

# **Building A New National Hydrographic Service: The Italian-Lebanese Collaboration**

**Lamberto Orlando LAMBERTI and Nicola Marco PIZZEGHELLO (Italy),  
Afif GHAITH, Elie el JBEILY and Christian FAHED (Lebanon)**

**Key words:** Capacity Building, Blue Growth, International Collaboration, Hydrography.

## **SUMMARY**

The International Hydrographic Organization (IHO) defines Hydrography as the description of the physical features of the water portion of the earth's surface, connected with the “blue growth” and all marine activities.

The importance of the marine sector will mount in Lebanon over the next decades. Institutions will be the critical enablers in order to achieve sustainable marine management. Hence, the need to strengthen the marine base knowledge, skills and capacities of individuals and organizations is becoming a priority.

The capacity building project of the Lebanese Hydrographic Service was created together with Italy, with the Italian Hydrographic Institute as the main technical actor, in order to support Lebanon and guide it through the creation of an independent National Hydrographic Service within the international standards and become its own Primary Nautical Chart Authority (PCA). Giving to the nation of Lebanon an independent hydrographic capacity is essential as it enables the future growth of marine business.

The article highlights already performed activities and future plans between Lebanon and Italy in order to build an independent Lebanese Hydrographic Service.

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## **1. INTRODUCTION**

Human activities occurring at sea or along coastal zones, either for civilian or military purposes, increase nowadays at a very high rate.

Marine activities such as ship navigation, port building, coastal infrastructure development, marine resources exploitation and others require the availability of hydrographic and bathymetric data.

It is responsibility of each coastal State to ensure at least the safety of those activities in its own territorial waters. Hydrographic offices or designated authorities should be able to provide all necessary assistance and to take decisions or suggest solutions regarding any marine matter. States should consider the importance of their national Hydrographic Services not only for development and researches but also for supporting national security and maritime defence.

Lebanon is a coastal State which has a strategic geographical position in the Mediterranean Sea. Along the history, Lebanon was considered “the gate of the East”, creating the liaison between the Arabic peninsula and the West. Since the Phoenician era, this Country has been aware of the importance of its maritime *façade* and has continuously worked on developing the coastal zone. The Lebanese Government is returning an active member in international affairs. International obligations, the need to resolve maritime boundaries disputes, to well develop and manage coastal areas, to exploit any possible resources, have included the marine environment and its potential benefits with a broadband approach within the national agenda. One of the opportunities to develop the “blue growth” has been the Lebanese-Italian shared project to create the “Lebanese Navy Hydrographic Service”.

This National Hydrographic Service recently established within the Lebanese-Italian cooperation is in a capacity building phase. Considering the need for cooperation in hydrography and oceanography, and wishing to coordinate the efforts to maximize safety of navigation, scientific researches and “blue growth”, the Italian Navy decided to assist the Lebanese Navy in building the Hydrographic Service within a structured plan, starting from the framework agreed into the Hydrographic community of the International Hydrographic Organization (IHO), as explained in the next paragraph.

## 2. WHY AN HYDROGRAPHIC SERVICE

The definition of “Hydrography” is explained in the Hydrographic Dictionary (publication S 32), published by the International Hydrographic Organization:

“Hydrography is 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.”

Hydrography describes the physical features of oceans, seas, coastal areas, lakes and rivers; the hydrographer needs measures to describe them. The first activity connected with hydrography is gathering data of the marine environment. The acquisition of data should have a broadband approach, ensuring different future uses of those data, as stated in the definition above (although safety of navigation is still the primary purpose, all other marine activities, such as economic development, security and defence, scientific research, and environmental protection, are growing their importance).

Data, the result of a measurement process, will be inserted in Marine Spatial Data Infrastructures, a structured way to share data with the final goal to improve the sustainable use of the sea.

Gathering data and disseminate information have been the main tasks of hydrographers and cartographers who have been working all over the world into the hydrographic offices for centuries.

E-navigation and the future use of autonomous vessels are radically changing this approach, and the hydrographic community is moving toward the future evaluating its own main skills. These skills are not connected to a single use application, yet, but to a more holistic approach, looking into all the possible opportunities that the marine environment can trigger. Controlling data quality, checking their consistency, selecting their key aspects through products are the very basic skills that all hydrographers are able to value and share within the marine community.

