



**IHO - Capacity Building  
Work Programme  
TECHNICAL VISIT  
TO CÔTE D'IVOIRE  
REPORT  
May 31 - June 05, 2021**



**Our thanks to .../...**

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West Africa Coastal Areas



Académie Régionale des  
Sciences et Techniques de la  
Mer



Institut de Sécurité Maritime  
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## ABSTRACT

The development of Côte d'Ivoire in terms of hydrography and marine cartography is quite contrasted:

- with an efficient hydrography department at the Autonomous Port of Abidjan (PAA)
  - but the absence of a dedicated operational structure at the national level;
- with competent players in fields related to hydrography (oceanography, geodesy, geomatics, navigation, etc.)
  - but, dispersed, non-pooling their human and material potential to complement the needs of the country as a whole: navigation safety (hydrography and nautical cartography) but also support for public policies, in particular in terms of coastal management and resilience, blue economy and finally State Action at Sea;
- with a state structure dedicated to maritime safety, the General Directorate of Maritime and Port Affairs (DGAMP)
  - but which in fact largely delegates to the PAA (geographical area of intervention limited) responsibilities of a sovereign nature such as the organization of navigation aids and maritime safety information;
- by being a member of international organizations such as IMO and IALA
  - but not an IHO member,
- by having ratified international conventions, in particular SOLAS (providing hydrographic services in order to establish and disseminate the information and nautical documentation necessary for the safety of navigation in its waters)
  - but without fully meeting the requirements (which results in non-conformities during IMO audit);

This report does not claim to be exhaustive, there are certainly potentialities which have not been inventoried and which should have been taken into account, it nevertheless offers some recommendations which are based on successful experiences elsewhere in Europe and Africa:

The capacities of Côte d'Ivoire are in terms of hydrographic development:

- **acquired for phase 1:** collection and transmission of maritime safety information / nautical information (**MSI**) to NAVAREA II, transmission of corrections to nautical publications, in particular nautical charts to the Shom. It will be enough to keep the processes in place alive. **It should nevertheless be noted that this national responsibility is organized de facto (or by default) by the PAA and not by a state structure like the DGAMP. However, in this regard, efficiency comes first;**
- **partially acquired for phase 2: hydro-oceanographic surveys** through data acquisition and archiving. **The function should be extended to all Ivorian waters and not just ports;**
- **not acquired for phase 3, ie the production of official nautical charts.** It will be possible to tackle it once phase 2 has been initiated in a sustainable manner. **The co-production of charts with Shom is an essential step.** It should be noted that Côte d'Ivoire has already produced State Action at Sea (CIGN) maps.

This report includes a set of findings and proposals for action that may be the subject of follow-up. Charge to Côte d'Ivoire to possibly request an IHO technical follow-up visit in a few years.

## RECOMMENDATIONS AND ACTIONS TO BE FOLLOWED

§ of the report	Object	Comments - Recommendations	Actions to follow
§8, 14, 18	<b>Phase 1 development Maritime Safety Information (MSI)</b>	Above all, maintain the quality of relations between PAA (in connection with the PASP) and NAVAREA II. In conjunction with the CNHOC (National Hydrography, Oceanography and Marine Cartography Committee to be created) take steps to extend the services already provided at port levels to all waters under Ivorian jurisdiction	• Côte d'Ivoire → deal with the subject during the first CNHOC meeting
§8, 15, 19	<b>Phase 2 development Hydro-oceanographic surveys from data acquisition to archiving</b>	Rather than setting up "ex nihilo" a new equipped national operational structure dedicated to surveys and databases, check whether it is not more appropriate to develop (by financing them specifically) existing ones by networking them (pooling): PAA, Navy, CRO, CIGN ... As a reminder, are needed: survey launches, scientific and IT equipment, logistics support infrastructure and of course personnel of sufficient quality and quantity (all professions combined: hydro-oceanographers, IT specialists, logistics specialists, managers) Training: certified IHO category B hydrographer is strongly recommended	• Côte d'Ivoire → deal with the subject during the first CNHOC meeting
§8, 16, 20	<b>Phase 3 development Cartographic production</b>	The co-production of nautical charts with Shom (INT Cartographic Coordinator for Region G and main cartographic authority) is an essential step. It will be initiated by the signing of an Administrative Arrangement (see §8). It seems essential to rely on the CIGN	• Côte d'Ivoire → deal with the subject during the first CNHOC meeting

