Ocean Affairs and the Law of the Sea

Contributions of the
Intergovernmental Oceanographic Commission of UNESCO (IOC/UNESCO)
to the Report of the UN Secretary-General

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Capacity building and the transfer of marine technology

Pursuant to United Nations General Assembly General Assembly resolution 79/144 of 12 December 2024: entitled "Oceans and the law of the sea" (A/79/L.37) the information below represents the contributions of the Intergovernmental Oceanographic Commission of UNESCO (IOC) to the report of the Secretary-General on key achievements and activities relating to capacity development and transfer of marine technology undertaken by the IOC/UNESCO.

The IOC Criteria and Guidelines on Transfer of Marine Technology

The Intergovernmental Oceanographic Commission of UNESCO(IOC/UNESCO), established in 1960, is recognised through the United Nations Convention on the Law of the Sea (UNCLOS) as a competent international organization in the fields of Marine Scientific Research (Part XIII) and Transfer of Marine Technology (TMT) (Part XIV).

Future efforts on capacity development and transfer of marine technology may benefit from the experience of IOC/UNESCO in operationalizing the IOC Criteria and Guidelines on Transfer of Marine Technology (CGTMT) and developing a corresponding Clearing House Mechanism (CHM). As an integral part of the IOC Guidelines, the establishment of a dedicated Clearing House Mechanism *"provides interested users in Member States with direct and rapid access to relevant sources of information, practical expertise in the transfer of marine technology, as well as to facilitate effective scientific, technical and financial cooperation to that end".*

Numerous references have been made to the IOC Criteria and Guidelines on Transfer of Marine Technology as a possible basis for further defining types of and modalities for capacity development and transfer of marine technology that the Biodiversity Beyond National Jurisdiction (BBNJ) Agreement may require. The IOC CGTMT were developed in direct response to article 271 of UNCLOS, with the aim to support the implementation of Part XIV. The Guidelines identify a special responsibility for IOC in facilitating the transfer of marine technology and recommend that IOC establish a clearing house mechanism for the transfer of marine technology, to link recipient and donor States.

The IOC Capacity Development Strategy 2023-2030

In June 2023, the IOC Assembly, through Decision A-32/4.3, adopted the IOC Capacity Development Strategy 2023–2030 and its Outreach and Communications Plan. Emphasizing the need for a closer collaboration with the regional subsidiaries bodies in implementing the new strategy, the IOC CD Strategy 2023-2030 provides a strong framework in order to ensure effective, equitable and universal participation of Member States in both capacity development and marine technology transfer as these are the competent areas of IOC that were recognized by the UN General Assembly resolutions as well as in the Sustainable Development Goals, specifically Goal 14 and target 14.(a) where IOC acts as a the UN custodian agency for this specific target which *inter Alia* calls to ***"increase scientific knowledge, develop research capacities and transfer marine technology taking into account the Intergovernmental***

Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular SIDS and LDCs

The fifth meeting of the IOC Group of Experts on Capacity Development (GE-CD), held from 27 to 29 February 2024, provided an opportunity to assess the work of the Group and its results in support of the IOC Capacity Development implementation. The group proposed revised Terms of Reference in accordance with the requirements of the new IOC Capacity Development Strategy 2023–2030, taking into account consultations with the global programmes and regional subsidiary bodies for their regional CD workplans and priorities. A Working Group on Implementation Plan and a Task Team on Capacity Development Needs Assessment were established at the sixth session of the IOC GE-CD to prepare the draft implementation plan of the CD Strategy and guide the implementation of the next iteration of the IOC Biennial Capacity Development Needs Assessment Survey. The outputs, activities and actions under the framework of the IOC CD Strategy contributes to a large extent to capacity building and transfer of marine technology. The most recent initiative is the IOC Ocean Training Internships which started its pilot phase in April 2024, with six host institutions, including two OBIS nodes (Australia and Deep-sea nodes), two OTGA Regional Training Centres (RTC India and RTC Colombia), one OTGA Specialized Training Centre and International Tsunami Information Center (ITIC), and one NODC (NODC Argentina), offering placements for seven Early Career Ocean Professional (ECOP) interns.

As part of the UN Decade of Ocean Science for Sustainable Development (2021–2030), the GE-CD was consulted in the implementation of the Ocean Decade Capacity Development Facility (CDF), which develops a community of practice among LDCs, SIDS and ECOPs in the Caribbean and African region. Aimed at delivering on-demand training and provide a flexible and evolutive means of supporting the capacity development needs of individuals and institutions involved in the Ocean Decade, the CDF facilitates matching of capacity development needs with the support available and with providers for the transfer of marine technology, including governmental, non-governmental or private entities interested in participating as donors in the transfer of marine technology, and facilitate access to related know-how and expertise.

