



Hydrographic Services at the Crossroads

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What actually is hydrography? You get different answers to this question. The marine scientist uses this term for physical oceanography without, however, explaining why it should be limited to physics. To mariners, to the hydrographic services themselves, and to the International Hydrographic Organization (IHO) its traditional meaning, at least until recently, has been the description of the physical features of the navigable portion of the earth's surface, with special reference to their use for the purpose of navigation. However, acknowledging the fact that the oceans are used not only for maritime transport, IHO meanwhile gives a broader definition of the term. Hydrography is now defined as 'that branch of applied sciences which deals with the measurement and description of the features of the seas and coastal areas for the primary purpose of navigation and all other marine purposes and activities, including *-inter alia-* offshore activities, research, protection of the environment, and prediction services.'

This broader definition is reflected in the development of the hydrographic services, which are finding themselves at a crossroads today - especially with regard to their international co-operation. A crucial date in this respect is 1 July 2002, when the revised Chapter V of the Annex to SOLAS entered into force: in recognition of their importance to the safety of navigation, hydrographic services have finally been rooted in international legislation. Considering hydrography's long history, with its beginnings somewhere in the misty past, this recent development really deserves some attention.

History of Hydrographic Services

The history of nautical information can be traced back to the earliest days of navigation. In the beginning, such information used to be passed on orally from the older to the younger generation. But, more often than not, it may have been kept secret like a hidden treasure. It was certainly interwoven with tales of adventure and of encounters with terrible sea monsters, or with narratives of merciful rescue by the gods. First written records date back to antiquity. In the *Odyssey*, the expert will find quite a number of sailing directions.

The first navigational charts in history are considered to be the Portulan charts from the 13th century. However, representations of charts existed much earlier than that. The beginnings of charts can be traced back to the Babylonians, but their charts, chiseled into rock, were totally unsuitable for navigation.

The age of discovery gave an enormous impetus to the development of navigational information. The obvious reason for this was that knowledge of the oceans meant control of the oceans. Looking at the ancient Turkish maps and books of Piri Reis, which date back to the early 16th century, one cannot help admiring the advanced

knowledge existing such a long time ago. The amazement of some of our contemporaries has been such that they seriously believe that these maps were created and brought here by aliens visiting Earth. Nevertheless, what was largely non-existent at the time was - as we would say today - a data and information acquisition system and a regular hydrographic service. The beginnings of hydrographic services in the modern sense of the word were much later, in the 17th and 18th century. The first hydrographic service was established in Sweden in 1643. Following next were France (1720), Denmark (1784), Great Britain (1795), and some other states in the 19th century. The German hydrographic service, established as the Prussian navy's hydrographic bureau in 1861, is among the more recent services. These services were mostly part of the national navy. That is hardly surprising because information about hydrographic conditions in the coastal waters, approaches to harbours, and in the open sea was of vital military importance and was an expression of a nation's sovereignty. Here, Erskine Childers' classic thriller 'The Riddle of the Sands' comes to mind, which we all once devoured. Besides, a civil maritime administration was hardly existent at that time.

Development of International Co-operation

Following the establishment of hydrographic services by the states having maritime interests, closer co-operation among them began in the late 19th and early 20th century. A contributing factor certainly was the enormous growth of maritime transport and, with it, growing awareness of the nations' responsibility for the safety of navigation. An important event which mirrored these developments was the International Congress of Navigation held in St. Petersburg in 1908. It ended with a resolution proposing, inter alia, an International Conference of Seamen and Surveyors with the objective of introducing uniformity in signs and abbreviations on charts and sailing directions. The next event was an International Maritime Conference in 1912, again held in St. Petersburg. Because of the large number of subjects discussed, real progress was not achieved, however. That changed after World War I, in 1919, when the First International Hydrographic Conference was held in London which led to the establishment of the International Hydrographic Bureau in 1921. Initially it had 18 member states. By establishing its headquarters in Monaco, it accepted the generous offer of Prince Albert I, one of the great patrons of hydrography and oceanography. Its statutes contained the following definition of tasks:

- To establish a close association between hydrographic offices
- To encourage the adoption of the best methods for hydrographic surveys
- To obtain uniformity in hydrographic documents

The number of its members increased quickly, and the IHB was integrated into the League of Nations. After World War II it recovered with great difficulty and resumed its International Hydrographic Conferences in 1947, to be held again every five years thereafter. Its integration into the newly established UNO was refused by the member states. They decided to remain independent in their hydrographic work.