		Training: IHO category B certified marine cartographer is strongly recommended	
<b>§8, 17</b>	<b>Creation of CNHOC</b>	This creation is essential A note will be written by PAA for the benefit of SEPCIM to explain the interdepartmental issues of the CNHOC	• <b>Côte d'Ivoire /PAA</b> → note to <b>SEPCIM</b>
<b>§8</b>	<b>Signature of Administrative Arrangement (AA)</b>	Be in compliance with SOLAS. Develop cooperation, co-produce nautical charts with support to develop cartographic production capacities.	• <b>Côte d'Ivoire /PAA</b> → Shom's AA draft to <b>Minister of Transport</b> (Côte d'Ivoire)
<b>§20, 21</b>	<b>Joining the IHO</b>	Join the international community like IMO and IALA. Benefit much more from IHO training support. IHO capacity development actions are limited to phase 1 for non-member countries.	• <b>Côte d'Ivoire</b> → contact the <b>IHO Secretariat</b> for more information
<b>§8</b>	<b>Creation of training modules (initial and continuing) qualifying in hydrography, oceanography and marine cartography</b>	Meet national and regional needs (West and Central Africa)	• <b>Côte d'Ivoire /CNHOC</b> → inventory the needs, target audiences, submit certifiable educational content to <b>ARSTM</b>
<b>§5</b>	<b>Involvement of the Regional Hydrographic Commission (EAtHC)</b>	Participation in the next EAtHC plenary in 2021 (EAtHC16 - from September 29 to October 01) in Lisbon (Portugal): <a href="https://iho.int/fr/chato16-2020">https://iho.int/fr/chato16-2020</a> . In particular, participate in the pre-plenary seminar, at the same location and from September 27 to 28, 2021, on Maritime Safety Information (MSI) and Maritime Spatial Data Infrastructures (MSDI). Contact point: <a href="mailto:henri.dolou@shom.fr">henri.dolou@shom.fr</a>	• <b>France/Shom</b> → remind this event Côte d'Ivoire • <b>Côte d'Ivoire /PAA</b> → appoint participants to the EAtHC seminar and plenary
<b>§13</b>	<b>Surveys - results:</b> Updating nautical charts	It is essential to provide Shom with all the available data accompanied by quality records (metadata on the means used during the survey) and not only the PAA surveys (the	• <b>Côte d'Ivoire /PAA</b> → contact all operators who have survey data and transmit them to the Shom with the



		reception of which is effective on Shom side). It should be noted that without the explicit permission of the owners of the data, their use by Shom is restricted to updating nautical charts. They are not distributed or used in other products without the consent of the owners	<p>metadata</p> <ul style="list-style-type: none"> <li>• <b>France/Shom</b> → take into account the transmitted data on the nautical charts and adapt the CATZOCs accordingly</li> </ul>
<b>§13</b>	<b>Surveys - needs:</b> Collection of hydrographic survey needs	Knowledge of coastal navigation areas should be supplemented by surveys, in particular when it appears to pilots that navigation could be extended taking into account the characteristics of future vessels and the foreseeable development of traffic (increase in tonnages and drafts).	<ul style="list-style-type: none"> <li>• <b>Côte d'Ivoire</b> → deal with the subject during the first CNHOC meeting</li> </ul>
<b>§8</b>	<b>Hydrography and navigation aids</b>	The coordination of all actors is a key factor.	<ul style="list-style-type: none"> <li>• <b>Côte d'Ivoire</b> → subject to be discussed within the framework of the CNHOC.</li> <li>• PAA / DGAMP coordination must be ensured</li> </ul>
<b>§22</b>	<b>Basic training (CAT B) for senior technicians in hydrography or cartography</b>	Contact point for the Shom school: <a href="mailto:drh-for-eco@shom.fr">drh-for-eco@shom.fr</a>	<ul style="list-style-type: none"> <li>• <b>Côte d'Ivoire</b> → select staff and contact the Shom school (or any other category B training). Concerns in priority the PAA (hydrography) and the CIGN (Cartography)</li> </ul>

### **MAIN CONTINUING ACTION**

The main ports (Abidjan, San Pedro) must above all maintain permanent relations with the NAVAREA II coordinator, who is also the main cartographic authority for the waters of Côte d'Ivoire (France / Shom), so that MSIs (Maritime Safety Information) are distributed to mariners on time (e.g. via SafetyNet in case of emergency) and that nautical documents (e.g. nautical charts) are updated at the appropriate frequency (e.g. sailing directions, new chart editions).

