International Hydrographic Organization | IHO | Organisation Hydrographique Internationale

IHO Input to the Report of the UN Secretary General on Oceans and Law of the Sea

This contribution is provided in response to your letter dated 21 March 2023 as the input from the International Hydrographic Organization to the report of the UN Secretary General on Oceans and Law of the Sea. It addresses developments and issues relating to ocean affairs and the law of the sea, including the implementation of resolution A/RES/77/248.

Executive Summary

The International Hydrographic Organization (IHO) is the inter-governmental international organization whose principal aim is to ensure that all the world's oceans, seas and navigable waters are properly surveyed and charted. The work is done by bringing together the national agencies responsible for the conduct of hydrographic surveys, the production of nautical charts and related publications, and the distribution of Maritime Safety Information (MSI) in accordance with the requirement set out in the International Convention for the Safety of Life at Sea (SOLAS) and other international regulations. The current membership of the IHO stands at 98 Member States.

Although safety of navigation remains a major driver for the IHO, hydrographic products and services are meant to support all activities associated with the oceans, seas and navigable waters. As every human activity conducted in, on or under the sea depends on knowing the depth and the nature of the seafloor and an understanding of the tides and the currents, hydrography is an essential enabler to the development of the Blue Economy. So far only about 25% of the world´s oceans are decently well surveyed. Though all main shipping routes are well charted nowadays and transformation to digital mapping has been undertaken successfully, there is an increasing lack of accurate charts for areas which haven't been of interest for navigation and other marine applications in the past. This has a significant impact on what mankind can do at sea today in a safe, economical and sustainable manner. It is impeding progress and economic development in many, if not most, coastal States and has a major impact on the effective management, sustainable exploitation, and well-informed governance of the seas and oceans. This situation results notably from the fact that only less than two third of the States Parties to the SOLAS Convention have arrangements in place to provide adequate hydrographic surveying and nautical charting services. In this context, it is important to continue to call upon States that have not yet done so to consider becoming Member States and actively contributing to the work of the IHO, and urge all States to work with the IHO to increase the coverage of hydrographic information on a global basis. However, whether it is an IHO member or not, all coastal States should be encouraged to not only ensure that their seas and coastal areas are properly surveyed and charted but also place increased focus on deep sea surveys.

Through its active technical and capacity building programmes conducted in close liaison with other international organizations, notably the International Maritime Organization and the Intergovernmental Oceanographic Commission of UNESCO, the IHO supports the development and improvement of hydrographic and nautical charting standards, products and services, especially in digital formats. These capabilities contribute directly to safe navigation, informed marine spatial planning, coastal management and marine protected area management in the deep sea as well as the limitation of and recovery from natural disasters. They also provide a technical basis for the implementation of the UN Convention on the Law of the Sea.

General

1. The International Hydrographic Organization (IHO) is the inter-governmental international organization whose principal aim is to ensure that all the world's oceans, seas and navigable waters are properly surveyed and charted, through the coordinated endeavours of national Hydrographic Offices that also contribute to the promulgation of Maritime Safety Information (MSI). The requirement to provide these services is set out in Regulation 9 of Chapter V of the International Convention for the Safety of Life at Sea (SOLAS) and is therefore an obligation placed on all contracting governments. Regulation 9 requires, among other things that States: "*… ensure that hydrographic surveying is carried out, as far as possible, adequate to the requirements of safe navigation*". Regulation 4 of Chapter V places an obligation on Contracting Governments to ensure that appropriate navigational warnings are issued as part of the MSI services. The IHO has been hosted by the Government of Monaco since its creation in 1921 and its current membership stands at 98 Member States.

The reference to "navigable waters" does not mean that the IHO is concerned only with safety of navigation. Although supporting safety of navigation is a major priority for all national Hydrographic Offices, their products and services, in some way or another, support all activities that take place on, in or under the sea – preferably with contemporary digital means. This has been highlighted in the current theme for World Hydrography Day of 2023: "*Hydrography – underpinning the digital twin of the ocean*"

2. Hydrography involves measuring the depth of the water (bathymetry), describing the physical features of the seafloor and fixing the position of all the navigational hazards that lie on the seafloor, such as wrecks and rocks. This is done mainly with specialized ships and boats operating echo sounders and sonars, but also using survey aircraft fitted with lasers. Useful information is increasingly being derived from satellite observations. Hydrography also involves measuring the physical features of the water column such as tide and the currents.

