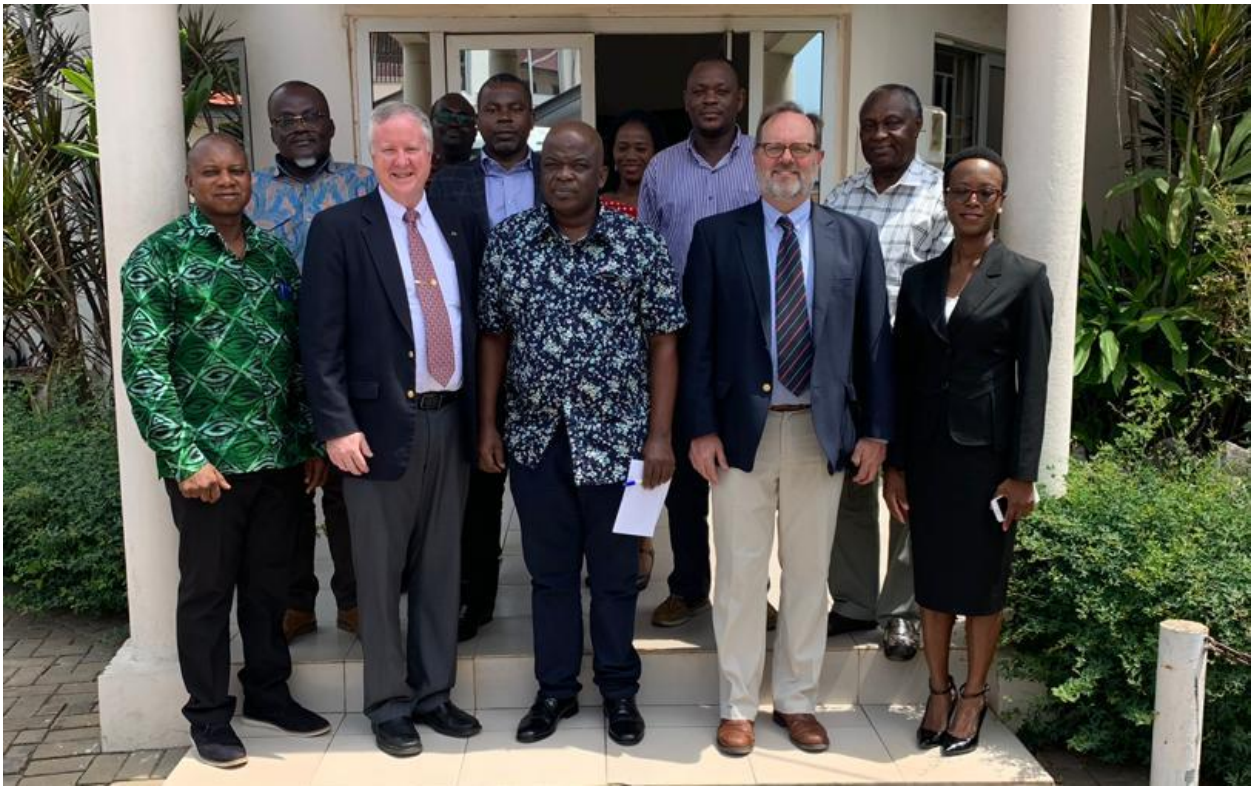
IHO Capacity Building Work Program

2019 A-07

Technical Visit to Regional Maritime University, Accra, Ghana

24-28 March 2019



Meeting of the Ghana National Hydrographic and Oceanographic Committee

Technical Visit Team : CAPT Brian Connon, US Navy (Ret) (Lead)

Dr. Stephan Howden (University of Southern Mississippi)

Executive Summary

A technical visit to the Regional Maritime University (RMU) was conducted on behalf of the IHO by CAPT(ret) Brian Connon and Dr. Stephan Howden from the University of Southern Mississippi. The visit focused on the desire of RMU to establish a Category B Hydrographic Surveyor program. A review of existing RMU facilities, faculty and curriculum was conducted to determine likelihood of success. In addition, the team was able to visit the Port of Tema and review the current hydrographic survey capability. The team also met with the Director General of the Ghana Maritime Authority and provided a short presentation to the National Hydrographic and Oceanographic Committee regarding membership in the IHO and the importance of hydrographic education and training. Overall, a very successful technical visit-Ghana is committed to hydrography and is well on track to improve capability and capacity. RMU is well placed to develop and execute a hydrography program, however, finding qualified faculty will likely be difficult. A number of recommendations are provided.