After lengthy preparations, the original statutes of IHB were replaced by a convention which entered into force on 22 September 1970. The Organisation adopted the name 'International Hydrographic Organization'. The International Hydrographic Conferences became a firmly established part of the Organisation, and the IHB continued to exist as its executive body headed by a Directing Committee consisting of three Directors, as before; it continued to be at the heart of the Organisation. IHO's tasks, now laid down formally in an official convention, differed hardly from those in the original statutes. They comprised:

- The co-ordination of the activities of national hydrographic offices
- The greatest possible uniformity in nautical charts and documents
- The adoption of reliable and efficient methods for hydrographic surveys
- The development of related sciences and techniques

This convention has in fact led to closer co-operation among the hydrographic services. However, it is expressly stated in the convention that IHO only has an advisory and purely technical function. Thus, it

neither stipulates the establishment of hydrographic services nor compliance with the IHO's decisions. This means that the Organisation's only possibility of promoting co-operation is to work efficiently and with convincing results, and to rely on voluntary implementation by the parties. From the perspective of international law, the IHO Convention is a rather imperfect basis for bringing about effective co-operation and facilitation of hydrographic services.

Rooting in the International Law of the Sea

- Irrespective of its importance to the safety of navigation, hydrography hardly played a role in the international Law of the Sea for a long time. First concrete regulations were included in the SOLAS Convention of 1974. Unlike the four preceding SOLAS Conventions, Regulation 20 in Chapter V of the Annex for the first time requires ships to carry adequate and up-to-date charts, sailing directions, lists of lights, notices to mariners, tide tables, and other nautical publications necessary for the intended voyage. These are many typical products of a nautical and hydrographic service. Nevertheless, this Regulation just stands at the very beginning of an endeavour to root hydrographic services in the Law of the Sea. For, firstly, the carriage requirement only applies to adequate - not official - products and, secondly, the states are not expressly required to make available such products at all. One might at best argue that the carriage requirement logically implies a commitment on the part of the states to create suitable conditions allowing shipping to meet this requirement. However, an obligation to establish a state's own hydrographic services cannot be derived from it. All that an individual contracting state might be required to do is to ensure that suitable information material is available to shipping. That requirement is also met, for example, if suitable products are provided by the hydrographic services of foreign states covering also areas beyond their jurisdiction.

- Also the United Nations Convention on the Law of the Sea, that fundamental constitution of the oceans, only touches on the subject of hydrography here and there but ultimately does not contribute much to a firmer legal rooting of hydrography. However, the Convention at least states clearly that hydrographic surveying in the territorial sea comes under the jurisdiction of the coastal state and that such activities are not allowed to be performed by third parties referring, for example, to the right of innocent passage. However such regulations do not exist with respect to the Exclusive Economic Zone, and they cannot be derived from the fact that scientific marine research in this area is subject to approval by the coastal state. This does not cover hydrographic surveying because the terms 'survey' and 'research' are quoted separately and cumulatively in the Convention on the Law of the Sea (Arts. 19, 21). Restrictions on third parties to carry out hydrographic surveying in the EEZ could be derived from other regulations, however. That may be the case, for example, if surveying is performed in preparation of activities coming exclusively under the coastal state's jurisdiction - e.g. the construction of installations or use of resources. The coastal states' obligation to publish nautical charts showing the relevant maritime boundaries, sea lanes, and traffic separation zones can be interpreted at least indirectly as a general commitment to issue nautical charts. Though it has to be taken into account that information about maritime boundaries can also be disseminated in other ways.

- Summarising these facts, it can be said that in the light of the Convention on the Law of the Sea and the legal development that has taken place, the coastal states' competence regarding hydrographic services is undisputed, at least in the territorial sea, but that an express commitment to establish such services is missing, to say nothing of an obligation for international co-operation and standardisation.

- Starting from this meager basis of international law, IHO has indeed done some impressive work. It has initiated useful co-operation among hydrographic services in quite a number of fields. Major achievements have been the development of the International Chart Series with contributions from many states and the development of a concept for a worldwide database system for the electronic navigational chart.

