

The Necessity for National Hydrographic Service in African Countries Using Ghana and Nigeria as Case Studies

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SUMMARY

Millions of people live in the coastal areas and depend on the sea and marine environment in as their source of life.

Safe and proper navigation reduces incidents at sea and on our water bodies hence this requires accurate, up-to-date and timely available hydrographic data, information and products delivered in a standardized and internationally recognized form.

Hydrographic information is a national asset required by both governments and private sectors. Each country needs to establish, agree and set its international borders and boundaries. Hence It is evident that somebody needs to have the responsibility, at the National Level, of conducting Hydrographic Surveys and producing Nautical Charts, also of building and keeping hydrographic databases for the preparation of special products required.

At the moment, in most African Countries, there are no standard quality control and quality assurance on the information generated through individual efforts. Moreover, the data and information collected by private companies are not maintained and kept conveniently archived for future national uses.

Although conducting hydrographic surveys and producing nautical charts are activities that can be contracted, it is a must to have the capability to understand and establish technical specifications and standards that must be followed. All these can only be managed by a Centralized Agency, a National Hydrographic Service,

A National Hydrographic Service is a “**MUST**” for any maritime country with the willingness to offer its citizens the advantages of having the sea as part of its territory.

This paper intends to highlight some of the hydrographic problems in Africa and the urgent need for a National Hydrographic Service.

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1. WHAT IS HYDROGRAPHY

IHO defined Hydrography as the branch of applied sciences which deals with the measurement and description of the physical features of oceans, seas, coastal areas, lakes and rivers, as well as with the prediction of their change over time, for the primary purpose of safety of navigation and in support of all other marine activities, including economic development, security and defence, scientific research, and environmental protection.

2.1 The Importance of Hydrography

IHO further stated that in addition to supporting safe and efficient navigation of ships, hydrography underpins almost every other activity associated with the sea, including:

- Resource exploitation - fishing, minerals, etc
- Environmental protection and management
- Maritime boundary delimitation
- National marine spatial data infrastructures
- Recreational boating
- Maritime defence and security
- Tsunami flood and inundation modelling
- Coastal zone management
- Tourism
- Marine science

2.2 International Obligations

In July 2002, the revised Chapter V of the IMO Safety of Life at Sea (SOLAS) Convention entered into force. Under the new Regulation 9, the Contracting Governments of SOLAS are now required to provide and maintain Hydrographic Services and products.

In the past few decades, the following important factors have emphasized the need for adequate hydrographic survey coverage and the production of nautical charts and publications as required by SOLAS Chapter V;

- the advent of exceptionally deep draught VLCC ships

- the need to protect the marine environment
- changing maritime trade patterns
- the growing importance of seabed resources
- and the U.N. Law of the Sea Convention affecting areas of national jurisdiction

Many charts which were adequate a decade ago, may have to be recompiled using new survey data, collected to a higher degree of accuracy and providing improved coverage. This deficiency may not be limited to sparsely surveyed waters of developing nations, but may also apply to the coastal waters of major industrial states. The advent of accurate satellite navigation has made poorly positioned historical data an even greater problem for navigators. Fortunately, new survey technologies have improved the precision to which modern hydrographic surveys can be conducted.

2. HYDROGRAPHY IN GHANA



Figure 1 Map of Ghana showing Ghana Rivers and Capital

Ghana, which lies in the center of the West African coast, 2,093 km of land borders with the three

French-speaking nations of Burkina Faso (548 km) to the North, Côte d'Ivoire (668 km) to the West, and Togo (877 km) to the East. To the South are the Gulf of Guinea and the Atlantic Ocean. See figure 1 above.

With a total area of 238,533 square kilometers, Ghana is about the size of the United Kingdom, or slightly smaller than Oregon. Its southernmost coast at Cape Three Points is 4° 30' North of the Equator. From here, the country extends inland for some 670 kilometers to about 11° North. The distance across the widest part, between longitude 1° 12' East and longitude 3° 15' West, measures about 560 kilometers. The Greenwich Meridian, which passes through London, also traverses the eastern part of Ghana at Tema.

Ghana statistically has a coastal length of 539 km, a continental shelf area of 23,700 km² and an exclusive economic zone (EEZ) of 349 km².

Volta Lake, the largest artificial lake in the world, extends from the Akosombo Dam in Southeastern Ghana to the town of Yapei, 520 kilometers (323 mi) to the North. The lake generates electricity, provides inland transportation, and is a potentially valuable resource for irrigation and fish farming.