Project Goals

(1) Evaluate the potential for establishment of a Category B Hydrographic Surveying program at the Regional Maritime University in Accra, Ghana.
(2) Promote IHO membership to Ghana and determine level of hydrographic capacity that exist in Ghana.

Timeline

The team departed New Orleans, LA, USA on 23 March 2019 and arrived the evening of 24 March 2019 in Accra, Ghana. Our primary host was Captain Johnny Adjetey of RMU, who provided excellent support during our visit. Meetings commenced on 25 March, as follows:

25 March

Regional Maritime University

- Office call with Vice Chancellor Elvis Nyarko
- Office call with Provost Augustus Addy-Lamptey
- Office call with Head of Research and Innovation, Dr. Robert Nyemah

Port of Tema

- Office call and tour with Port Hydrographic Surveyor Isaac Yirenkyi, a Category A Hydrographer.

26 March

Ghana Maritime Authority

- Office call with Director-General Thomas Alonsi- Also attending were Mr. A.A. Akanteyam, Director Technical, Capt. Inusah A.N.-Deputy Director, Environment and Safety Standards, and Ms. Marilyn Eghan, GMA Hydrographer. Of note, Ms. Eghan is a Category A Hydrographer.

Regional Maritime University

- Toured the facilities of RMU, to include classrooms, library, computer laboratories, and simulators.

27 March

National Hydrographic and Oceanographic Committee

- Meeting of Ghana's National Hydrographic and Oceanographic Committee held at the Ghana Maritime Authority.

28 March

Regional Maritime University

- Office call with Vice Chancellor Nyarko

The team departed Accra the evening of 28 March and arrived in New Orleans the evening of 29 March.

Detailed Summary

Office calls with RMU officials were very productive and informative. VC Nyarko is a strong proponent of hydrographic training and is well informed of the requirements of a Category B Hydrographic Surveying program. He has a strong network in the local and regional maritime community, which we encouraged him to utilize when looking for equipment, faculty, etc. We stressed the need to conduct a gap analysis of existing courses against the Category B requirements. RMU produced a document from 2006 (written by Hugo Gorzilia, IHB Director) that contained a gap analysis, but the information is based on out of date information. **Recommendation 1: Conduct a gap analysis.** The VC is interested in potentially offering a Bachelor of Science in Marine Science with a Hydrography emphasis similar to the program established at the University of Southern Mississippi. The VC reported a demand signal for hydrographic surveyors from both industry and government. We encouraged the VC to reach out to hydrographic points of contacts in all RMU member countries to gain support and identify needs from those countries, as well. **Recommendation 2: Identify hydrographic contacts for Cameroon, Gambia, Sierra Leon, and Liberia.**

Provost Addy-Lamptey echoed the VC's comments and indicated a workboat was being donated to RMU that could be used as a hydrographic training vessel. **Recommendation 3: Evaluate donated workboat for use as a survey vessel and determine needed equipment and modifications.**

The Head of Research and Innovation, Dr. Robert G. M. Nyemah was very interested in the hydrographic program and indicated his support.

The Port of Tema Hydrographer, Mr. Isaac K. Yirenkyi, gave an excellent overview of his responsibilities and resources. A significant port expansion project is nearing completion in Tema and updated charts will be required very soon. Mr. Yirenkyi is also responsible for the Port of Takoradi, a smaller, but very active port west of Tema. He is the only trained hydrographer for the ports and he provides on the job training to his assistants who have no formal or informal hydrographic training. A harbor pilot boat is configured as the port hydrographic survey vessel with a permanent mount for their Teledyne MB1 multibeam system, but this is not a dedicated survey vessel. Mr. Yirenkyi indicated that they have a Sound Velocity Profiler and a Inertial Motion Unit. Hypack is used for survey planning, collection, and