Into this path the Hydrographic community is developing a new model to describe the marine environment through data which is called S-100, universal hydrographic data model. It is oriented to different aspects of reality, everyone described in additional documents called “product specification”.

Safety of navigation products remain one of the key aspect of human activities at sea. It is the more developed area of the marine activities within the inter-State international relationships.

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Regulation 9 of the International Convention on the Safety of Life at Sea (SOLAS), Chapter V, details that having an Hydrographic Service is an obligation for the Contracting Governments under an International Treaty Law.

Regulation 4 of SOLAS Chapter V places an obligation on Contracting Governments to ensure that appropriate Navigational Warnings are issued.

The United Nations Convention on the Law of the Sea (UNCLOS) states that IHO is the Organization in charge for hydrographic subjects, and it highlights a significant number of references, including maritime boundaries, that relate directly to hydrography and nautical charting.

What is practically doing an Hydrographic Service?

As we started to explain above, it is:

- gathering different kinds of data connected to marine activities, such as bathymetry, nature of seabed, coastal features, currents and tides;
- analyzing and processing data in order to evaluate their quality;
- disseminating data through spatial data infrastructures for all marine applications, with a broadband orientation and, to ensure safety of navigation, specific products such as Electronic Nautical Charts, Paper Charts and Nautical Publications;
- maintaining up to date the Nautical Documentation issuing and trough dissemination of Notice to Mariners.

The need of an Hydrographic Service is connected with the use of the sea for all marine activities. The four main tasks explained above are where Hydrographic Offices can contribute for a sustainable use of the sea.

Conducting those tasks requires deep knowledge of the underpinning subjects, and specific courses must be attended by personnel involved the hydrographic activities. All around the world many teaching authorities hold courses focused on hydrographic and cartographic matters. The FIG, IHO and ICA, through the International Board On Standards Of Competence for hydrographic surveyors and nautical cartographers (IBSC), review the course programs and state that they are compliant with updated recommended minimum standards of competence for Hydrographic Surveyors and Nautical Cartographers maintained by the same IBSC (IHO publications S-5 and S-8). There are courses for hydrographic surveyors, oriented to the first two tasks, and for cartographers, oriented to the last two tasks. Two levels are defined for organizations into the IBSC frame, level A, at a manager level, and level B, at an operator level.

Once tasks are defined and people have the knowledge to face hydrographic matters, software and hardware are needed in order to perform activities and surveys. Here we find two main forces combined. On the one hand we have the global trend, with standard equipment and

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software produced by specialized companies. On the other hand there is the local trend, where products specifications are adapted to the particular national needs.

Combining these two drivers should conduct to the best equipment.

Within this background, agreed by the International Hydrographic Community, Italy and Lebanon started a common project to build the new Lebanese Hydrographic Service, firstly focusing on training, secondly on the four tasks of an Hydrographic Service explained above and finally approaching the marine environment with broadband approach collaborating with other national and international authorities and stakeholders.

### **3. LEBANESE BACKGROUND PICTURE**

#### **3.1. Country general background**

Lebanon has over 255 kilometres of coast and an extension of 10,452 km<sup>2</sup>, including 12 miles of territorial water. This territorial water is an extension of the State territory and has a surface of approximately 4700 km<sup>2</sup>. Beirut is the largest city, main port and the capital of Lebanon, as well as economic and administrative centre. The Country is divided into 8 Governorates: Beqaa, Beyrouth, Liban-Nord, Liban-Sud, Mont-Liban, Nabatiye, Aakkar and Baalbek-Hermel.

#### **3.2. Ports and harbours**

The five main commercial ports of Lebanon are Tyr, Sidon, Beirut, Jounieh, Tripoli. In addition, four secondary ports acting mainly as petroleum or chemical terminals are found in Jieh, IPT Amchit, Selaata and Herri. Regarding leisure and fishery, Lebanon has a natural attractive seashore with about 300 days of sunshine a year. This broadband use of the sea, beyond safety of navigation, strengths the need of a National Hydrographic Service.

Figure 1 - Political map of Lebanon



### 3.2.1. Port of Beirut

The Port of Beirut is the main port in Lebanon; it is located on the eastern part of the Saint George Bay on Beirut's northern Mediterranean coast, west of the Beirut River. It is one of the largest and busiest ports on the Eastern Mediterranean. It is the main port to enter into the Country.