3. Hydrographic information is essential for the safe, efficient and sustainable conduct of every human activity that takes place in, on or under the sea. Without hydrography, no ship sails; without hydrography, no port is built; without hydrography; no offshore infrastructure is developed; without hydrography, no marine environmental plan is implemented; without hydrography, no shore is defended, no island protected; without hydrography, no search and rescue operation is attempted, without hydrography, no maritime boundary is delimited. Thus, hydrography is inherent to the three dimensions of the sustainable development of the oceans, ensuring that the marine environment is respected and that no adverse economic or social impact is incurred.

4. The activities of the IHO in 2022/2023 which addressed specifically the implementation of resolution A/RES/77/248 concerned four areas: developing standards, guidance, products and services; building capacities; raising awareness on the role of hydrography; and contributing to the promotion of the marine dimension in global agendas.

5. The second Assembly of the IHO in November 2020 adopted a new strategy to foster the IHO vision, mission, and objects for the years 2021 to 2026. The strategy is focused on three main goals:

1. Evolving the hydrographic support for safety and efficiency of maritime navigation, undergoing profound transformation;
2. Increasing the use of hydrographic data for the benefit of society;
3. Participating actively in international initiatives related to the knowledge and the sustainable use of the Ocean.

6. The third Assembly of the IHO in May 2023 approved that Goal 1 of the IHO Strategic Plan and its targets shall have the highest priority in the implementation of the 2024–2026 Work Programme.

Developing standards, guidance, products and services

7. IHO standards and guidelines, intended to assist coastal States in meeting their obligations and requirements, fall under three main themes:

- nautical charts, issued on paper or in digital format (Electronic Navigational Charts), which are produced by national Hydrographic Offices to support safe navigation in accordance with the requirements of SOLAS;
- the maritime component of spatial data infrastructures being developed at the national and regional levels, which includes in particular high resolution bathymetry (depth data) compiled by national Hydrographic Offices;
- the global reference bathymetric data sets developed and made available through the GEBCO programme (General Bathymetric Chart of the Oceans) operated jointly by the IHO and the Intergovernmental Oceanographic Commission (IOC) of UNESCO.

8. The current worldwide coverage of Electronic Navigational Charts is now effectively corresponding with paper chart coverage. However, numerous remote areas that are far away from the highly frequented shipping routes are still not sufficiently covered by modern up-to-date nautical chart information. Further progress is hindered by the lack of reliable survey data and the allocation of appropriate resources and priority by the governments of many coastal States. While most of the world's established shipping routes are relatively safe navigationally because of widespread use by many ships over many years, the advent of larger vessels and the need for vessels to travel to new destinations, in particular with regard to the expansion of the cruise industry, are not supported by adequate surveys and charts.

9. The IHO is also developing and maintaining guidelines to assist stakeholders in implementing the requirement of international instruments such as UNCLOS and SOLAS. An example is the Manual on Technical Aspects of the UN Convention on the Law of the Sea (TALOS Manual - IHO Publication C-51). The TALOS Manual is maintained jointly by the IHO and the International Association of Geodesy (IAG). Its purpose is to provide guidance in order to ensure maximum international standardization of the technical aspects of UNCLOS. The Manual can be downloaded free of charge from the IHO website at www.iho.int.

