributed around the world comprising, for example, 784 marine stations, 325 research vessels, and more than 3,800 Argo floats.
 - (b) Ocean science is multidisciplinary. Most ocean science facilities work across a broad range of issues (39%), whereas others specialize on observations (35%) or fisheries (26%).
 - (c) There is more equal gender balance in ocean science than in science overall. Female scientists represent on average 38% of the researchers in ocean science, about 10% higher than science overall.
 - (d) Ocean science expenditure is highly variable worldwide. According to available data, ocean science accounts for between 0.1% and 21% of natural science expenditure and between < 0.04% and 4% of total research and development expenditure. From 2009 to 2013, ocean science expenditure varied among regions and countries, some increased their annual expenditure on ocean science, while others significantly reduced it.</p>
 - (e) Ocean science benefits from alternative funding. Private funding, including philanthropy, in some cases provides supplemental support for ocean science and enables the development of new ocean science technologies.

- (f) Ocean science productivity is increasing. Ocean science is expanding in magnitude and scope, resulting in greater scientific output. When comparing the time periods 2000-2004 and 2010-2014, China, Iran, India, Brazil, Republic of Korea, Turkey and Malaysia show the strongest relative growth in scientific output. China has become a major source of new publications, with the USA, Canada, Australia and European nations (UK, Germany, France, Spain and Italy) continuing as top producers of ocean science publications.
- (g) International collaboration increases citation rates. Generally, North American and European countries have a multiplying factor or impact factor (ratio of citations to publications) higher than countries from other parts of the world. The extent to which a country is engaged in international collaboration influences its citation rates. On average, publications that are co-authored by scientists from many countries are cited more often than publications for which all the authors are from the same country.
- (h) Ocean data centres serve multiple user communities with a wide array of products. At the global level, the main type of data archived by ocean data centres is physical data, followed by biological and then chemical data. Less than half of ocean data centres provide data on pollutants or fisheries. The top three ocean data/information products provided by ocean data centres are metadata, geographic information system (GIS) products and raw data access. Ocean data centres provide three main services: data archival, data visualization and data quality control.
- (i) Science-policy interactions can occur through many avenues. Current ocean science policy and science diplomacy focuses on prioritizing scientific research areas and steering the production and use of knowledge to address societal needs and prepare nations for future challenges at national, regional and global scales.
- (j) National inventories on ocean science capacity exist only in few countries. The multidisciplinary nature of ocean science complicates efforts to establish reporting mechanisms to map ocean science capacities; the organization of national, academic, and federal capacities for marine research varies greatly.

10. To foster ocean-based sustainable development, a baseline is needed of where and how existing ocean science capacities are being used to empower society, sustain the environment and generate knowledge to support ocean management and develop useful products, services, and employment. The GOSR offers a tool to help address this gap. It identifies and quantifies the key elements of ocean science at the national, regional and global scale, including workforce, infrastructure and publications.

Data repository – Data portal

11. In light of the SDG 14 in particular the target 14.a, which is aligned with the *IOC Criteria and Guidelines on Transfer of Marine Technology*, and the related proposed indicator 14.a.1 (Proportion of total research budget allocated to research in the field of marine technology) a regular process of reporting the national ocean science/marine technology budget has to be established. The first edition of the GOSR established the needed methodology to compile and assess such data.

12. The Inter-agency Expert Group on SDG Indicators (IAEG-SDG) also acknowledged that part of the information provided in the GOSR contains the data needed to report towards the SDG target 14.a. This multistakeholder group therefore decided that IOC is the custodian agency for the indicator 14.a.1.

13. However, as the GOSR is envisaged to be published every four to five years, a more frequent mechanism to collect and deliver the requested information will be needed. This is proposed to be achieved through the development of a GOSR data portal. Data submission by Member States is

expected to take place every two years, on the basis of an improved GOSR questionnaire (IOC CL-2506), which will be developed with the support of IODE and UNESCO Institute for Statistics.

14. This data portal will feature all types of data presented in the first edition of GOSR; additional data from relevant existing databases and other relevant published reports will be relied upon as appropriate for quality assurance and quality control purposes.

15. The GOSR portal will also be closely linked with the new "IOC Country Profiles" system of which the development has started in 2017 (collaborative effort between IOC Headquarters and IOC Project Office for IODE, Ostend, Belgium).

16. It is envisaged to start with a document repository, launched until the end of 2017. This repository is the foundation for a data portal. The IOC secretariat (at Headquarters and at the IOC Project Office for IODE), in cooperation with the UNESCO Institute for Statistics, will develop a detailed GOSR data portal proposal, including data gathering, data analysis, data storage and reporting towards Target 14.a after adoption of the draft decision XXIX/Dec.5.1 by the IOC Assembly at it 29th session.

17. Additional financial and human resources support will be needed to develop and implement the GOSR data portal as this is beyond the current capacity of the IOC Secretariat. It is estimated that the task requires a software developer and a part-time data manager.

18. A fully developed data portal will allow (version controlled) submission and retrieval of 'raw data', metadata, and literature. The collection of new data will be organized at regular time intervals, probably every two years. The development of a user friendly interface and multiple visualization possibilities will allow multiple stakeholders, including scientists, civil society, policy makers and politicians to utilize and communicate the results of the first and subsequent GOSR editions in ways adapted to their specific needs.

19. The development of the GOSR data repository and the related data portal will contribute to the IOC's medium-Term Strategy 2014-2021 and to the 2030 Agenda for Sustainable Development, it particular Goal 14 ("Conserve and sustainable use the oceans, seas and marine resources for sustainable development"; see also draft decision IOC-XXIX/6.2.2, "IOC Strategic Plan for Data and Information Management, 2017-2021").

Future editions of the GOSR

20. The full edition of the GOSR will be published every four to five years (in line with other UNESCO global reports, e.g. UNESCO *Science Report*, *Global Education Monitoring Report*).

21. The independent Editorial Board of GOSR will be maintained with rotating membership (50% of its current members will rotate immediately, taking into account discipline, geographical and gender balance) to ensure both continuity and renewal. The Executive Secretary or his representative will act as the Secretary to the Editorial Board. This external panel of international qualified experts with experience and expertise in ocean science and/or science diplomacy, statistics, and evaluation will guide the preparation process and will further contribute directly, co-authoring chapters, or indirectly, via suggesting authors, to the report's content.

Financial implications

22. It is estimated that costs related to the production of the Report, including those related to the meetings of the GOSR Editorial Board meetings and the development and management of the data portal will amount to approximately US \$250,000 per biennium.