



---

**REPORT TO  
THE UNITED NATIONS COMMITTEE OF EXPERTS ON  
GLOBAL GEOSPATIAL INFORMATION MANGEMENT  
ON  
MARINE GEOSPATIAL INFORMATION  
BY  
THE INTERNATIONAL HYDROGRAPHIC ORGANIZATION**

**General**

The International Hydrographic Organization (IHO) is the inter-governmental technical and consultative organization, established in 1921, whose principal aim is to ensure that all the world's seas, oceans and navigable waters are adequately surveyed and charted. It does this through the coordinated endeavours of the world's government Hydrographic Offices. Membership of the IHO currently stands at 87 Member States world-wide. Each Member State is normally represented in the IHO by its national Hydrographer or the authority assigned with governmental responsibility to ensure the provision of an appropriate hydrographic service in accordance with the obligations of the relevant international treaties such as the International Convention for the Safety of Life at Sea (SOLAS) and the UN Convention on the Law of the Sea (UNCLOS).

Hydrography involves measuring the depth of the water (bathymetry) and fixing the position of all the navigational hazards that lie on the seafloor, such as wrecks and rocks. This is done mainly using specialized ships and boats operating echo sounders and sonars, but useful information is also obtained from mariners using the standard equipment fitted in all ships. Survey aircraft fitted with lasers can be used to survey in shallow water areas when conditions are acceptable. Depth information can be derived from satellite imagery in shallow waters, though its accuracy is variable. Hydrography also involves measuring the tide and the currents.

Hydrographic information is essential for the safe, efficient and sustainable conduct of every human activity that takes place in, on or under the sea or a body of water. Hydrography supports, among other things, ship navigation and safety, port and offshore infrastructure development, marine environmental planning, coastal protection and management, tourism and recreational activities, search and rescue, and maritime boundary delimitation. Hydrography is essential to the sustainable development of the oceans, seas and other significant inland bodies of water, ensuring that the marine environment is respected and that no adverse economic or social impact is incurred.

According to the statistics maintained by the IHO, the depth of at least 85% of the world's seas and oceans has yet to be directly measured. Over 50% of the world's coastal waters have never been surveyed. Geospatial knowledge for most of the world's land mass, as well as for the surfaces of the Moon and Mars are far more detailed than for most of the world's seas, oceans and inland water areas. This means that providing appropriate access to the limited amount of hydrographic information that is available is vital.

A primary reason for the IHO to participate in the work of the United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) is to ensure that the geospatial information under the purview of the IHO is in harmony with and supportive of the global guidance and leadership on geospatial information management that is being provided by the UN-GGIM.

## **Promoting the marine dimension in global agendas**

In September 2015, the UN General Assembly adopted its 2030 Agenda for Sustainable Development. The Agenda specifically targets the sustainability of the oceans under its Sustainable Development Goal (SDG) 14 - *Conserve and sustainably use the oceans, seas and marine resources for sustainable development*. Its Sustainable Development Goal 11, which addresses the resilience of cities and human settlements, refers to the implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030. This framework, initiated at the request of the UN General Assembly, considers the impact of severe weather events and of natural phenomena such as tsunamis. Sustainably managing the oceans and their resources, assessing and controlling the impact of marine disasters and ensuring the integrity of the oceans as stated in December 2015 in the Paris Agreement on climate change, are strongly influenced by our knowledge of the seas and oceans and the work of the world's hydrographers and associated scientists and professionals.

The need for improvements in the mapping of the seas and oceans is an underlying, albeit vital, supporting element to almost all of the targets of SDG 14. Hydrography also covers determining the depth and shape of the bed of inland bodies of water. In this respect, hydrography and the work of the IHO support SDG 6 - *Ensure availability and sustainable management of water and sanitation for all*. In relation to coastal settlements, good hydrography is vital to storm and tsunami inundation modelling - thereby contributing to SDG 11 - *Make cities and human settlements inclusive, safe, resilient and sustainable*. The continuous and long-term measuring and analysis of tides and water levels undertaken by the IHO and its Member States is an important contributor to SDG 13 - *Take urgent action to combat climate change and its impacts*.

## **Developing interoperable IHO standards, guidance, products and services**

The IHO maintains the global standards and guidance that ensure hydrographic information is delivered to users through appropriate harmonized and interoperable products and services. Both elements require easy access to standardized high quality digital geospatial information describing the aquatic environment.