processing. Hypack is scheduled to provide training in April 2019. The Port of Tema has also recently purchased a small drone for airborne imagery that may be available for hydrographic surveyors. A full equipment list and survey vessel photos can be found in Appendix A. This list is noticeably thin and we recommended purchase of additional survey equipment to provide redundancy for port surveys and to support training events. **Recommendation 4: Procure additional survey equipment**. The current arrangement between the Port of Tema and RMU regarding provision of training is a verbal one. **Recommendation 5: Formalize the relationship between RMU and the Port of Tema with a Memorandum of Agreement**. Recommendations 3-5 should be undertaken concurrently to develop a comprehensive and coherent approach.

We inquired about the provision of Maritime Safety Information (MSI) for Ghana and Mr. Yirenkyi reviewed their process. The harbormasters for each port are responsible for providing MSI to the Ghana Maritime Authority. This information is published in a geospatial format on the internet at the following website: https://niord.ghananautical.info/#/. During our visit, the Danish Maritime Authority signed an agreement on maritime cooperation with GMA, including enhancements to Ghana's e-navigation efforts. (https://www.myjoyonline.com/business/2019/March-26th/ghana-denmark-sign-strategic-maritime-sector-cooperation.php) Recommendation 6: Host a training session of WWNWS with an ultimate goal of establishing a recurring MSI training module.

We discussed the need for accurate tide and water level monitoring-Mr. Yirenkyi informed us that new tide gauges in Tema and Takoradi were under contract for installation by OceanWise in the next few months. These stations will include meteorological sensors and will be connect to the internet for data retrieval. Recommendation 7: Once operational and accessible via the internet, register gauges with the Intergovernmental Ocean Commission. (http://www.ioc-sealevelmonitoring.org/)

Office call with GMA Director General Alonsi: DG Alonsi is new to the position and kindly made room in his busy schedule for an office call with us. We provided a quick overview of our goals for the technical visit. DG Alonsi was grateful for our visit, thanked us for supporting Ghana's hydrography efforts, and extended an invitation to attend a meeting of the National Hydrographic and Oceanographic Committee.

Our campus tour of RMU was eye opening-we were impressed by the facilities and equipment. RMU provides extensive education and training from the vocational/technical through graduate levels for the maritime community (www.rmu.edu.gh) Classrooms are large with sufficient teaching equipment, including video projectors and whiteboards. Several computer labs are available to students, as well as a fully equipped library. As part of the Nautical Science program, an ECDIS Lab is in use running Kongsberg ECDI software., as well as, modern Bridge simulators.

Typical RMU Classroom

Library

Computer Lab

ECDIS Lab

The timing of our visit coincided with a meeting of the National Hydrographic and Oceanographic Committee (NHOC). Membership of the NHOC includes stakeholders from across the Ghana government and is indicative of Ghana's efforts to build hydrographic capacity. The membership can be found in Appendix B. The meeting agenda can be found in Appendix C. A welcome was provided by DG Alonsi of the Ghana Maritime Authority followed by an overview of the Ghana hydrography program from the GMA Hydrographer, Ms. Marilyn Eghan. Portions of this presentation are included in Appendix D and provide some recent history of hydrographic efforts, current activities, and examples of the online MSI service. After departure of DG Alonsi, we gave a short presentation on our mission in Ghana. The importance and benefits of IHO membership was a key point of our presentation and the current status of membership was discussed. Ghana's membership is awaiting Parliamentary approval-

