

THE ECONOMIC BENEFITS OF HYDROGRAPHY AND OCEAN MAPPING

Gordon Johnston, United Kingdom

Abstract. To generate discussion around the need and justification for the development and sustained use of hydrographic services to support and expand a national, regional or local economy, this paper sets out to examine the current status of hydrography in several areas in relation to a number of disciplines and user groups. The use and benefit from Hydrographic data and products for stakeholders are often promoted however there appear to be few direct and tangible outcomes rather than simply vague links and indirect consequences. This paper aims to offer a summary of some example assessments. For the increasingly competitive market place of the global economy, coupled with a consumer group of increasing knowledge and awareness of environmental issues the baseline and framework for many activities relies upon good quality, reliable and objective data sets. The paper offers some thoughts on how modern Hydrographic data and products as well as the Hydrographic community could influence and aid in the strategic development of areas and regions by working with the various stakeholders.

Key words: Hydrography, economics, bathymetry, capacity building, stakeholders

1 INTRODUCTION

Over 90% of international trade is transported by sea. A fundamental requirement for the safe transportation of goods is adequate nautical charting. Yet despite this massive reliance upon sea transportation many areas and regions do not have adequate cartographic coverage.

In the 4 years of the FIG Commission 4 Working Group several regions have been reviewed to assess their current status with respect to nautical charting and the potential Stakeholders who may benefit from good survey data and products.

2 REGIONAL STATUS

There are quite a number of important factors that may influence the status of Hydrography and Hydrographic services for a maritime state. For many Small Island Developing States there is a huge challenge in terms of the logistics and the areas requiring coverage, such that the financial burden would be enormous without some aid from developed states. These nations are often motivated by the need for safe transportation of goods and exports as well as the safety of life at sea; a perceived benefit in terms of keeping the shipment of goods safe. For other developing areas such as West Africa, the challenge is more the political will to focus on the sea and the value that the maritime coastal zone can contribute to a state's wealth and prosperity. Many consider that the beneficiaries are only the local inhabitants who make their living from the fishing and tourism. This is a limited view which should be reconsidered. The IHO maintains a publication, C-55, on the IHO website that aims to detail and describe the current status of Hydrographic surveys for each maritime state (http://www.iho-ohi.net/iho_pubs/IHO_Download.htm).

For some regions, such as the Caribbean or the Far East, there is a growing demand for good Hydrographic surveys and coverage due to the interest of ocean cruise companies that wish to visit more exclusive and unexplored islands and areas of our seas and coasts. These large commercial enterprises form a strong demand for up to date products. Such regions are under pressure to balance the increase in maritime traffic and to preserve their, often little known, environmental regime.

Island states and many of the maritime states of West Africa may be relatively far from the modern developed urbanized growth taking place however their remoteness means that these states must compete at the international level even more effectively so as to not lose out on expanding markets. Some countries have only a few ports and well established routes for shipping. Others rely upon smaller ports and a less well developed infrastructure of maritime routes as well as the ports and harbours that must act as trade hubs.

Regional studies indicate that there is a lack of up to date charting and hydrographic survey data in many developing maritime areas. However that is not to say that there is no hydrographic survey activity. It is thought most likely that the specific surveys being undertaken either, do not meet the required international specifications to enable the data to be used for hydrographic purposes, or the data is restricted or lost.

Whatever the reason for the lack of suitable Hydrographic surveys and data, it's clear that regions and maritime states must look to find the beneficiaries of any up to date hydrographic data and create a facility to ensure as many users as possible of the data gain access. These Stakeholders may form a vital focal point to support the development of Hydrographic services.

3 STAKEHOLDERS

There are quite a number of potential Stakeholders when the uses and applications of Hydrographic data and products are considered. There may be government agencies and departments, ports and harbours, environmental organizations, tourism and aquaculture and administrative groups. These varied government and commercial enterprises may form a strong demand for up to date products.

Commercial Shipping: Coastal freighters and Panamax container vessels as well as cruise operators require good and up to date information. The impact of poor routing into and out of ports restricted berthing and anchoring as well as general safe traffic movements have significant cost implications. Fleets are being replenished, vessels renewed or replaced and owners should have the confidence that investment in modern and efficient techniques will ensure quick and safe passage.

Tourist Organisations: Aim to offer new and "unspoilt" locations and many involve sea and coastal spots. Maintaining coastal waters, bays, beaches and islands all require and benefit from modern up to date Hydrographic data.

Ports and Harbours: As the economic hubs for many maritime states, the infrastructure of modern ports require that the seaward routes and passages are also surveyed, maintained and made available for the transportation of goods and exports etc. These authorities often are direct beneficiaries of good up to date Hydrographic data. The case for the collection and management of survey data can be made on the basis of the direct benefits to the coastal region and local interior to the port. The Middle East is cur-

rently seeing a series of port expansion projects that are investing millions to develop their ports and ensure the viable transportation of goods. In the Caribbean region port developments have relied upon dredging and channel surveys to ensure safe access. What is vital to the success of these ventures is adequate Hydrographic survey data to provide safe berthing and passage for the ever increasing numbers and size of vessels.

Local Communities: The residents and communities that live on or near the sea depend directly upon its ability to provide them with a source of food and income. These communities rely upon their habitat often without the benefit of a benchmark assessment and survey. Consequently it is a challenge to allow development and change without being able to understand if there will be a negative impact.