10. The IHO develops and sets standards, and issues guidance which ensure that hydrographic information is available and can be delivered to users through appropriate harmonized and interoperable products and services. The current maintenance of existing standards and the development of new ones are driven by the need to continue to satisfy the SOLAS requirements of enhancing safety of navigational, and more recently, supporting the implementation of "e-navigation", which is being led by the UN's International Maritime Organization (IMO). Both elements require easy access to standardized, high quality digital geospatial information that can support marine spatial management. Accordingly, the IHO continues to work on its S-100 framework to support the creation and maintenance of interoperable maritime data product specifications compliant with the ISO-19100 series of geographic information standards. The series also includes a product specification for maritime limits and boundaries (S-121). The purpose of S-121 is to provide UN DOALOS with a suitable format for the exchange of digital vector data pertaining to the maritime boundaries, limits and zones of States to meet their respective UNCLOS deposit obligations.

11. Numerous IHO Member States currently engage in significant efforts to establish regular and frequent services utilizing such datasets with national and regional coverage. Since the S-100 framework and the associated web based infrastructure is not limited to host data product specifications native to the hydrographic domain, the IHO is proactively supporting the expansion of the S-100 concept to related domains such as maintenance of fixed and floating aids to navigation (IALA), weather and sea ice coverage (WMO), route plan exchange format (IEC), inland electronic charting (IEHG) and oceanography (IOC).

Authoritative Dataset on the Limits of Oceans and Seas

The IHO's responsible technical body is currently taking action to develop a new Product Specification named *Polygonal Demarcations of Global Sea Areas* (S-130). The objective is to use the S-130 Product Specification as a dataset model for the subsequent production of the authoritative S-130 Dataset with global coverage of all geographic limits of the oceans and seas as maintained in analogue form by the IHO since 1919 by means of IHO publication S-23.

Recognition of the Southern Ocean

12. In 2021, National Geographic, USA, quoting the IHO, recognized the Southern Ocean as the 5th ocean. Following this publication, the IHO Secretariat received a significant number of requests for explanations on how this name had been discussed in the course of the historic review of IHO Publication S-23 on the Limits of Oceans and Seas. This name to designate the southern waters of this hemisphere was included in the 2nd edition of the S-23 published in 1937. The majority of opinions from Member States received after this were not in favour to this inclusion. In short: the "Southern Ocean" became an official ocean in 1937, but lost its official status in 1953. Noting the well-established use of the denominator Southern Ocean by geographers and the scientific community, and in order to solve this long lasting issue, the 3rd Session of the Assembly approved a new IHO Resolution focused on the recognition of the existence of the Southern Ocean with a northern geographic limit defined by the parallel of Latitude 60°S. Since these limits have neither political nor oceanographic or, more generally, environmental significance whatsoever, Hydrographic Offices may continue to adopt their own limits as long as these limits remain technically consistent with the data model of the polygonal demarcation of global sea areas (IHO S-130).

Building capacities

13. Capacity building continues to be an important component of the IHO Work Programme. The IHO defines capacity building as the process by which the Organization assesses the status of current arrangements and assists States to achieve sustainable development and improvement in their ability to meet hydrographic, cartographic and maritime safety obligations with particular reference to recommendations in UNCLOS, SOLAS, and other international instruments. The scope encompasses all hydrographic needs as it underpins every other activity associated with the sea, including safety of navigation, protection of the marine environment, national infrastructure development, coastal zone management, marine exploration, marine resource exploitation (minerals, fishing, etc.), maritime boundary delimitation, maritime defence and security, and coastal disaster management. The IHO Capacity Building Strategy stipulates that the focus should be on achieving enduring output which will benefit safe navigation, safety of life at sea, protection of the marine environment and economic development, rather than on creating enabling infrastructure per se.

14. The IHO Capacity Building programme is funded from the IHO budget and is supplemented by additional support from Member States. With the easing of the COVID-19 pandemic, activities included in the 2022 Capacity Building Programme and those not carried out in the previous two years were conducted for the benefit of Regional Hydrographic Commissions and their members in 2022. The total amount of expenditure in 2022 was 347,000 Euro. The total funds for CBWP non-earmarked projects limits the attribution of funds to the activities submitted by the RHCs and will continue to be significant in the future.