the final step in their process. We stressed the urgency needed to complete the process before their next election cycle (2020) which could again delay their membership. We commended the NHOC for their current efforts to establish a strategy and recommended they include "Education and Training" as a new subcommittee, which was accepted. Questions were raised regarding possible assistance in three areas of need: lack of legal mandate (i.e. IHO membership); required training in database processing and management; and lack of survey capacity. We recommended that the NHOC determine, within their strategy, the end state for hydrography in order to scale their challenges. **Recommendation 8: Review and complete National Hydrographic Strategy.** We discussed options ranging from providing MSI, to adding survey capacity organically or via contract, to a full Hydrographic Office producing ENC. This was well received and appreciated, however, the basic challenges remain. Our primary recommendation was to quickly achieve IHO membership as it will open up opportunities for advanced training, such as the desired database processing/management training and other capacity building projects. Regarding lack of survey capacity, this primarily applies to surveys offshore in Ghana's EEZ. Offshore resource exploration is on the rise and we recommended they work closely with industry to ensure data collected in the EEZ is provide to GMA in a format that can be useful for nautical charting purposes. The representative from the Ghana National Petroleum Corporation is a key player in this effort and he is well versed in the need for bathymetric and other data for charting purposes. Ghana does have regulations that cover maritime activities including scientific research in their waters. The procedures are covered in the Ghana Shipping (Protection of Offshore Operations and Assets) Regulation 2012 L.I. 2010. Permits are issued to entities that want to conduct research in Ghana waters and are obliged to comply with conditions which include submission of data (report) to the Ghana Maritime Authority.

We discussed their current relationship with UKHO for charting purposes and that focusing on building a survey capability first is perfectly fine. Options for hydrographic survey capacity included contracting a commercial survey company, buying a dedicated vessel for offshore work, and working with international partners. Ghana has nine charts in their catalog and we suggested the return on investment to build and maintain charts (paper and ENC) may not be worth the effort at this point. No resolution was expected or reached, but members appreciated the frank conversation and the available options.

Our final meeting was with Vice Chancellor Nyarko to review our trip and discuss the way forward. He hopes to have permission to begin the hydrography program within 6-12 months. We discussed the need for the gap analysis and the probable challenge of finding appropriate faculty to teach the hydrography courses. We talked over some options, including bringing in visiting faculty from other organizations, contracting the course to a commercial provider, and exploring options with regional partners. For example, Nigeria, who has some hydrographic training capacity, may be a potential partner for RMU. The key for RMU is to identify their shortfalls through the gap analysis.

Summary of Recommendations

Recommendation 1: Conduct a gap analysis. Action: RMU

This is the most important task for RMU. Completion of the gap analysis will identify actions needed to successfully launch a Category B hydrographic surveying program.

Recommendation 2: Identify hydrographic contacts for Cameroon, Gambia, Sierra Leon, and Liberia. Action: NHOC/EAtHC CB

Regional cooperation and collaboration is important to the success of Ghana's hydrographic program and RMU's Category B course. These four countries are members of RMU and have the opportunity to identify their hydrographic training needs and participate in program development.

Recommendation 3: Evaluate donated workboat for use as a survey vessel and determine needed equipment and modifications. Action: RMU/Port of Tema

The Port of Tema Hydrographer can provide needed technical expertise to evaluate the donated workboat and make recommendations for outfitting hydrographic equipment.

Recommendation 4: Procure additional survey equipment.

Current inventory of hydrographic equipment is sufficient for maintaining port surveys, although there is no redundancy. The addition of hydrographic training will place additional stress on this equipment and purchasing additional survey equipment is highly recommended.

Recommendation 5: Formalize the relationship between RMU and the Port of Tema with a Memorandum of Agreement. **Action: RMU/Port of Tema (Ghana Ports and Harbors Authority)**

A verbal agreement to provide a vessel and equipment during the Category B training course is insufficient and should be replaced by a formal, binding Memorandum of Agreement.

Recommendation 6: Host a training session of WWNWS with an ultimate goal of establishing a recurring MSI training module. (RMU and WWNWS)

RMU has verbally agreed to host a training session for WWNWS and is very interested in developing a formal course. WWNWS and RMU should collectively build a strategy and implementation plan for establishing an MSI course offering.

****Recommendations 3-5 would ideally be accomplished concurrently.**

Recommendation 7: Once operational and accessible via the internet, register gauges with the Intergovernmental Ocean Commission. (http://www.ioc-sealevelmonitoring.org/) (Port of Tema)

There are no established tide gauges in the Gulf of Guinea currently providing data to IOC. Data from Ghana will be a significant addition to the worldwide monitoring of sea level.