Fishing and Aquaculture: Often the local communities, referred to above, are involved in commercial fishing and farming. However it requires care in the placement of a fish farm to avoid pollution and health risks to the fish. The audience at the Costa Rica FIG meeting heard of just such a situation occurring locally in the region. Fish stocks and quotas are all too familiar concepts but without good monitoring and surveys, the management of stocks and the spatial distribution of resources are very difficult. Recent Hydrographic surveys in areas of the north Atlantic have supported the management of fish stocks using efficient use of data.

There are many other potential Stakeholders, all with their own specific interests and requirements of the data and products. New Stakeholders will probably appear if some of the experiences of the developed maritime states are to be followed. The benefits of modern up to date Hydrographic data has been shown, in the case of the Irish Seabed Mapping Programme, to provide benefits to over seven categories of Stakeholders as well as over 100 research initiatives.

4 THE HYDROGRAPHIC VALUE CHAIN

The value chain that represents Hydrographic data starts with data collection. This is an activity that requires up to date highly technical equipment and suitably trained personnel both of which represent a relatively high investment. However without the data no further progress can be made to develop and improve the situation. Data collection alone is not sufficient, as the data collected must be of a suitable standard and then be processed to create products that are of interest and value to as many Stakeholders as possible. The data products must also be made available to as many as possible through data management facilities, mapping and web enabled access points.

The starting point for many coastal, marine and water based developments must be a good map and this requires that a good Standard of survey is executed to provide that basis. A national Hydrographic Service to provide a national focal point and to collect and maintain the data can serve to add value and sustain the value chain from data collection to data products for Users.

5 INTERNATIONAL STUDIES

Only a very few studies and reports have been generated that provide any detail regarding the need for a Hydrographic service in terms of the benefits it can bring to a maritime state or the major Stakeholders in a region. Two examples are given here:

5.1 APEC Transportation Working Group Study (2002)

This study concentrated upon archipelagic states in the Pacific but its findings and recommendations offer some fundamental points that seem relevant to any maritime state wishing to develop and benefit from Hydrography. It recommends a state to undertake a study of its Hydrographic Office or Service to identify areas that need attention. The report also developed a high level model to facilitate the economic analysis for the Hydrographic requirements. Further the APEC report recommended that a 5 year plan was created and that the objectives were included in national or ministerial development plans. Regular review and assessment of the progress was to be achieved through the introduction of co-ordination arrangements allowing the identification of the benefits.

5.2 UN Maritime Transportation Development Study (1989)

This study, although now relatively old, indicates some of the institutional areas that also need to be recognised and addressed if relevant to a maritime state or region.

The UN study identified that delays in the processing of permits and clearances to access partner organizations often impacted on the efficiencies of projects. Further the outdated procedures, procurement policies and relatively inadequate human resources and labour combined to stall or even prevent capacity being developed. For any groups wishing to develop and sustain Hydrographic services these potential obstacles will be no exception and the UN urged that strategic plans recognize and address these to create suitable conditions for sustainable development of capability and capacity.

6 CASE STUDIES

As well as the international studies some maritime states have also reviewed the situation.

Canada undertook a review of the cost of the Canadian Hydrographic Service in 1992 and concluded that, on the basis that the charts were the “maps” of the maritime highways supporting better, safer, cheaper transportation then the return on Hydrography was 10 to 1.

More recently in 2008, the Irish Seabed Survey reported their conclusion that the benefit of their surveys is likely to be in the order of 6 to 1 based on a wider group of Stakeholders.

Consequently maritime states recognizing the benefits as outlined by these studies, will wish to seek support in developing their capacity and Hydrographic capability, if not for the direct economic benefits but for other political and geo-spatial purposes. Countries such as Bangladesh, Papua New Guinea and states bordering the Red Sea have all benefitted from the direct support and collaboration with other maritime states whose Hydrographic services are developed and can contribute expertise and training to develop a sustained capability.

7 SUMMARY

Direct links between Hydrographic surveys and the economic benefits to the local community and developing maritime states have usually not been easily identified and quantified. This has hindered the creation of up-to-date Hydrographic capacity and resulted in the loss of economic benefits due to a lack of recognition that Hydrographic surveys can and do provide a basis to develop a value chain of data products and services to support their socio-economic needs and challenges.

Strategic plans and investments should include Hydrographic surveys as a fundamental component to building capacity that directly benefits the local communities, industry, transport and economies, with a return in excess of 5 to 1.

SELECTED REFERENCES

Australian Dept. of Defence: An economic analysis of the benefits of the RAN hydrographic programme, 1992.

Brinkman, G. L., and S. L. Caverley. *Benefit-Cost Assessment of the Canadian Hydrographic Service*. Report prepared by Intercambio Limited for Canadian Hydrographic Survey, Ottawa. 1992.

A Study for the APEC Transportation Working Group "An Analysis of the Economic Benefits of the Provision of Hydrographic Services in the APEC Region" in 2002.

BIOGRAPHICAL NOTES

Gordon Johnston is director of Venture Geomatics Limited, an independent consulting and technical training group in the UK. He joined Decca Survey as a field surveyor, working in Europe and Africa and became Chief Surveyor of Racal Survey in 1993. In 2004 he started consulting for non government, commercial and international organisations providing strategic technical, market and commercial services. He is based in the UK and is the chair of the FIG/IHO/ICA International Board on the Standards of Competence for Hydrographic Surveyors and Nautical Cartographers and a vice chair of FIG Commission 4.

CONTACT

Gordon JOHNSTON, Director, Venture Geomatics Limited, UK gordon.johnston1@orange.net.