The Port of Beirut is able to receive vessels with draft up to 16 meters, has 16 berths including sophisticated logistical facilities for up to 5 large vessels (Super-post-Panamax) on quay 16 whereas remaining quays can handle up to twentieth of smaller container vessels.. Approximately 3 thousand ships are using Beirut Port every year.



Figure 2 - Port of Beirut

### 3.2.2. Port of Tripoli

The Port of Tripoli is the second main port of Lebanon. It is located in the northern part of Lebanon. The Port of Tripoli is able to receive vessels with draft up to 8 meters, including logistical facilities for up to 5 large vessels.



Figure 3 - Port of Tripoli

### 3.3. Fisheries

Fishery is a traditional maritime activity in Lebanon. The Lebanese fishing fleet consists of 2,700 fishing boats spread all over the Lebanese coast with approximately 1,100 being active in northern Lebanon. Fishing is not allowed within 500 m off the shoreline and between the 6 and 12 nautical miles zone for security reasons, unless when having a special authorization. Close to the maritime border, northern and southern, a special behaviour about fisheries activities is applied.

All fisheries activities need a clear delimitation of marine areas, and a National Hydrographic Service should be a technical focal point for these activities.

### 3.4. Marine Protected Areas (MPA)

The Lebanese coastal area, which constitutes around 8% of the total area of the Country, comprises 33% of the total built-up area in the Country and it hosts 55% of the total population. The Lebanese coastal area is part of the Mediterranean region that is considered a global biodiversity hotspot.

The current marine protected areas are listed below:

- Palm Islands Nature Reserve (PINR): it was established through Law no. 121 of 9<sup>th</sup> March 1992; it includes three islands: Palm, Sanani and Ramkin.
- Tyre Coast Nature Reserve (TCNR): it was established by Law no. 708 dated 5<sup>th</sup> November 1998. The law states that a committee, established through a decision from the Minister of Environment for a period of five years, manages the MPA. It would be beneficial that Lebanese Navy Hydrographic Service be represented in that committee through its certified hydrographers.



Figure 4 - Palm Islands in Northern Lebanon

### 3.5. Education and Science

Marine science wasn't considered a priority in Lebanon. There are not specialization courses in this domain. No tidal observations, circulation models, marine geology and geophysics researches, oceanographic instrumentation deployment were conducted in the Lebanese waters.

But in the last few years Lebanese personnel from the Navy attended courses in foreign Countries about Hydrography and Oceanography, in order to learn the fundamental subjects of these matters.

New specialised personnel can arise the awareness about the possible opportunities in this field.



### **3.6. Coastal Zone Development in Lebanese Waters**

Some key significant maritime developments in Lebanese waters started to take place recently. Such developments include constructing new ports and the maintenance and development of existing ones, dredging operations for maintenance of minimum depths. Add to this, transportation and public works projects including construction of nearshore infrastructures.

This new national interest can be better managed by an Hydrographic Service which can be used as enabler of the National Marine Strategy.

### **3.7. Cruise Ship Operations**

There is almost no cruise ship activity in Lebanon, but it can be an opportunity for the future.

### **3.8. Offshore Oil and Gas**

As a result of its geographic location, Lebanon was once a refinery centre for crude oil that was exported from Iraq and Saudi Arabia by pipelines to two Lebanese coastal refineries, Zahrani in the south, and Tripoli in the north. However, the civil war led to the closure of these refineries.

Lebanon currently imports all of the oil that it consumes. Recent seismic surveys indicated the potential for oil production in Lebanese waters where 17 potential fields were discovered in the eastern Mediterranean. Lebanon has signed agreements with Cyprus delimitating the Economic Exclusive Zone (EEZ) of each Country and marking out undersea borders to facilitate future oil and gas exploration.

Marine delimitations and production of authoritative data is one of the activities of a National Hydrographic Service.

### **3.9. Maritime Claims**

Lebanon has fixed the limit of its territorial waters at 12 Nautical Miles. With regard to the EEZ, Lebanon's claim covers an area of approximately 44,000 NM<sup>2</sup> (151,000 Km<sup>2</sup>). An agreement was reached with Cyprus in 2004 to determine its western limit.

Lebanon ratified the United Nations Convention on the Law of the Sea (UNCLOS) on 5<sup>th</sup> January 1958.