Recommendation 8: Review and complete National Hydrographic Strategy. Action: NHOC/IHO CB

Completion of the National Hydrographic Strategy and a follow-on Action Plan should be completed irrespective of Ghana's IHO membership legislation. Identifying near, mid, and long term goals is crucial

to prioritization of resources. Once a final draft is ready, recommend a review by the IHO Capacity Building staff to provide final comments and suggestions.

Recommendation 9: IHO leadership write a letter to the new Director General of the GMA supporting Ghana's IHO membership. Action: IHO CB Staff

Since the Ghana Parliament has passed a resolution supporting IHO membership, a letter outlining the next steps in the process would keep momentum moving forward.

Key Contacts

Ghana Maritime Authority:	Thomas K. Alonsi, Director General Thomas.k.alonsi@ghanamaritime.org Office: +233 302 663506 Mobile: +233 244 0840 91
	Marilyn Eghan, Hydrographer marilyn.eghan@ghanamaritime.org Office: +233 303 968564 Mobile: +233 271 823282
Port of Tema:	Isaac Yirenkyi, Hydrographer ykoranteng@ghanaports.net Office: +233 303 204153 Mobile: +233 54 576 17 35
Regional Maritime University:	Elvis Nyarko, Vice Chancellor vc@rmu.edu.gh Office: +233 302 712599 Mobile: +233 242 101445
	Capt. Johnny Adjetey, Head, Nautical Science blessgod3341@yahoo.com Mobile: +233 24 542 1570

Final Thoughts

We believe Ghana is poised to become a leader in hydrography for western Africa. Establishment of a Category B Hydrographic Surveying program would provide a sorely needed training venue in western Africa and establish a regional center of expertise for hydrography. Most countries in the region lack hydrographic surveyors to fill roles in industry and government. RMU is uniquely placed to provide this training in the form of aCategory B course, but significant work remains to be done. RMU has the appropriate facilities (classrooms, laboratories, dormitories, etc) to hold training, but lacks instructors to provide the training. Of note, RMU is primarily an English-speaking campus. However, French is taught as a subject to increase the worth and versatility of students on the job market. Additionally, an intensive English program is available for non-English speaking students.

Overall, Ghana is within Phase 2 of establishing their national hydrographic service in accordance with IHO Pub. M-2: MSI is provided via a modern web portal and limited hydrographic survey capability exists. Establishment of the NHOC is a huge step in the right direction and the members seem truly committed to building Ghana's hydrographic program. IHO membership is a key enabler for them to increase training opportunities and to begin taking an active role in IHO activities.

Many thanks to everyone in Ghana who took time to meet with us and discuss hydrography. A special thanks to Captain Johnson Adjetey for being our escort and primary point of contact for this visit.