15. Ongoing financial support is provided by the Nippon Foundation of Japan, the Republic of Korea and by a contribution from the IHO budget with in-kind support from Member States and from industry. The Secretariat is continuing its campaign to find additional donor States and funding organizations. Taking into account the growing demands for IHO CB activities, more funds and contributions are required. For this reason, the IHO representatives continuously engage with external stakeholders such as the United Nations, IMO, IALA, the European Commission, funding

agencies, academia and industry in general, with priority for the Caribbean, West Africa and South West Pacific regions.

16. Benefit of the full range of IHO Capacity Building activities is accessible only to IHO Member States.

Promoting the marine dimension in global agendas

17. The IHO Secretariat has continued to contribute directly to the UN Committee of Experts on Global Geospatial Information Management (UN-GGIM). At its 12th session in August 2022 the report on the *Implementation and adoption of standards for the global geospatial information community* (Agenda Item 13), was brought to the attention of the Committee by the three Standard Developing Organizations ISO, OGC and IHO Group. This group, being an integral part of the global geospatial information management community, agreed to continue the strong liaison on all levels to further support the UN-GGIM process. In the preliminaries of the session, the Group of Standard Development Organizations (SDO) conducted a side event which was organized and moderated by the IHO. Under the title *"Bringing Land and Sea together – How standardization helps to implement the Integrated Geospatial Information Framework in Coastal States"* this event presented the approach of the maritime domain, how marine geodata can be operationalized by means of IGIF paradigms and presented case studies demonstrating how World Bank's IGIF methodology is applied in developing island/coastal Nation States.

18. The Working Group on Marine Geospatial Information, established by UN-GGIM 7 in 2017 under the co-leadership of Dr John Nyberg (USA) and Ms Pearlyn Pang (Singapore), reported to the Committee of Experts for the fifth time. The growing membership of the Working Group and expanding knowledge on the value of marine geospatial information reflects the overall growing engagements and how the oceans unite and connect diverse stakeholders across the full spectrum of the marine domain, including the oceans and seas, coastal zones and deltas, inland water bodies and waterways.

19. The Working Group remains engaged with the global geospatial community and with international and regional organisations including the International Hydrographic Organization (IHO), the Open Geospatial Consortium (OGC) and the Pacific Community. The group´s work has contributed from a water-themed perspective through various outreach opportunities, notably the webinar series on marine geospatial information last October and the first UN-GGIM International Seminar on Effective and Integrated Marine Geospatial Information Management in May this year jointly organised by the Working Group, the IHO Marine Spatial Data Infrastructures Working Group, and the OGC Marine Domain Working Group, and hosted by the Maritime and Port Authority of Singapore. The outcomes of these activities and contributions from expert representatives, coupled with the 2020 white paper on readily available and accessible marine geospatial information, have driven marine knowledge and the advancement of IGIF-H. The Working Group recommended the outcome document of the International Seminar, the Singapore Statement on Effective and Integrated Marine Geospatial Information Management, for due recognition by the Committee of Experts.

Ocean bathymetry

20. The General Bathymetric Chart of the Ocean (GEBCO) programme is a joint programme that is executed under the governance of the IHO and the Intergovernmental Oceanographic Commission (IOC) of UNESCO. GEBCO is directed by a Guiding Committee made up of representatives from both IHO and IOC and is supported by a Technical Sub-Committee on Ocean Mapping (TSCOM), a Sub-Committee on Undersea Feature Names (SCUFN), a Sub-Committee on Regional Undersea Mapping (SCRUM), a Sub-Committee on Communications, Outreach and Public Engagement (SCOPE) and a Nippon Foundation/GEBCO Training Project Management Committee. SCUFN maintains close liaison with the UN Group of Experts on Geographical Names (UN-GEGN) and with international or national authorities concerned with the naming of undersea features.

21. Through the work of its organs, GEBCO produces and makes available a range of bathymetric data sets and products, including the GEBCO Gazetteer of Undersea Feature Names;

the GEBCO world map; the GEBCO Cook Book; Web Map Services and its lead bathymetric product: a global gridded bathymetric data set.