3. SOME OF THE PROBLEMS WITH HYDROGRAPHY IN GHANA AND ITS ECONOMIC IMPLICATIONS.

- Poor or dangerous maritime facilities resulting in reduced maritime trade.
- Underdeveloped fishery activities
- Poor development of marine recreation and boating
- Poor protection of coastal areas from maritime disasters (tsunamis, typhoons etc...)
- Difficulty in managing and developing the coastal zone
- Limited support to national and international shipping affecting safety, the environment and mariners' lives.
- It will be difficult to support and progress the exploitation of marine resources
- Inability to properly delimit, declare and enforce national maritime boundaries

These answers all highlight the need to provide hydrographic services in a coastal State.

3.1 Is National Hydrographic Service Necessary For Ghana?

Yes. Due to the following reasons;

- Ghana is a Coastal State and lies on the Western Coast of Tropical Africa.
- Ghana is bordered on the south by the Gulf of Guinea and The Atlantic Ocean.
- Ghana has two International Ports, Tema and Takoradi harbours
- Ghana has one of the largest artificially created lakes in the world, Lake Volta.

3.2 Procedure For Establishment

- Ghana has to acknowledge the need for a National Hydrographic Service.
- Identify all Stakeholders and Institutions that possess and use hydrographic data.
- Institutions/Stakeholders to determine the appropriate governmental authority to which the future hydrographic service will report, then identify a body to host the National Hydrographic Service.
- A Technical Status Report be prepared as a result of a Technical Cooperation Project.

3.3 Hydrography In Nigeria



Figure 2 Map of Nigeria Rivers

Nigeria has a population of over 120 million and a growing economy fueled by the exploitation of hydrocarbons. The maritime sphere plays a vital role in this growth. Over 80% of Nigeria's trade is

conducted by sea. Southern Nigeria is dominated by the combined delta area of the Niger and Benue river systems which provide extensive inland waterways and numerous inland ports. Oil and Gas products are extracted both onshore and offshore.

Nigeria does not have any natural harbours on the coast, all of the ports have been developed inside the vast system of river tributaries of the Niger-Benue delta. Congestion is a problem at most ports, where there is no space for expansion on the network of islands and increasing pressure on land access routes due to high traffic density and poor road networks. Although the inland waterway system is extensive it suffers from heavy siltation and continuous maintenance dredging is needed to keep routes open. The coastal ports act as transshipment points between ocean, coastal and inland routes.

Offshore oil and gas fields under production are mainly concentrated in the Eastern area off Port-Harcourt. Several major pipelines come ashore, however there is a recent trend towards the introduction of Offshore Production, Storage and Offloading Vessels (OPSOV).

Nigeria has two major ports. The major ports are Lagos and Port Harcourt, with numerous other ports and terminals serving the oil industry and coastal trade. Lagos and Port Harcourt serve as the major hub ports between the sea and inland waterway and road traffic routes. Container traffic mostly arrives at Lagos.

Nigeria serves as regional hub for trade between West African countries in the Gulf of Guinea. Inland waterway routes also extend into Cameroon and Benin.

3.4 Is A National Hydrographic Service Necessary For Nigeria?

The answer is yes. Nigeria is long overdue for this. For some years now the Navy and members of the Nigerian Hydrographic Society of Nigeria have been clamouring for this and made different publications on the national newspapers but till date nothing has been done.

3.5 Reasons for the National Hydrographic Services in Nigeria

Different Government sectors and in the Oil and Gas sectors are custodian of their data and thus different sectors have different information about an area (proliferation of data). For example,

The Nigerian Navy Hydrographic Office (NNHO) has responsibility for ensuring the provision of hydrographic services throughout Nigerian waters. This includes the production of Tide Tables and circulation of Notice to Mariners (these are issued through Chief of Training and Naval Operations). The NNHO approves all requests for mineral exploration, production or pipeline activities such as offshore surveys, rig moves and pipeline lays.

Besides giving permissions, the NNHO also embarks in vessels conducting offshore surveys in order to ensure their activities are in accordance with agreed terms. Although charged with the responsibility for conducting hydrographic surveys in Nigerian waters, the NNHO has neither the ships nor equipment to be able to do so at present. NNHO also has responsibility for maintaining a wrecks database. The NNHO is the official point of contact with the UKHO which currently acts as the primary producer of charts of Nigerian waters and is therefore reliant on Nigeria for the supply of updating information.

The Nigerian Ports Authority (NPA) has responsibility for the maintenance of channels, provision

maintenance of nav aids, and the promulgation of local Notices to Mariners (NtMs) within the designated NPA limits. These limits normally extend from the fairway buoy to the limit of port areas, however there appeared to be some overlap with NIWA where port facilities were developed in creeks that were not officially under NPA jurisdiction. This emphasized the need for close co-operation between the two authorities to ensure that provision of hydrographic support for safe navigation was not neglected in such cases.