Appendix A - Port of Tema Hydrographic Capabilities

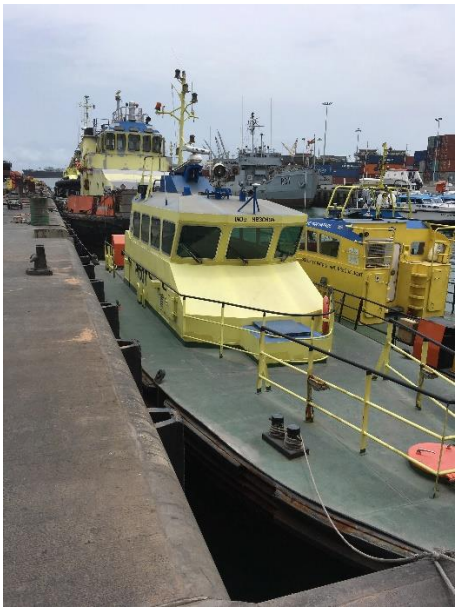


Figure 1-Port of Tema Survey Vessel

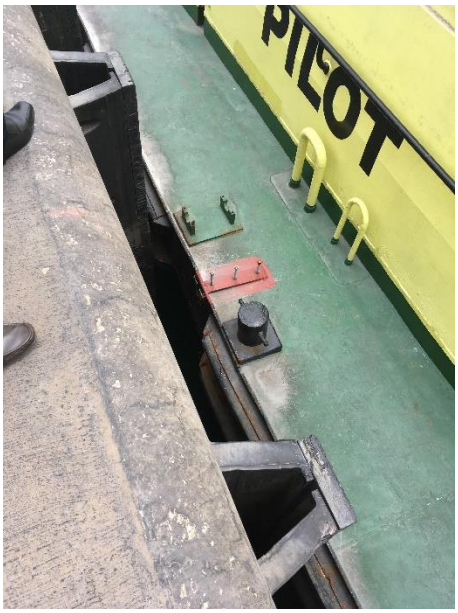


Figure 2-Multibeam Sonar Mount

EQUIPMENT LIST

1. Land Survey Equipment

Global Navigation Satellite System (GNSS) (set for RTK)

- Four (4) UNITS –TOPCORN HIPER V IWITH LOGGERS

Total Stations

- Two (2) Topcon BS 103
- 0ne (1) Sokkia CX105

Levelling Instrument (with all accessories)

Measuring Tapes

2. Hydrographic Survey Equipment

MB1 Multibeam Echo Sounder with internal DMS5-25 motion sensor – Portable shallow water, 170-220 kHz (user selectable), 120° multibeam echo sounder system. TSS DMS5-25 motion sensor installed inside the sonar head. Includes MB1 Titanium and Acetal transducer with integral electronics, Real Time Appliance (RTA) along with all necessary cables, 15 meter Kevlar reinforced power & communications cable, mounting hardware.

MB1 Fairing, designed to reduce drag on the MB1 multibeam as it moves through the water, and provide additional protection to the sonar head. Complete with titanium hardware.

HYPACK HYSWEEP Multibeam Data Acquisition & post-processing software (Windows) with system Dongle (USB).

Hemisphere H320 GNSS Compass Module installed inside the MB1 RTA top side

Digibar S. 100m Self-contained, rugged, all stainless steel design for un-tethered sound velocity casting to 100m

The "Digibar V" –providing accurate sound velocity data in real-time using time of flight algorithms. Designed to plug directly into the MB1 sonar head'

Plotter - HP Design Jet 800

3. Additional Equipment

Drone - Phantom 4 Pro

Appendix B – National Hydrographic and Oceanographic Committee Membership

NATIONAL HYDROGRAPHIC AND OCEANOGRAPHIC COMMITTEE MEMBERS

	Name	**Organization**
1	Capt. Abdul Nasir Inusah	Ghana Maritime Authority (Chair)
2	Isaac Yirenkyi	Ghana Ports and Harbours Authority
3	Joseph T. Portuphy	Ghana Meteorological Agency
4	Cdr I.M. Abu	Ghana Navy
5	Veronica Amissah-Aidoo	Environmental Protection Agency
6	Emmanuel Kwame Dovlo	Fisheries Commission -Fisheries Scientific Survey Division
7	Nana Adusei Poku	Ghana National Petroleum Corporation
8	Capt. Darlington Newton Akrofi	Ghana Maritime Authority
9	Capt. Johnson Adjetey	Regional Maritime University
10	Selorm Ababio	University of Ghana
11	Ernest Kusi-Minkah	Hydrological Services Department
12	Mr. Isaac Larbie	Lands Commission -Survey and Mapping Division
13	Marilyn Eghan	Ghana Maritime Authority
14	Mawuenyega Fiaxe	Volta River Authority

Appendix C – National Hydrographic and Oceanographic Committee Agenda

National Hydrographic and Oceanographic Committee Meeting

Date: 27th March, 2019

Time: 10:00am

Agenda

- Opening Prayer
- Welcome by Chairman
- Introduction of new NHOC member; (Mr. Mawuenyega Fiaxe) replacement of the late VRA member (Minute of silence)
- Introduction of IHO team
    - Presentation by the IHO

Group photograph

Matters Arising

- Ratification of IHO Convention: Approved by Parliamentary Select Committee
- National Strategy
- National Standards
    - Hydrographic Survey Standards
    - Oceanographic Standards
- E-Navigation: platform developed
    - web.ghananautical.info (public)
    - niord.ghananautical.info (user)