22. A significant source of data for these products is the IHO Data Centre for Digital Bathymetry (DCDB). One of the primary objectives of the IHO DCDB is to provide an authoritative source of bathymetry for ocean mapping requirements. In order to achieve this, GEBCO proactively collects, stores and disseminates bathymetric data for the world's oceans. GEBCO has worked towards improving its participation in regional mapping activities and has appointed representatives to participate in selected meetings of Regional Hydrographic Commissions that operate under the umbrella of the IHO. Traditionally, GEBCO has focused on waters deeper than about 200 m; however, it is now actively collecting data in shallow water areas to support activities such as coastal zone management and development, and the mitigation of marine disasters such as storm and tsunami inundation. IHO Member States are encouraged to contribute bathymetric data in shallower coastal areas to support the production of higher resolution gridded data products.

23. A new GEBCO 15 arc-second global grid is regularly published every June. The most current GEBCO grid was produced in cooperation with the Nippon Foundation-GEBCO Seabed 2030 Project. The grid uses as a 'base' Version 1 of the SRTM15+ data set (Olson et al, 2014) - a fusion of land topography with measured and estimated seafloor topography. This base grid is augmented with the gridded bathymetric data sets developed by the four Seabed 2030 Regional Centers and compiled into a global bathymetric grid at the Seabed 2030 Global Center. Information on how to access the grid and the data sets included can be found on the GEBCO web site: www.gebco.net/data_and_products/gridded_bathymetry_data/. The new GEBCO grid released in June 2023, contains significantly more data, and the overall coverage has increased to approximately 25%. Work continues on making additional datasets available and encouraging the IHO Crowdsourced Bathymetry (CSB) initiative to help increase publicly available bathymetric data. The Seabed 2030 regional and global centers continue to work closely with the CSBWG.

24. The IHO initiated the Crowdsourced Bathymetry Initiative aiming to incorporate, manage and use bathymetric data acquired by other than conventional means for the benefit of all stakeholders interested in knowing the shape and nature of the seafloor and its depths. The IHO has published a guidance document named IHO B-12 "*Crowdsourced Bathymetry Guidance Document*", which includes a maintained list of Coastal States which positively accept crowd sourced bathymetry activities and the provision of resultant datasets in national waters of jurisdiction: https://iho.int/en/csbwg

Empowering women in hydrography

25. The IHO also supports the joint Canada-IHO project "Empowering Women in Hydrography" as a work item in the Work Programme of the IHO Capacity Building Sub Committee (CBSC). The project seeks to initiate and organize activities which will raise awareness about career opportunities in hydrography and work to increase the number of women in leadership positions. Project activities have included: conducting research to obtain baseline data regarding equity in the hydrographic offices of the IHO Member States, holding webinars which focus on building workplace skills and organizational cultures that break down barriers, holding conferences in conjunction with the celebration of International Women's day, hosting internships, establishing a mentorship program, and profiling female leaders in hydrography who can act as role models to others.

26. As part of its mission to induce "transformative ocean science solutions for sustainable development, connecting people and our ocean", the UN Ocean Decade has endorsed the Empowering Women in Hydrography project as a United Nations Decade of Ocean Science for Sustainable Development action hosted by the World Maritime University's Empowering Women for the United Nations Decade of Ocean Science for Sustainable Development Programme. The IHO and WMU consult each other on matters of common interest to both entities with a view of ensuring maximum coordination of their respective work and activities. These activities include, but are not limited to, events, mentorship programs, workshops, and meetings.

Awareness of hydrography and the future

27. Increased IHO involvement in the United Nations initiative on Global Geospatial Information Management (UN-GGIM) and the steady support of the UN´s Decade of Ocean Science for sustainable development indicates that there is a growing acknowledgement and awareness of the relevance and the underpinning contribution that hydrographic information can make in the context of the 2030 Agenda for Sustainable Development and, in particular, in support of its Sustainable Development Goal 14 - Conserve and sustainably use the oceans, seas and marine resources for sustainable development. The IHO will continue to promote the vital importance of the digital mapping of the oceans presenting seabed topography as the basic information and to advertise for IHO´s S-100 approach to be potentially applicable to all sorts of marine information including chemistry and biology of the oceans resulting in interoperable datasets to form “the digital twin of the Ocean”.