Maritime boundaries within UNCLOS are technically managed by Hydrographic Services.

## **4. THE LEBANESE NAVY HYDROGRAPHIC SERVICE**

### **4.1. Lebanon and International Organisations and Conventions**

The Republic of Lebanon has been a member of the International Maritime Organization (IMO) since 1966 and is a signatory to the SOLAS Convention, but it is not a member of the International Hydrographic Organization (IHO). It has observer status within the Mediterranean and Black Sea Hydrographic Commission (MBSHC). There is a general awareness in Lebanon on obligations and provisions under SOLAS Chapter V, Regulations 4 and 9, to ensure that appropriate hydrographic and charting services are made available. The Government of Lebanon, through its various agencies, is aware of the current state of hydrography and nautical charting in Lebanon and the benefits of modern hydrography to economic growth, safety of navigation and protection of the marine environment.

The Lebanese Navy is the overarching body to coordinate the national hydrographic effort in the Country and it is leading the Lebanese Maritime Chamber appointed by a government decision dated the 16th of August 2006 in organizing and controlling navigation movement from and to Lebanese territorial waters.

Lebanese Navy is assuming the main responsibility for national hydrography and nautical cartography development.

### **4.2. History and Status of hydrography in Lebanon**

Without any formal agreement, the Hydrographic and Oceanographic Service of the French Navy (SHOM) has historically been the Primary Charting Authority (PCA) in Lebanon. The cartographic production is kept up-to-date but the underlying surveys are partially old. A comprehensive chart updating programme is required to contribute to a modern maritime and port infrastructure development and to allow Lebanon to fulfil its international obligations in accordance with Regulations 4 and 9 of Chapter V of the SOLAS Convention. Lebanese waters have not been surveyed with modern standards except for the survey of the coastline, a survey carried out in 2003, the Beirut Port Approach hydrographic survey performed by SHOM in 2010 and 2011, and the offshore Lebanon survey performed by SHOM in 2016. Hydrographic data collected in 2016 were provided to the Lebanese Navy.

The Lebanese Government decided in 2011 to join the IHO (no formal steps were followed) and the Lebanese Armed Forces (LAF) created the Navy Hydrographic Committee (NHC), comprehensive of LAF-Navy Staff. Under the Lebanese Navy, the Lebanese Navy Hydrographic Service (LNHS) was established on the 1<sup>st</sup> February 2014 and was not activated till the 28<sup>th</sup> October 2014. Afterwards, training of LAF Navy personnel started in Italy and United Kingdom.

In December 2014, the LNHS was designated by the government as the National point of contact for all matters related to Hydrography and was appointed as the National Coordinator for Marine Safety Information (MSI). Lebanon started procedures to join the IHO, it became

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an observer Country in the MBSHC and participated in the 19th meeting of MBSHC held in Batumi-Georgia on the 30th of June 2015.

### **4.3. Lebanese Navy Hydrographic Service**

The Lebanese Navy Hydrographic Service (LNHS) has the willingness to build a national hydrographic capability to contribute to a modern marine management and port infrastructure development and to allow Lebanon to fulfill its international obligations. For the time being LNHS is composed by LAF-Navy Personnel, it is currently located in Beirut Naval Base and is directly attached to the Navy headquarters.

### **4.4. IHO Capacity Building phases**

With respect to the IHO, the Capacity Building is the process to assist a given State in sustainable development and improvement of hydrographic capabilities.

Since the last IHO technical team visit to Lebanon and the designation of the LNHS as national Point of Contact (POC) for hydrography, the Lebanese Navy has worked hard to fulfill the hydrographic obligations.

Concerning the capacity building phases, Lebanon still needs to build a national MSI network allowing the integration in the World-Wide Navigational Warning Service (WWNWS) and the dissemination of MSI.

Since that the LNHS is the National Coordinator for MSI, it is developing an effective maritime safety information system, but the information flow is still under a development process.

LNHS is taking all the necessary steps to gather information and enhance the information flow between all stakeholders in order to disseminate it to NAVAREA III Coordinator and to establish a procedure and an effective way of updating charts and nautical documents.

Nowadays, all significant information that require chart updating are sent to SHOM so that Notice to Mariners are produced and all the relative charts and Nautical Charts and Publications are updated.