Main Business

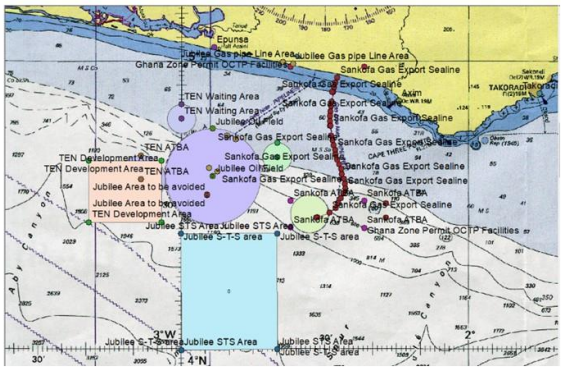
- Develop National Programme: Incorporate member organizations programmes for the year
- Finalize National Strategy
- Discuss 2019 Agenda

A.O.B.

- East Atlantic Hydrographic Conference (EAtHC) in Nigeria feedback
- IALA Mission to Ghana- Technical Needs Assessment of Ghana conducted from the 11th to 15th February 2019
- ENCs
- Any other business

Appendix D-Ghana Hydrography Overview NHOC 27 March 2019

Hydrography Overview of Ghana



Background

- Ghana has a coastline of about 550km.
- As a coastal state and signatory to SOLAS, Ghana is obligated to arrange for the collection and compilation of hydrographic data, dissemination and keeping up to date of all nautical information necessary for safe navigation.
  – GMA/UKHO Arrangement for Cooperation

GHANA MARITIME AUTHORITY

- Governmental body responsible for the provision of hydrographic services and maritime safety information in Ghana.
- Established by an Act of Parliament (Act 630), Ghana Maritime Authority ACT, 2002 with responsibility to monitor, regulate and coordinate activities in the maritime industry
- It is mandated to ensure the **Safety of Navigation**, among other related functions.

HYDROGRAPHY AND NAVIGATION SERVICES DEPARTMENT

•The HNS department is in charge of the Authority's hydrographic functions.

•Conducted a National Hydrographic Technical Status (NHTS) Exercise in 2014 to assess Ghana's Hydrographic Capacity.

•Twelve (12) Government organizations were involved.

Status of Hydrographic Surveying

- Within Ghana's maritime domain, the areas with current bathymetric survey data are mostly the Ports and the oil blocks/offshore platforms.
- Most governmental agencies engaged in maritime activities do not have in-house hydrographic surveying capacity with the exception of the Ghana Ports and Harbours Authority. However their operations are restricted to the ports area.

NHTS Findings

- Hydrographic activities in Ghana are conducted under varying standards.
- No Data sharing and exchange
- Lack of coordination and duplication of work.

National Hydrographic and Oceanographic Committee

- The National Hydrographic and Oceanographic Committee was established in October, 2015
- It is an inter-institutional Committee which seeks to improve the working relationship of stakeholders and to facilitate Ghana's fulfillment of national and international hydrographic obligations
- The NHOC concept is highly recommended by the IHO as the most effective and efficient mechanism for ensuring the provision of hydrographic services and production of nautical charts.

NHOC MEMBERS

Ghana Maritime Authority

Ghana Ports and Harbours Authority

GNPC

epa

Ghana Meteorological Agency

Lands Commission

Volta River Authority

The Regional Maritime University (RMU)

Fisheries Commission

University of Ghana

Hydrological Services Department

Ghana Navy

Purpose

- Cooperation, data exchange and sharing of expertise.
- Main objectives
  - Formulation of National Hydrographic and Oceanographic Standards
  - Development of a Centralized Database, among others

NHOC Activities

- Established the National Data Centre
- Developed Draft National Hydrographic and Oceanographic Strategy
- Developed Draft National Hydrographic and Oceanographic Standards

NATIONAL HYDROGRAPHIC OFFICE

- The National Hydrographic Office was opened on 16th December, 2016 at the GMA to serve as the central point for the collation of hydrographic information. It is equipped with the following:
  - Two (2) dedicated workstations
  - Specialized maritime software- ArcGIS for Maritime software
  - Printer/Plotter

Benefits

- Datasets obtained from member organizations will be processed to update nautical charts, thematic maps and other types of documentation for the following common uses:
- maritime navigation
- assist naval operations
- coastal management
- marine environment preservation
- definition of maritime boundaries
- scientific studies, among others.
- It will also ensure the timely dissemination of Maritime Safety Information.