Another outcome from the work of the GE-CD is the development of the Ocean Capacity Development Hub (https://oceancd.org), a global repository of CD opportunities that enable matching offers with demand in capacity development. The Ocean CD-Hub addresses requests for capacity development and the transfer of marine technology and opportunities with respect thereto, including research collaboration and training opportunities, information on sources and availability of technological information and data for the transfer of marine technology, opportunities for facilitated access to marine technology and the availability of funding.

IOC, through its regional subsidiary bodies also assists in advancing ocean knowledge and developing research capacities of countries in this region, in view of their needs and challenges they have faced in conserving and sustainably using the oceans, seas and marine resources. They aim to develop and strengthen research capacity of UN Member States in their regions through the coordination with the RSBs and their regional network of training and research centers on marine science.

<u>Capacity development via an e-learning platform and network of training centres</u>

The IODE OceanTeacher Global Academy

The OceanTeacher Global Academy (**OTGA**), an IODE Programme Component, has established a global network of Regional and Specialized Training Centres (RTC/STCs) to deliver customized training for the

ocean community worldwide, including experts, practitioners, decision-makers, and young scientists, and to increase national and regional capacity in coastal and marine knowledge, services, and management. OTGA currently has 17 RTCs/STCs (Argentina, Belgium, China, Colombia, Ecuador, Denmark, Fiji, Ghana, India, Indonesia, Kenya, Malaysia, Mozambique, Norway, Portugal, Uruguay/Brazil, and USA). The IOC Science and Communication Centre on Harmful Algae (HAB), University of Copenhagen (Denmark), serves as a Specialized Training Centre for HAB. The IOC International Tsunami Information Centre, US National Oceanic and Atmospheric Administration National Weather Service, serves as a Specialized Training Centre for Tsunami. Over the years, OTGA has been an essential element for professional training and career development, facilitating knowledge sharing and expertise building beyond excellence centres. OTGA organizes an average of 60 online, face-to-face, and blended training courses every year on a range of topics such as data management and sharing, marine spatial planning, satellite remote sensing, blue carbon, ocean literacy, weather forecast, and many more, covering competencies needed for ocean sustainable planning and blue economy. Four different languages (English, Spanish, Portuguese, and French) are used to deliver training courses. All training resources are hosted by the OceanTeacher e-Learning Platform (www.oceanteacher.org). Nearly 14,200 users are registered on the OTGA e-Learning Platform.

OTGA has collaborated with many other organizations in the joint development of training, including other UN Agencies (WMO, IMO, IAEA, UNDP, UNEP) and international programmes (e.g. POGO, Early Career Ocean Professional (ECOP) Programme, Marine Environmental Data and Information Network (MEDIN), Flanders Marine Institute (VLIZ), European Marine Observation and Data Network (EMODnet) Alfred Wegener Institute for Polar and Marine Research (AWI), Marine Biodiversity Observation Network (MBON), and Ocean Decade Capacity Development Facility (CDF)). OTGA partners contribute to (i) expanding global awareness of learning opportunities, (ii) increasing learning content, (iii) developing new crosscutting learning services and opportunities, (iv) developing and implementing quality standards for the delivery of learning services and (v) facilitating solutions for knowledge, technology and innovation sharing.

Regional Training and Research Centers (RTRCs)

The Sub-Commission for the Western Pacific and adjacent regions (WESTPAC) **Regional Training and Research Centers (RTRCs)** network was initiated in 2008 by UN Member States in the region and subsequently adopted by IOC/UNESCO, aiming to improve national and regional capability and capacity on marine science in a sustainable and systematic manner, through the establishment of IOC RTRCs in national oceanographic institutes or universities, and regular provision of training and research opportunities on their specialized areas to young scientists mainly from developing countries within and outside the region.

<u>Capacity development activities related to marine policy and ocean management</u>

The Marine Policy and Regional Coordination Section of IOC also has capacity development among its key activities, as reflected in the Updated Joint Roadmap to accelerate Marine/Maritime Spatial Planning processes worldwide 2022-2027 (MSProadmap) adopted as a partnership with the European Commission.

Even though about 126 countries/territories have already embarked in MSP processes, the majority is still at early stages. The degree of implementation of MSP is not uniform, nor is the level of institutional, technical, and human capacities.