Another focus of IHO's work, which is of considerable importance, is standardisation. Its wide range of

largely unnoticed in the hydrographic community. The fact that the future consequences of the revised Chapter V were not discussed at the 16th International Hydrographic Conference in April 2002 throws a rather critical light on IHO, which is not really encouraging. It is hardly an excuse that the revision had not yet entered into force at that date. Of course it would be a most prominent task for IHO to emphasise, to accompany and to monitor each step in the implementation of the new SOLAS Regulations. This includes:

- Verification whether adequate hydrographic services are provided by the states, including the promotion of ECDIS which is now officially recognised by SOLAS
- Clarification of the scope of future standardisation requirements
- Determination which resolutions and recommendations have been referred to in the individual case
- General principles for an adequate supply of small craft shipping with nautical charts and publications

Unless IHO addresses these issues with determination, there is a risk of other international institutions, especially IMO itself, but also standardisation organisations, dominating the discussion. This would inevitably lead to general reflections on whether or not there is a need for an independent hydrographic organisation.

Hydrography and Marine Environmental Protection

With insufficient activity on the part of IHO, it is conceivable that hydrographic issues may be embedded much more firmly in innovative forms of co-operation developing not only within Europe but also in other regions of the world. It is important to note in this connection that there is generally a growing awareness of the importance of hydrography to the safety of navigation and prevention of marine pollution, also on a regional level. At an extraordinary ministerial meeting in September 2001, the Helsinki Commission, whose task is the protection of the Baltic Sea, adopted a comprehensive packet of measures aimed at improving the safety of navigation in the Baltic Sea area. Among a large range of measures, it also provides for an intensification of the activities of the Baltic Sea states' hydrographic services. An important fact is that the measures have not been agreed solely as a political declaration of intent by the ministers but that the Helsinki Convention has been amended at the same time, with binding effect under international law.

In particular, the amended Convention requires the Baltic Sea states to develop a scheme for systematic resurveying of major shipping routes and ports and to begin implementation by 2003. The standards to be met by hydrographic surveying must not be inferior to the latest IHO standard. This standard, which ultimately had been non-binding until then, has thus become binding under international law, at least on a regional level. Moreover, hydrographic services must ensure that major shipping routes and ports are covered by ENC by the end of 2002, secondary routes by the end of 2004, as a prerequisite to the introduction of the electronic chart display and information system ECDIS. This is to ensure that ECDIS will be available for the whole Baltic Sea area. At the same time, the Governments are required to accept ECDIS as equivalent to paper charts. As SOLAS presently does not yet include an international carriage requirement for ECDIS, the Baltic Sea states are to enter into negotiations with shippers and recipients with the aim that the commercial parties make arrangements to the effect that ships with a draught of 11 m or more, tankers with a draught of 7 m or more, chemical tankers and gas tankers irrespective of size, and ships carrying radioactive cargo carry ECDIS. On the vessels in question, port state control of paper charts will be intensified by the end of 2002 at the latest. If it is found that a vessel does not carry up-to-date paper charts, sanctions will be imposed.

This is the first time that concrete obligations for hydrographic services have been laid down in an environmental convention. At the same time, by referring to the IHO principles of hydrographic surveying, it emphasises their importance as internationally recognised standards that have to be complied with. An example has thus been set in the Baltic Sea area which could inspire activities in other regions as well. This may strengthen IHO if it decides to deal with these issues in an active and constructive way and takes adequate measures to ensure that the individual regional requirements are met.

New Tasks

By including regulations relating to hydrography, the intention of both SOLAS and the Helsinki Convention is to ensure the safety of navigation. Hydrographic services, however, are not only important to shipping but beyond that also provide - as is illustrated by the few regulations concerning hydrography which are included in the Convention on the Law of the Sea - a marine data bases. There is a growing awareness that hydrographic surveying and the collection of hydrographic data are playing an increasingly important role also in a number of other fields. That applies, for example, to the use of marine resources and to those aspects covered by the rather vague term 'coastal zone management'. Therefore, it is high time for a much wider definition of the term hydrography, which should not be limited to shipping but should rather be defined as a description of the seas for all maritime purposes. On that basis, the hydrographic services should embark on the task of developing a marine geodata information system. Such a system which in the long run should result in a more or less global coverage, can only be achieved through international co-operation and sharing of tasks, for which IHO offers a suitable framework.