The National Inland Waterways Authority (NIWA) has responsibility for the safety of navigation on the inland rivers, tributaries, creeks and lagoons where they are not otherwise under the jurisdiction of the NPA.

The Nigeria Maritime Safety Administration Authority (NIMASA) and the Government Inspector of Shipping (GIS) has responsibility for overall Maritime Safety matters and the implementation of international shipping regulations. The NMSAA are, amongst other things, actively involved in developing national capability in Search and Rescue (SAR) and pollution monitoring and control. NMSAA are also actively investigating setting up a Vessel Traffic Management Scheme to improve safety in Nigerian waters. GIS is the appointed receiver of wrecks and has responsibility for identification and recovery of wrecks. It was noted that GIS had produced a catalogue of the many wrecks that exist in Nigeria.

Recall that The NNHO is responsible for maintaining a wreck database and promulgating NtMs as well as informing the responsible charting authority where appropriate. NPA also has the responsibility of promulgating NtMs.

While the Nigerian Navy (NN) has responsibility for carrying out patrols in support of fishery protection and operations to counter illegal trafficking; however, the capability was reported to be severely limited and rarely employed. Likewise there is no significant NN capability to engage in SAR operations. The NN does have requirements for improved hydrographic data to support naval operations but no specific plans have been made due to insufficient funds.

From the above it is noticed that there are diverse responsibilities of each sector and each maintaining its own data not to mention the Oil and Gas sector with each maintaining their own data. Hence the need for a central body to coordinate all these activities.

4. ROLES AND FUNCTIONS OF A HYDROGRAPHIC SERVICE

4.1 The Roles

Primarily to aid the efficient and safe use of maritime transport

- -To collect, with systematic surveys at sea and along the coast, geo-referenced data.
- -To process the information collected in order to create organized databases capable of feeding the production of thematic maps, nautical charts and other types of documentation
 - To update the databases through re-survey when and where needed, gathering supplementary information from other maritime authorities
 - To ensure the production, distribution and updating of charts

- To ensure the timely dissemination of maritime safety information

4.2 The Functions

Primarily the co-ordination and management of hydrographic services

- MSI and AtoNs
- RNW
- NtoM
- Hydrographic surveys
- Determine the need for surveys
- Instigate surveys
- Co-ordinate government ministries and commercial surveys

Nautical charts

- Production
- Distribution
- Maintenance

Nautical publications

- Production
- Distribution
- Maintenance

Provide information to marine spatial users

5. SOME WORLD HYDROGRAPHIC OFFICE / SERVICE

5.1 The United Kingdom Hydrographic Office (UKHO)

The UKHO has a world-class reputation for providing safe and accurate navigational information, essential to the needs of the Royal Navy and merchant mariner.

The UKHO has a proud history, going back more than 200 years. It has always had an enviable reputation for the quality and accuracy of its charts and other products.

Some of the objectives of the UKHO are to provide:

- Operational support to the Royal Navy and other Defence customers
- Support to “Safety of Life at Sea” treaty obligations
- Developing profitable business streams
- Organisational excellence

5.2 United States

In United States statutory authority for hydrographic surveys of territorial waters and the

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Exclusive Economic Zone (EEZ) lies with the National Oceanic Atmospheric Administration (NOAA).

NOAA hydrographic surveys are conducted by the National Ocean Service a uniformed corps within NOAA and a fleet of survey vessels based at two major centers. The organic survey assets are supplemented by other agencies and contract surveys in order to survey the large areas within its responsibility.

For inland surface waters such as rivers, streams and inland lakes the US Geological Surveys (USGS) has national responsibility. USGS coordinates survey data collection and publishes a National Hydrography Dataset that is designed to be used with geographical information systems (GIS). Other federal agencies such as the Environmental Protection Agency and the U.S. Fish and Wildlife Service use these data and, along with state and local hydrographic collection organizations, contribute to the national hydrographic data base. The Environmental Protection Agency conducts or contracts for surveys on projects such as the GE/Hudson River Super Fund site.

The U.S. Coast Guard conducts hydrographic survey operations, particularly in the Polar regions.