CHALLENGES

- NHOC lacks legal mandate
  (Ghana not a member of the IHO)
- Database processing and management training required
- Lack of capacity to conduct surveys

IMO MEMBER STATE AUDIT SCHEME (IMSAS)

- Conducted in January 2017
- Ghana's Hydrographic functions were audited under IMO Coastal State obligations

I.M.S.A.S.

- The Auditors commended Ghana for the formation of the National Hydrographic and Oceanographic Committee and noted it as an area of positive development in the audit report.
- The Auditors urged the country to become a member of the IHO to help develop her surveying and charting capability for safe navigation.

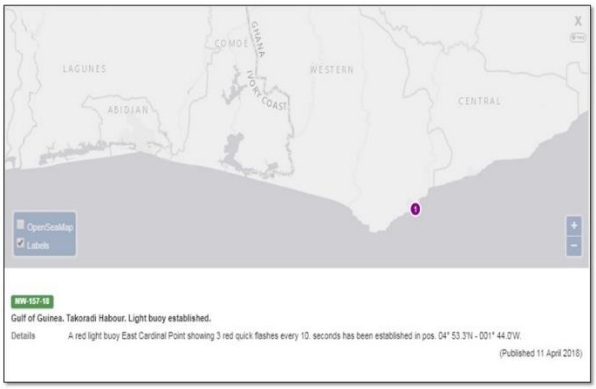
IHO RATIFICATION

- The GMA initiated action for Ghana's ratification of the Convention on the International Hydrographic Organization (IHO) in 2014
- Stakeholder Consultations
- Obtained Cabinet Approval in December, 2015
- Due to administrative changes, Parliament could not ratify in 2016
- Resubmitted Cabinet Memo in 2017
- New cabinet memo approved in 2018
- Currently awaiting Parliamentary consent

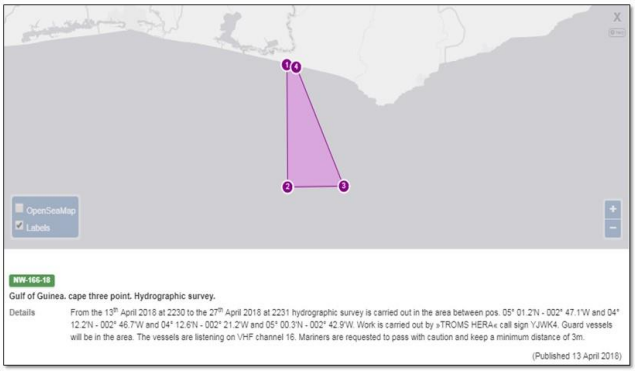
E-Navigation

- Test production system for promulgating Navigational Warnings (NW) and Notices to Mariners (NM) has been developed.
- https://niord.ghananautical.info

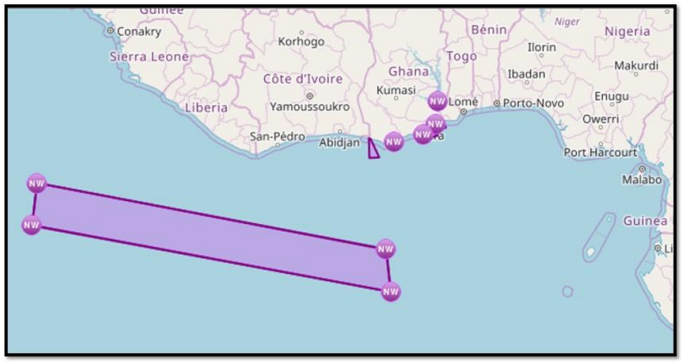
Example of a Navigational Warning



NAV. Warning Example Cont'd



Navigational Warnings in Force



Notices to Mariner