On the other hand, LNHS has also started collecting, processing and managing hydrographic, geodetic, topographic, oceanographic and meteorological data through the acquiring of various survey capabilities.

At the moment LNHS has a new survey boat and a RIB (both provided by Italy) with shallow water survey systems allowing to survey ports and to a certain extent their approaches, medium and deep waters survey capabilities will be acquired in the near future.

Related to the next phase of the capacity building programme, LNHS has started some training in Cartography and Nautical Publications but there is still a long way to go to the production of their own charts and documentations.

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Figure 5 - The Hydrographic Vessel Navy-Gator donated by Italy to Lebanon

## 5. ITALIAN-LEBANESE COLLABORATION

### 5.1. The Italian Project

In order to develop and strengthen the Lebanese hydrographic capabilities and reach the internationally recognized standards, the Italian Navy through the Italian Hydrographic Institute (IIM) supports Lebanon in creating an independent National Hydrographic Service within the IHO standards in order to give to Lebanon an independent hydrographic capacity. It will improve safety of navigation and will build an essential tool for maritime business and tourism development, and finally will permit Lebanon to become its own Primary Chart Authority.

### 5.2. Project phases

The IHO Publication M-2, the need of National Hydrographic Services, has been the guide for project planning. The 6 years project (2014-2020) will be completed in 2020. At the end, Lebanon will have a fully developed Hydrographic Service.

The Lebanese and Italian Navies agreed that steering and mentoring are vital for the project success, thus focusing on regional approach, and bilateral agreements. It was mentioned before that Lebanon needs support to comply with a perfect circulation of Maritime Safety Information (MSI), in accordance with creation and development of autonomous Hydrographic Surveying capability and Nautical Charting Capabilities.

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### **5.3. Training and Education**

Training and education of the Lebanese personnel were considered a basic tool for Capacity Building. Courses and meetings with hydrographic experts have been concluded, to stress the importance to identify and prioritise Lebanese candidates and to plan and manage funds for the whole project. Activation of LNHS would not be possible without training of Lebanese Navy personnel in hydrography. So far, IIM certified 2 officers after completion of an IHO Hydrographic Surveyors Category “A” Course, and certified others 2 officers and 3 petty officers after completion of an IHO Hydrographic Surveyors Category “B” Course. Training and education were not limited to Cat A and B courses but covered as well practical training to operate with hydrographic, oceanographic, topographic and geodetic equipment.

### **5.4. Creation of autonomous hydrographic surveying capability**

Italy did not only provided training assistance to Lebanon but also equipped LNHS with hydrographic, topographic and geodetic equipment in two first waves of provision of equipment, the first dating back to October 2016 followed by a second one in October 2017. Other equipment will be provided this year to complete the main items of the project. This year IIM will assist LNHS to fulfill deep water surveys capabilities by providing the upgrade of the hydrographic surveying assets existing in Lebanon which are managed by the National Council for Scientific Research (CNRS).

CRNS has been conducting multi-beam echo sounder surveys with the Scientific Research Boat CANA in support of scientific and environmental activities in coastal areas. Currently, LNHS has started a formal mechanism to ensure data and assets common use. CNRS Boat CANA must be considered as an important Hydrographic Resource for Lebanese country.

### **5.5. Nautical charts and publications**

In this field, a first introductory cartographic software course was followed by LNHS personnel. Of course, additional specialization courses and training on the job activities in this domain are necessary to allow the creation of an efficient cartographic section. So far, LNHS has started to produce plotting bathymetric charts not intended for navigation.

### **5.6. Future plans**

In order to perfectly finalize the Italian-Lebanese project, Italy recommended more training in order to gain the necessary professional experiences in the different hydrographic fields. Long-term tide gauges systems (at least three to cover the entire Lebanese coastline) and GNSS static receivers (at least six to permit corrections in positioning at sea and coast) are under establishment, allowing determination of the different vertical and horizontal reference frame. Moreover, planning joint survey operations with participations of LNHS staff is considered a priority in order to get full experience in the field of hydrography and cartography.

Finally, a Technical Arrangement between the two Countries, in the field of hydrography and cartography, is under discussion. This step will be a great achievement in order to harmonize the joint cooperation.