The National Geospatial-Intelligence Agency (NGA) oversees charting of international waters for Department of Defense purposes. The Navy's Naval Oceanographic Office conducts many of the oceanic surveys. The U.S. Army Corps of Engineers conducts hydrographic surveys supporting its responsibility for the major waterway projects that include navigation and flood control. Hydrographic data from those surveys is published by districts. Such data is incorporated into both NOAA and NGA products and the Corps engages in efforts to improve hydrographic collection methods. Military combat organizations such as the Navy's SEA and engineering units have specialized hydrographic reconnaissance survey capability.

5.3 The Hydrographic Service of The Russian Federation Navy

The Hydrographic Service is one of the important national bodies responsible for the safety of navigation in Russia.

Although the Hydrographic Service forms a part of the Navy, it also meets the requirement of merchant and fishing fleets and vessels of other ministries and agencies. The Hydrographic Service is under the direction of the Department of Navigation and Oceanography of the Russian Federation Ministry of Defense (DNO of the RF MD), which is traditionally located in St Petersburg.

The principle functions of the DNO of the RF MD are:

- to carry out oceanographic, hydrographic and geophysical surveys in the World Ocean

- to compile and produce Nautical Charts, Publications and Guides to Navigation
- to develop and produce Guides, Instructions, Regulations and Methodical Directions on carrying out the World Ocean surveys and processing of their results
- to equip the coast of the Russian Federation by aids to navigation
- to organize mariner notification about changes in navigational conditions and regime
- to develop up navigational instruments and complexes.

The results of oceanographic, hydrographic and geophysical surveys are submitted to the Navy Charts Division for compilation and updating of Nautical Charts and Guides to Navigation.

5.4 Australian Hydrographic Service

The Australian Hydrographic Service (formerly known as the Royal Australian Navy Hydrographic Service) is the Australian Commonwealth Government agency responsible for providing hydrographic services that meet Australia's obligations under the SOLAS convention and the national interest; enabling safe navigation, maritime trade and supporting protection of the marine environment. The agency, headquartered at the Australian Hydrographic Office in Wollongong, New South Wales, is an element of the Royal Australian Navy (RAN), and serves both military and civilian functions. The names Australian Hydrographic Service and the Australian Hydrographic Office are commonly abbreviated as AHS or AHO respectively.

6. CONCLUSION / RECOMMENDATIONS

That the significance of hydrography in the general development of nations cannot be over emphasised. Despite this significance and the fact that its practice has been on for over a century, the level of hydrography awareness is very low in Africa.

There is need to raise the awareness of Hydrography to the African nations for them to know the importance and economic benefit of hydrography and hence hydrography be given its prime of place. There are no strong institutional and legal framework that will enhance or facilitate the development of hydrographic practice in Africa.

The various African countries with coastal and maritime zones are always reluctant to partner with International Hydrographic Organization (IHO) for the development of hydrography in their domains. One of the objectives of the IHO is to tender guidance and advice to Maritime States engaged in setting-up or expanding their hydrographic services. The National Hydrographic Service will ensure that the hydrographic service rendered to the nation is holistic in nature and meets international standards as laid down by the World Hydrographic body

Drawing an inference from the various world Hydrographic Office / Service, there is need for African Countries especially Ghana and Nigeria to have a National Hydrographic Office / Service or similar coordination structure, composed by all stakeholders needing hydrographic

information as required to define the size, mission, objectives and policies of the National Hydrographic Service / Office as well as its annual work program.

Considering the huge financial requirement involved in hydrographic operations and the enormity of surveying Nigeria's vast maritime domain, it is difficult if not impossible to fund hydrography from a low or no budgetary allocation.

Therefore, nations of Africa with Coastal and Maritime Zones are to:

- Set aside 5% of their national income derived from the maritime sector for the development of
- Hydrographic Surveying in Africa.
- Establish strong institutional and legal framework to facilitate the development of hydrography in Africa
- Collaborate on issues of hydrography so as to synergize and fastrack the development of hydrographic practice.
- Called on IHO and the various concerned African countries to step-up their partnership for the development of Hydrography in Africa.
- Called on all hydrographers in Africa to be proactive and work assiduously for the development of hydrography.

A National Hydrographic Service is a "must" for any maritime country with the willingness to offer its citizens the advantages of having the sea as part of its territory.

BIOGRAPHY

Mrs. Angela Kesiena Etuonovbe is the Chair Elect of Commission 4 - Hydrography of the International Federation of Surveyors and the Chair, Working group 4.5- Hydrography in Africa also of the FIG.

She is the Principal Consultant of AnGene Surveys & Consultants and the Managing Director of GFSH Consult Ltd. She is a Consultant to the Federal, State and Local Government areas in Nigeria. And also a Consultant to many private sectors and in the Oil and Gas industries. She has presented various papers at the FIG and other national and international events.

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