IOC's MSPglobal porgramme implements face-to-face trainings on Marine Spatial Planning (MSP) mainly at national and regional level using the MSP Challenge board game, co-produced and donated to the

institution by the Government of the Netherlands. Besides, the training material was translated to all UN official languages, plus Portuguese to make this material applicable all around. Then, an MSP Challenge/MSPglobal Training Network on Marine Spatial Planning was established with twelve organisations across the globe.

At OTGA, a self-paced and multilingual online training was recently developed to respond to the high demand from Member States, particularly regarding to the implementation of the MSPglobal International Guide on Marine/Maritime Spatial Planning. The course explores MSP, its relationship with other integrated ocean governance approaches, the process for developing a marine spatial plan and how to use a marine spatial plan.

In order to contribute to the development and implementation of the IOC Capacity Development Strategy 2023–2030, IOC has asked the specific needs of Member States as part of its regular surveys on the status of MSP worldwide. The results of the 2024 survey are under analysis to produce a global assessment that will inform specific tailored capacity development activities by IOC and other interested institutions. This will also inform the development of Ocean Decade Actions relevant to MSP.

Beyond trainings, community of practices are also an effective approach for knowledge exchange and good practices. As part of the MSProadmap, IOC leads the organization of the International MSPforum together with the European Commission, and other three regional MSPforums together with organisations from the following regions: Africa; Latin America and the Caribbean; and Western Pacific.

Building on the experience of its programmes and projects, an IOC Wide-Strategy on Sustainable Ocean Planning and Management is under development to strengthen the IOC value chain from ocean observation and data to knowledge-based marine policies. The draft strategy has capacity development also as one of its pillars in order to: (i) enhance stakeholder capabilities through comprehensive training programmes, workshops, information materials and ongoing education, tailored to meet the needs of diverse users and widely distributed through platforms such as Ocean CD-Hub; (ii) establish knowledge exchange platforms to effectively disseminate best practices and innovations, promoting a global community of practice that enables continuous improvement and adaptation of ocean management strategies; and (iii) engage with ECOPs to foster hands-on learning and leadership in ocean governance and science.

IOC services related to CBTMT, including data and information

The different ways in which IOC's particular strengths could provide useful services for CBTMT include open access to data and information required for building knowledge through online data sharing platforms, coordination of global monitoring and observation networks, human capacity development through a network of regional training centres, development of guides, manuals, codes of conduct and best practices in Marine Scientific Research and data standards and management and monitoring of ocean science capacity.

The International Oceanographic Data and Information Exchange (IODE)

Established by IOC in 1961, IODE facilitates the exchange of oceanographic data and information between participating Member States . The IODE is structured around a global community of national data centres, each established and maintained by IOC Member States. There are 65 National Oceanographic Data Centres (NODCs)which , together with 30 Associate Data Units (ADUs), collect, quality control, and archive millions of ocean observations related to physical, chemical and biological data, and make them available to Member States. In addition, a diverse range of IODE programs and projects have created data systems as well.

(i) **The Ocean Data and Information System (ODIS)**

The **Ocean Data and Information System (ODIS)** is a federation of independent data systems coordinated by the IOC's IODE programme. This federation includes continental-scale data systems as well as those of small organisations. ODIS partners use web architectural approaches to share metadata describing their holdings, services, and other capacities. While ODIS has initially focused on 'partners associated with IOC' this has been expanded, considering the partnership established under the UN Decade of Ocean Science for Sustainable Development.

Special attention is given to developing regional "portals" that provide access to data as well as tools to develop knowledge products relevant to a specific region.

Through a capacity development needs assessment survey, all regions reported that such a mechanism would be instrumental to the further development of ocean science capacity in the countries.

As an example INVEMAR (Colombia) developed a pilot CHM for the Latin America and Caribbean region, in the context of the Caribbean Marine Atlas (CMA-II) project. The pilot "Clearing-House Mechanism LAC) (http://portete.invemar.org.co/chm) is a hybrid model, with a centralized portal that provides access to information sources identified by the users as most relevant (Databases on Training and Education resources, List of experts, Research vessels,..) and integrated from a number of existing web sources developed and maintained under IOC (OceanExpert, Ocean Teacher Global Academy, ODISCat).

The vision was that this CHM should become the primary information repository to support international conventions and agreements with a focus on cooperation related to marine scientific research and, at the same time provide a platform to share information, build partnerships and forge collaboration for the growth and transfer of marine technology in developing countries.

The global ODIS-architecture has been established, and proof-of concept achieved with over 20 partner organisations. The documentation for the ODIS-architecture is openly available online https://book.oceaninfohub.org/index.html.