The relevant IHO standards and guidelines on hydrography and bathymetry are reflected in the over-arching global geospatial information management guidance of the UN-GGIM, notably in *A Guide to the Role of Standards in Geospatial Information Management* and its companion document - *Standards Recommendations by Tier*, both published in 2015,

In addition to other long-standing and universally implemented standards for navigation-related products and services, standardized access to hydrographic data and information is supported by the development of newer IHO standards related to latest generation digital products and services under the framework of the IHO standard known as S-100 - *Universal Hydrographic Model*. S-100, which is based on and is interoperable with the ISO 19100 series of geographic standards, has been recognized by the UN's International Maritime Organization (IMO) as the baseline standard for creating a common maritime data structure for e-navigation data access and services. In addition to the IMO, S-100 has been adopted by several other international organizations, including the World Meteorological Organization (WMO), the UN Division for Ocean Affairs and the Law of the Sea (DOALOS), and the International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA), as the baseline standard for the development of some of their maritime data exchange services.

The IHO encourages national Hydrographic Offices to participate in and contribute to the marine element of national Spatial Data Infrastructures so that all relevant hydrographic and particularly bathymetric data is made as widely available as possible to support coastal zone management and marine spatial planning (see IHO Publication C-17 - *Spatial Data Infrastructures: "The Marine Dimension" - Guidance for Hydrographic Offices*, available from the IHO website). S-100 is also meant to provide the appropriate framework to support these developments.

## **Building capacities**

Capacity building is another important component of the IHO Work Programme. The IHO assesses the status of current arrangements in targeted States and assists those 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 and to assist in the achievement of relevant SDGs related to the seas, oceans and other relevant bodies of water. The scope of IHO capacity building encompasses all hydrographic needs as it underpins every other activity associated with the sea and water, 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 growing value and importance of marine geospatial information**

The IHO has recognised that fundamental geodata is a key enabler for economic development and the sustainable use of the aquatic environment. In recognition of this and the importance of making marine geospatial information, especially bathymetry, accessible to the widest possible user community, the IHO adopted Resolution 1/2017 on *Improving the Availability of Bathymetric Data Worldwide* at its most recent Assembly. IHO Member States resolved that, in addition to fulfilling their international obligations to provide hydrographic information in support of safety of navigation, they should also consider implementing mechanisms that ensure the widest possible availability of all hydrographic and particularly bathymetric data, so as to support the sustainable development, management and governance of the aquatic environment. This is very much in line with the guiding principles being pursued by the UN-GGIM.

IHO Resolution 1/2017 was further reinforced by a separate IHO Assembly Decision that supported the continued engagement of the IHO with the UN-GGIM and encouraged the representatives of IHO Member States and the Regional Hydrographic Commissions to engage with the UN-GGIM and its regional entities.

## **IHO and the UN-GGIM**

The IHO, is the intergovernmental technical and consultative organization considered by the UN Assembly and other UN bodies as the competent authority in relation to bathymetric surveying and mapping. The IHO has been active as an Observer in the UN-GGIM from its beginning.

Of particular note, the following IHO activities share common elements with the work and the considerations of the GGIM:

- globally implemented standards for gathering, exchanging and distributing hydrographic data;
- globally implemented standards for the training of hydrographic surveyors and nautical cartographers;

- the provision of the authoritative source of bathymetry for ocean mapping requirements and its extension in shallow water areas to support activities such as coastal zone management and development, and the mitigation of marine disasters through the General Bathymetric Chart of the Ocean (GEBCO) project - executed under the governance of the IHO and the Intergovernmental Oceanographic Commission (IOC) of UNESCO - and the IHO Data Centre for Digital Bathymetry (DCDB);
- the promotion of supplementary methods to improve the currently unsatisfactory world's bathymetric data set, such as:
  - Crowd-Sourced Bathymetry,
  - Satellite Derived Bathymetry,
  - the use of autonomous vehicles for the collection of environmental data, including bathymetry;
- the development and implementation of capacity building programmes to improve global hydrographic capability;
- the encouragement to consider ocean and coastal geospatial data as an integral part of Spatial Data Infrastructures (SDI) initiatives and to incorporate the Statement of Shared Guiding Principles for Geospatial Information Management into the relevant institutional frameworks; and
- the well-established use of Regional Hydrographic Commissions to coordinate and harmonize the delivery of globally available hydrographic services.

## **Conclusion**

The IHO represents a specific, and significant, part of the global geospatial information domain under the purview of the UN-GGIM. Noting the global, over-arching leadership and guidance role of the GGIM in setting the agenda for the development of the total global geospatial information domain and its role in addressing key global challenges, the IHO is keen to continue to ensure that its ongoing objectives are coordinated and incorporated, as appropriate, in the higher level agenda of the UN-GGIM

The IHO recognizes and supports the important role that the GGIM is playing in bringing the land and sea together from a geospatial information perspective. In that context, the establishment of a specific body that will enable the high level of global guidance and coordination that the GGIM currently provides in the land geospatial information domain to be extended and harmonized with the maritime and water domain is a logical development. The IHO stands ready to support such an initiative.