## **CONCLUSIONS**

Lebanon is improving its hydrographic capability. The effective cooperation and coordination of national activities will prove a positive step towards the improvement of the Lebanese Navy Hydrographic Service, which will help Lebanon to build a solid maritime infrastructure to support safety of navigation and economic growth.

LNHS acts on behalf of the government to ensure that Lebanon meets its international obligations to make proper MSI and nautical charting services available to mariners. It is the first point of contact for in-Country stakeholders and for maintaining relations with relevant international organisations. In the case of the Republic of Lebanon, these contacts would include the IHO, MBSHC, the PCA and other Countries and agencies that might support hydrographic development and assistance in Lebanon.

The Italian project through the IIM was the key that opened the door for the LNHS to properly establish itself and to build its capacities on strong foundations. From its beginning, the vision has been to build an independent Lebanese Hydrographic Service within the international community able to gain all possible opportunities arising from the “blue growth”.

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## **BIOGRAPHICAL NOTES**

Captain Lamberto Orlando Lamberti joined the Italian Navy in 1985. After studies at the Naval Academy in Livorno, he attended the Hydrographic Course IHO/FIG/ICA Category A Level in Genoa. He has been conducting hydrographic surveys since 1993, receiving the IHO Category A Certification in 1996 at the Italian Hydrographic Institute. He has spent much his career on board IT Navy Hydrographic Survey Vessels as a Hydrographic surveyor, Executive Office and Commanding Officer on board IT Navy HSV Magnaghi and Mirto. He led the Hydrographic Department and the Surveys & Cartographic Department of the Italian Hydrographic Institute for more than ten years promoting surveys in Italy and abroad and the nautical documentation production of the Italian Chart/Publication Portfolio for safety of navigation purposes. He worked at the IT Navy Headquarters as Head of the GEOMETOC Department. He is currently the Vice Director of the Italian Hydrographic Institute and the Vice Chair of the Capacity Building Sub-Committee of the International Hydrographic Organization.

Commander Nicola Marco Pizzeghello joined the Italian Navy in 1997. After studies at the Naval Academy in Livorno, he earned a degree in Political Sciences focused on International Affairs at the University of Pisa and attended the Master of Science in Marine Geomatics in Genoa. He has been conducting hydrographic surveys since 2005, receiving the IHO/FIG/ICA Category A Certification in 2007 at the Italian Hydrographic Institute. He was the Commanding Officer of the IT Navy HSV Galatea. He led the Hydrographic Department and he is currently the Head of Training Department at the Italian Hydrographic Institute.

Lieutenant Commander Afif Ghaith studied engineering at Lebanese University. He joined the Lebanese Navy in 2000. After studies at the French Naval Academy, he earned marine engineering degree. He served onboard amphibious vessels for 7 years. In 2014, he followed the IHO Category A program in Italy at the Italian Hydrographic Institute and earned a Master degree in Marine Geomatics. Since 2016 he is doing a PhD in Italy at University of Ferrara in earth and marine sciences, studying Lebanese Canyons. Currently, he is the director of Lebanese Hydrographic Service.

Lieutenant Elie El Jbeily joined the Lebanese Navy in 2007. After studies at both the Lebanese and French Naval Academy, he earned in 2011 a Master degree in Naval Science and Technology focused on underwater acoustics. He served onboard naval patrol and amphibious vessels for 3 years. In 2014, he followed the IHO Category B program in the United Kingdom at the Royal Navy Hydrographic and Meteorological School and earned a Bachelor degree in Marine Sciences focused on hydrography from Plymouth University. Since 2015 he is participating in building the Lebanese Navy Hydrographic Service capabilities. In 2017, he attended the Master of Science in Marine Geomatics in Genoa in order to obtain the IHO/FIG/ICA Category A Certification. Currently, he is the head of hydrographic branch at the Lebanese Navy Hydrographic Service.

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Sub Lieutenant Christian Fahed joined the Lebanese Navy in 2010. After studies at the Lebanese Naval Academy and Britannia Royal Naval College in the Royal Navy, he earned in 2013 a bachelor degree in military sciences. He served on board various naval patrol and amphibious vessels for 3 years. In 2016, he followed the IHO Category B program in the United Kingdom at the Royal Navy Hydrographic and Meteorological School. He is participating in building the Lebanese Navy Hydrographic Service since 2017 and currently he is commanding the survey vessels.

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FIG Congress 2018

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