Many partner organizations are working with the project to demonstrate proof-of-concept of the ODIS architecture. Forty-eight (48) Project partners are fully operational nodes in ODIS and are contributing openly discoverable content to the Ocean InfoHub knowledge graph. An Ocean InfoHub Global Search portal was developed as a demonstration of ODIS (https://oceaninfohub.org) to improve and refine services offered. The portal currently contains over 130,000 content items (as of October 2024) in eight content categories: (i) Experts (27,000); (ii) Institutions (13,000; (iii) Documents (42,000); (iv) Training (1,500); (v) Vessels (113); (vi) Projects (3,600); (vii) Datasets (49,000); and (viii) Spatial data (42,000).
1-1 Training was provided to new partners joining ODIS.

Other UN agencies, global data systems, and initiatives in other domains and sectors have expressed an interest in adopting the ODIS technology. Interoperability solutions are discussed with the Group on Earth Observations Biodiversity Observation Network (GEO BON), the Helmholtz Metadata Collaboration (HMC), the Earth Science Information Partners (ESIP), and the Polar Data Discovery Enhancement Research (POLDER) project).

With the current developments under ODIS, IOC is also well positioned to support the BBNJ secretariat by further development and expansion of its data system, and to provide technical support for a CHM managed by the BBNJ secretariat. Importantly, the IODE's OBIS and ODIS components can also ensure that BBNJ digital systems are "born interoperable", leveraging decades of network building and technical

alignment. The IOC CGTMT can provide the guidance and substantive scope of technology needs assessments including its capacity development needs assessment based on its experience from its successful initiatives. A pilot project called Biodiversity Data Hub for the High Seas is currently being developed by IOC that intends to demonstrate the utility of the ODIS infrastructure, alongside the specific capacities for biodiversity data developed by OBIS, to support the requirements of the BBNJ secretariat.

(ii) **A global data sharing and clearing house for marine biodiversity data through the Ocean Biodiversity Information System (OBIS)**

The **IODE/OBIS** database has continued to grow, now incorporating one new dataset daily and 1 million new marine species observations monthly. OBIS presently integrates over 5,400 datasets, with more than 135 million observations of nearly 200,000 marine species (constituting 80% of all described species). Of these, 23 million records are based on DNA sequences. Data contributions come from over 1,000 institutions across 99 countries, including 16 from Africa and 21 SIDS, with SIDS alone contributing 1 million records in 2023. The OBIS network comprises 34 national, regional, and thematic nodes, as either IODE NODCs or ADUs.

OBIS is one of the largest databases with marine biodiversity data in the world. Species occurrence data is shared according to FAIR principles with full open access to metadata and data provenance. The standardized, machine-readable data stored in OBIS ensures data comparability across studies. OBIS also houses millions of genetic records, enabling a stable and searchable data record for marine genetic resources, which multiply the benefits from individual genetic studies. Further, OBIS is working to integrate sequence-based search capabilities to allow the use of unknown sequences in comparative studies across the globe.

The Republic of Korea OBIS node was reactivated in 2023, now hosted by the National Marine Biodiversity Institute of Korea, which also hosted the 12th session of the IODE Steering Group for OBIS, 25–29 March, 2024. During this session, the SG-OBIS agreed on a new priority strategy and management structure to align with the new Rules of Procedure for IODE Programme Components, Programme Activities, or Projects. Accordingly, OBIS has prioritized two thematic areas: a) data mobilization; and b) data application. To support these, OBIS established a data coordination group and a product coordination group, respectively. For data application (Area B), OBIS is developing a data products portal comprising an online virtual laboratory and a products catalogue. A nodes coordination group was also formed to facilitate discussion among OBIS nodes on ongoing activities, priorities, and challenges, while the OBIS steering group will concentrate on business and strategy. OBIS nodes now have an expanded mandate that goes beyond data publication, including mentoring data holders in their respective areas to facilitate the direct publication of biodiversity data into OBIS and GBIF, while providing support to ensure marine-specific data requirements are met. A biennial OBIS All Hands meeting will unite the extensive OBIS community of practice. These coordination and community engagement activities will be reinforced by the employment of a part-time staff member (consultant), made possible by the increased regular programme funds. The SG-OBIS has also crafted a communication plan with a dedicated budget for branding materials. Furthermore, the SG-OBIS has revised and adopted new guidelines on data sharing and usage in OBIS to align with the new IOC Data Policy and Terms of Use (https://manual.obis.org/policy.html).