#### **Transmission MSI :**

coord.navarea2@shom.fr ou coord.navarea2@gmail.com  
Tel: +33 2 56 31 24 24 24 (D7 - H24) Fax: +33 2 98 22 22 16 65

#### **Non-urgent nautical information :**

Hydrographic surveys, harbours plan : bri@shom.fr + copy na-om@shom.fr and dmi-rex-d@shom.fr

#### **Other nautical information :**

na-om@shom.fr + copy : bri@shom.fr and dmi-rex-d@shom.fr

#### **Address :**

Département "Informations et Ouvrages Nautiques"  
Service hydrographique et océanographique de la marine (Shom)  
CS 92803 - 29228 BREST CEDEX 2  
FRANCE

## INTRODUCTION

### 1 Preparation of the technical visit - Background

The visit was planned as part of the IHO Capacity Building Program for the year 2021:

- *CBWP 2021: action A-01;*
- *"Technical visit & Regional training center visit to Côte d'Ivoire".*

The visit was organized locally by:

- Mr. Sangaré SEYDOU, Head of the Hydrography Department of the PAA (official correspondent with the IHO);
- Commander Stéphane LE BEON, adviser to the Chief of Staff of the Ivorian National Navy for contacts in connection with State Action at Sea.

The terms of reference for the visit are recalled in Appendix B.

### 2 Composition of the team.

The visiting team consisted of:

<u>Name</u>	<u>Role</u>
Henri DOLOU	Project manager at the Shom for African affairs (France on behalf of the IHO)

## PART A - OVERALL ASSESSMENT OF THE SITUATION IN THE REGION

### 3 Effectiveness of the Technical Visit

The follow-up of actions resulting from drafted recommendations will make it possible to measure the real effectiveness of the visit. However:

- the technical visit could be prepared in detail in advance through discussions and analyzes of existing reports and texts;
- the head of the hydrography department of PAA and the adviser to the Chief of Staff of the Ivorian Navy were able to obtain all the desired meetings at all levels, namely the following stakeholders (managers and teams):
  1. the Minister of Transport (the only meeting that could not be honored at the last moment);
  2. the Managing Director of PAA;
  3. the Director of engineering and project management of PAA (on which the hydrography department depends)
  4. the Director of maritime operations, security and the environment – Harbormaster of the port of Abidjan;
  5. the chief of maritime pilots of the port of Abidjan;
  6. the director of the logistics division in charge of Aids to Navigation (national role)
  7. the Managing Director of DGAMP;
  8. the Managing Director of ARSTM;
  9. the Managing Director of ISMI;
  10. the Managing Director of CRO;
  11. the Coordinator of the WACA-ResIP project;
  12. the permanent secretary of the Interministerial Committee for State Action at Sea ;
  13. the Ivorian Navy;
  14. the CIGN of BNEDT;
  15. the Defense Attaché of the French Embassy.
- a summary meeting at the end of the visit could take place with operational services such as the Navy, the harbor master's office and the chief of pilots. Scientific and technical services such as CRO and CIGN supported them.
- the actors able to collect nautical information were again made aware of the SOLAS obligations ensured by Côte d'Ivoire in connection with France (NAVAREA II, IHO cartographic coordinator, producer of nautical documentation in force in the waters under the jurisdiction of Côte d'Ivoire, IHO capacity building coordinator).

The discussions were professional and constructive. Actions are suggested:

- some of them can be carried out in the very short term such as (PRIMORDIAL):
  - the creation of a NHC (CNHOC) without which national requirements within an interdepartmental framework cannot be met;
  - the finalization of an Administrative Arrangement with the current producer of nautical charts;

- others deserve further deepening such as a definition study (in the sense of project management) of the organization to be put in place (pooling of skills and resources) which will allow the completion of phase 2 and the beginning of phase 3 development of national capacities, namely data acquisition (hydro-oceanographic surveys for navigation and the environment) and their cartographic use.

The potential for regional cooperation could be addressed in particular through the capacities of already existing maritime formations (ARSTM).

It should be noted that the technical exchanges focused on the obligations of the SOLAS convention (chapter V) as well as on the expected economic benefits. As such, hydrographic investments can generate very substantial financial savings, particularly through optimization:

- dredging operations;
- ship loading.

They also focused on the expected benefits in terms of the marine environment, in particular at the land-sea interface (coastal development - coastal protection).

Mr. Sangaré SEYDOU took part in all the visits. He represents in Abidjan a source of knowledge (including IHO) and a capacity on whom to count with the assistance of Mr. Stéphane LE BEON for the partners in charge "Action of the State at Sea".

## 4 International and regional cooperation - Defense

### a. [International and Regional Organizations]

OHI/IHO Status	Regional Hydrographic Commission	OMI/IMO	AISM/IALA	OMAOC/MOWCA
Non Member	Associated Member CHAtO/EAtHC	Member	Member	Member

Note: the procedure for joining the IHO can be found on:

[https://www.iho.int/iho\\_pubs/iho\\_ms/join\\_IHO/FR\\_Information\\_on\\_the\\_IHO\\_MembershipProcess.pdf](https://www.iho.int/iho_pubs/iho_ms/join_IHO/FR_Information_on_the_IHO_MembershipProcess.pdf)

### b. [Defense and security arrangements]

Subject not addressed during the visit.