Challenges to Be Met

Taking into account all of these aspects, one can say that hydrography entails major new challenges going far beyond navigational interests. Only the future will tell whether IHO will be able to meet these challenges, or whether other institutions will assume more and more of its functions. Undoubtedly, IHO, which in some way is still rooted in the early 20th century, is facing major changes. With its very traditional structure and organisational set-up, which still values technical knowledge and experience far higher than management and leadership skills, it will not be able to cope with the future. What is required is nothing less than a total reform of IHO, which will have to include a revision of the Convention with respect to tasks, competences, and organisational structure. Also indispensable will be a stronger hands-on contribution of the member states to the Organisation's technical work, which in the past has been left largely to the IHB. It will be crucial to succeed in the support of developing countries in order to help them build up competent hydrographic services. This requires much more concentrated efforts of IHO, but ultimately depends on the willingness of highly developed countries to actively contribute to projects of technical assistance.

However, whether or not the hydrographic community will successfully meet future challenges also depends on an other factor, that is the private sector. It is obvious that potential users as well as industry must be much more integrated into IHO, not only with respect to the development of standards, but also in terms of private-public partnership.

Putting hydrography on the desk of governments will certainly contribute significantly to an expansion of the hydrographic market. States, in conjunction with the UN law of the sea and the increasing demands of administering their territorial waters and EEZs, will have to invest in order to develop and maintain sufficient knowledge of their waters. Although this task is usually in the responsibility of governmental authorities, industry is needed as partner to get the job done. The government sector is almost nowhere expanding anymore, so that added responsibilities will have to be carried out increasingly in co-operation with industry. Hydrography, particularly at sea, means heavy-duty high-tech. Expanded responsibilities of states for their waters therefore create an expanded market to manufacturers of hydrographic systems as well. We are at present only at the beginning where states are gradually becoming aware of their increased seaborne responsibilities. The impact on hydrographic industry certainly will develop only gradually. One can foresee that, at the end of the day, the nations' sea areas will experience a similar intensity and depth of administration and management as it is customary ashore. One may deplore this as loss of freedom of the seas, but the overall objective is to guarantee a sustainable development of all areas including the seas. And this is not possible without the necessary management. For the hydrographic industry this means not only bureaucratic constraints, but also a promising future on the market.

activities in this field includes, for example, the setting of minimum standards for hydrographic surveying and the standardisation of colours and symbols, among many others. In this way, navigational charts throughout the world have become more and more similar in appearance, which has simplified their use and enhanced the safety of navigation. To facilitate co-operation, IHO has also developed principles for the exchange of data and charts among hydrographic services on the basis of bilateral agreements. This has led to a concrete intensification of contacts and, in the longer term, networking among the hydrographic services involved, especially on a regional level. Nevertheless, an overall appraisal leads to a rather critical result: Worldwide, nearly half of all coastal waters are still inadequately surveyed. In many parts of the world, the last surveys were made several decades ago. The introduction of the novel electronic nautical chart system ECDIS, which will contribute substantially toward improving maritime safety, has stagnated in many states. This is due to the fact that often such states either have no hydrographic service or such services are inadequately equipped for the task. Although the IHO is trying to improve this situation, especially with a view to capacity building, little has actually been achieved to date.

- The community of states has not taken much notice of hydrography until fairly recently. In 1998, the International Year of the Ocean, the UN General Assembly for the first time passed a resolution on the promotion of hydrographic services. Largely adopting the targets stated in the IHO Convention, it called for the states to co-operate in the field of hydrographic surveying in order to improve maritime safety, to ensure uniformity in charts and nautical publications, and to co-ordinate their activities in order to ensure worldwide availability of hydrographic data. This resolution by the supreme body of the community of nations lends particular weight to the work of IHO. It does not, however, create any obligations that are binding under international law but rather constitutes an expression of political goodwill.

New Situation Due to SOLAS

A completely new situation has arisen after the total revision of Chapter V of the Annex to SOLAS. After several years of discussion, a revised version containing a body of rules regarding the safety of navigation was adopted by the Maritime Safety Committee of IMO in December 2000, which entered into force on 1 July 2002 and is binding under international law. Following a proposal made by Germany, the hydrographic services are now expressly mentioned in Chapter V.