The two global biodiversity data networks, OBIS and the Global Biodiversity Information Facility (GBIF) have had an ongoing cooperation agreement since 2014. However, to effect tangible progress, they formulated (February 2024) and endorsed a joint marine strategy and action plan to achieve the following objectives by 2030:

• The best available marine biodiversity data, respecting FAIR and CARE principles, is available to meet the needs of relevant users, supporting the goals and targets of the UN Ocean Decade, including the OBIS 2030 UN decade project, the Kunming-Montreal Global Biodiversity Framework, the 2030 Agenda for Sustainable Development, the future UN High Seas Treaty, global assessments (e.g., IPBES, UN World Ocean Assessment) and other international policy objectives.
• Marine biodiversity data is securely archived, and our respective networks persist and can operate sustainably into the future.

OBIS supports global capacity development through diverse initiatives aligned with the IOC CD Strategy. Highlights include maintaining the 178-page OBIS Manual, producing 26 data formatting video tutorials, and hosting three OBIS/OTGA online courses, collectively certifying 132 participants from 63 countries. The OBIS led **PacMAN** (Pacific Islands Marine Bioinvasion Alert Network) project enhanced local capacity in Fiji for invasive species detection and data management using eDNA metabarcoding techniques. OBIS leads educational initiatives, such as developing a marine biology curriculum for Ostend elementary students (MPA Europe), and engaging >200 children globally through UNESCO eDNA Expeditions. Through the BioEcoOcean Horizon Europe project, OBIS is co-developing a Blueprint for Integrated Ocean Science to support the entire ocean observation value chain. OBIS fosters equitable access through Spanish-language resources and workshops, while partnerships with GOOS and GBIF enhance data accessibility and sharing. IOC Ocean Training internships hosted by OBIS nodes (Australia and Deep Sea) further enhance professional development. Collectively, these efforts promote global sharing and application of marine biodiversity data.

The General Bathymetric Chart of the Oceans (GEBCO)

GEBCO provides the most authoritative publicly available bathymetry of the world's ocean. It operates under the joint auspices of the International Hydrographic Organization (IHO) and the IOC. GEBCO produces and makes available a range of bathymetric datasets and products including a global bathymetric grid, a Gazetteer of Undersea Feature Names, a Web Map Service, and printable maps of ocean bathymetry . Under the umbrella of GEBCO and with the support of the Nippon Foundation, the major project 'Seabed 2030' aims to cooperatively work towards mapping 100% of the topography of the ocean floor by 2030 . In order to broaden the GEBCO community and to encourage more younger scientists and hydrographers to become involved in mapping the ocean floor, GEBCO and the Nippon Foundation established the Postgraduate Certificate in Ocean Bathymetry (PCOB) at the University of New Hampshire (UNH), USA. Running since 2004, the Course has trained students who have completed the course and returned to their home organisations where they apply the skills and knowledge they acquired on the course to build capacity within their own country.

<u>Global monitoring and observation networks</u>

IOC also coordinates global monitoring and observation networks such as the **Global Ocean Observing System (GOOS)** which is co-sponsored by IOC (lead agency), the World Meteorological Organization, the International Science Council and the United Nations Environment Programme. Created in 1991, GOOS provides continuous and long-term ocean observations around climate, operational services and marine ecosystem health in order to contribute to sustainable development, safety, wellbeing and prosperity . GOOS has convened expert panels to develop specifications for Essential Ocean Variables (EOVs) including a Biological and Ecosystems EOV Panel.

Other global monitoring networks include the **Harmful Algae Bloom Programme**, addresses the scientific and societal challenges of harmful algal blooms through the application of advanced and cost- effective technologies, training and capacity building, and curates information about harmful algal events and

species in the Harmful Algal Information System (HAIS). IOC also houses part of the Secretariat of the **Global Ocean Acidification Observing Network (GOA-ON)**. This network aims to improve the understanding and measurement of global ocean acidification and its effects on the ocean and manages an ocean acidification data portal. IOC also plays a lead role in the coordination of several programmes responsible for monitoring and studying ocean acidification and its effects and houses part of the Secretariat of the coordinates the Global Ocean Oxygen Network (GO2NE).

Monitoring ocean science capacity

The Global Ocean Science Report (GOSR)

GOSR assesses the status, trends and gaps in ocean science capacity at the national, regional and global scales, including human and technical resources and capacity. The GOSR identifies and quantifies the key elements of ocean science, providing a resource for policymakers, academics, and other stakeholders seeking to harness the potential of ocean science and to advance international collaboration in ocean science and technology.