- Under the new Regulation 9, the governments which are parties to SOLAS are now required to maintain hydrographic services. This includes the obligation to arrange for the collection and compilation of hydrographic data and the publication, dissemination and keeping up to date of all nautical information necessary for safe navigation. At the same time, the governments are required to co-operate and to carry out nautical and hydrographic services in the manner most suitable for the purpose of aiding navigation. The compulsory scope of such services encompasses:

- Hydrographic survey adequate to the requirements of safe navigation
- The issue of nautical charts, sailing directions and other nautical publications
- The promulgation of notices to mariners in order to keep up to date nautical charts and publications
- Data management arrangements to support these services

In a definition under Regulation 2, para 2, it is clearly stated that such nautical charts and publications must have been issued by or on the authority of a relevant government institution. Regarding the responsibility of the coastal states, a footnote has been included which refers to the appropriate resolutions and recommendations of IHO. Regulation 9, moreover, requires the governments to ensure the greatest possible uniformity in charts and nautical publications. In this regard, maximum compliance with the relevant international resolutions and recommendations should be achieved. Again a footnote refers to the relevant decisions and recommendations of IHO.

Finally, the governments undertake to co-ordinate their activities to the greatest possible degree in order to ensure that hydrographic and nautical information is made available on a worldwide scale.

- This regulation constitutes a quantum leap in the history of hydrography, for several reasons:
 - For the first time in history, international law makes it mandatory for states to operate hydrographic services. This obligation applies to all states that are parties to SOLAS, i.e. it goes far beyond the group of IHO members. It should be noted in particular that the requirements to be met by hydrographic services are laid down in considerable detail
 - Although a commitment to co-operate, standardise, and co-ordinate activities on a worldwide scale is also included in the IHO Convention, that commitment is formulated with much less precision, rather as a general goal
 - Finally, the crucial factor regarding implementation of these commitments is that SOLAS refers to the relevant decisions and recommendations of IHO, which are thus connected with the SOLAS Convention. In this way, the IHO decisions take on a new quality under international law, namely that of generally recognised rules and standards as referred to in Articles 211 and 219 of the Convention on the Law of the Sea. They must be taken into account whenever possible- that means as a matter of principle - and can no longer be disregarded on the grounds that they are not binding. This clearly enhances the value of the IHO functions

There is another aspect which is of considerable importance to the work of hydrographic services. The problem in question is to what extent and on what basis hydrographic services are authorised to issue charts covering sea areas which come under the jurisdiction of another coastal state. This was quite a critical issue during the preparatory drafting work. In the end the solution was to refer in a footnote to the resolutions and recommendations of the IHO concerning the authority and responsibilities of coastal states in connection with the definition of nautical charts. The underlying consideration is that the coastal states are, in principle, responsible but other hydrographic services are also allowed to issue charts for such areas if they have been duly authorised to do so by the responsible coastal state in compliance with the relevant IHO decisions. The regulation to be applied in this context is primarily the IHO Technical Resolution A 3.4, amended in 1997, which provides for co-operation and bilateral agreements while recognising the primary rights of the coastal state concerned.

- The revised Chapter V strengthens hydrographic services in yet another respect. Under Regulation 19, para 2.1.4, all ships are required to carry adequate nautical charts and publications. This requirement is confirmed additionally by Regulation 27, which corresponds to the version of 1974. However, the definition of the term 'charts and publications' now makes it clear that the carriage requirement applies to official products exclusively. The carriage requirement covers all ships and all ship sizes, i.e. it also applies to small craft and, in particular, pleasure craft. The common practice of using charts from private publishers on board pleasure craft is contradictory to this regulation. In future, this practice will only be in line with SOLAS if the states have exempted small craft from the carriage requirement, a possibility provided under Regulation 1, para. 4. Even though in such cases of exemption non-official charts may still be carried on board, this does not in any way affect the fundamental principle of SOLAS that, in order to ensure the safety of navigation, vessels have to carry official nautical charts and publications. Irrespective of the fact that exemptions may be granted subject to certain conditions, this regulation at least creates a commitment for hydrographic services to issue adequate nautical charts and publications also for small-craft navigation. The question in principle whether it is a compelling task for a national hydrographic service to provide products for this sector of shipping, which has been discussed repeatedly at international meetings, has thus been settled. This is resulting from the fact that in principle the carriage requirement applies to all ships.

- Without exaggerating, one can certainly say that these new regulations hail a new era for hydrographic services worldwide and for their co-operation. It is nothing short of amazing, therefore, that this seems to go

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Biography

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