## PART B – CÔTE D’IVOIRE – ASSESSMENT

### 5 Involvement in the Regional Hydrographic Commission (EAtHC)

Findings	Actions
Côte d’Ivoire systematically participates in EAtHC meetings. It is then represented by PAA.	<ul style="list-style-type: none"><li>• Participate at the next EAtHC (16th) plenary meeting in 2021 (from September 29 to October 01) in Lisbon (Portugal): <a href="https://iho.int/en/eathc16-2021">https://iho.int/en/eathc16-2021</a></li></ul>
	<ul style="list-style-type: none"><li>• In particular participate at the seminar which will precede at the same place on September 27 and 28, 2021 on maritime safety information (MSI) and maritime spatial data infrastructures (MSDI)</li><li>• Contact point : <a href="mailto:henri.dolou@shom.fr">henri.dolou@shom.fr</a></li></ul>

### 6 Preliminary liaison

The visit was prepared by Henri DOLOU (Shom) in close collaboration with Mr. Sangaré SEYDOU, head of the hydrography department of PAA and Commander Stéphane LE BEON, adviser to the Chief of Staff of the Ivorian National Navy.

The Shom was consulted as:

- NAVAREA II coordinator (permanent role);
- EAtHC capacity building coordinator (permanent role);
- Coordinator of the IHO international card portfolio for region G (permanent role);
- Hydrographic survey producer (occasionally);
- Producer of nautical charts and nautical publications (permanent role).

The Shom provided copies (paper and GeoTiff) of the Shom charts N ° 7384 (Greenville - Sassandra), 7385 (Sassandra - Aby), 7575 (Approaches of Abidjan), 7576 (Port of Abidjan). They have proven to be essential in explaining the issues and the meaning to be given to hydrography.

### 7 Technical Visit Contact Points - IHO Correspondents (P5-Yearbook) of EAtHC and Shom

The contact points for the Technical Visit are listed in Annex C. Difficulties are sometimes reported in knowing who to contact in Côte d’Ivoire regarding hydrography and navigation aids. At this stage there is no need to change the representation of Côte d’Ivoire at IHO. It is indeed necessary to wait for the creation of the NHC (CNHOC) to update and complete it (new stakeholders).

For the record: IHO / secretariat P5YEARBOOK DIRECTORY on: [https://iho.int/uploads/user/pubs/periodical/P5YEARBOOK ANNUAIRE.pdf](https://iho.int/uploads/user/pubs/periodical/P5YEARBOOK_ANNUAIRE.pdf))

## DESCRIPTION OF MARITIME ACTIVITIES

### 8 National Maritime Affairs

The duration of the visit (6 days) made it possible to meet the main actors.

#### General context, levels of development.

The meetings focused on the issues associated with hydrography: beyond the safety of navigation (international commitments - SOLAS), economic performance through port capacities for ships management and loading optimization (through the depths plotted on nautical charts).

It was recalled that hydrography is an applied science dealing with the measurement and description of the physical elements of seas and coastal areas. Hydrography necessarily intervenes in coastal protection (coastal development) thus emphasizing its transversal nature (physical oceanography is part of it) and consequently, at government level, its interdepartmental ambition.

In terms of capacities, according to the capacity building phases of IHO, the following points of progress have been noted:

Phase	Object	Level of development - Remarks
1	Collection and transmission of maritime safety information / nautical information (MSI) to NAVAREA II, transmission of corrections to nautical documents in particular nautical charts to the Shom	<b>Achieved</b> <i>"The country fulfils its national obligations in a sustainable manner"</i> <sup>1</sup> The actors (pilots, Navy, PAA) are well aware. This national responsibility is piloted in fact (or by default) by PAA and not a state structure like the DGAMP. However, in this area, efficiency counts above all
2	Hydrographic and oceanographic surveys through data acquisition	<b>Partial</b> <i>"The country is aware of its national obligations but does not have "national" means to do it"</i> Even if PAA is endowed with efficient means, these are mainly implemented only in the port area of Abidjan. There are no national capacities. The focus must now be on phase 2 for a response to "national" needs and not just "ports"
3	Production of nautical charts and documents	<b>In the medium term</b> <i>"The country fulfils its national obligations through a third party"</i> An administrative arrangement should nevertheless organize cooperation with France

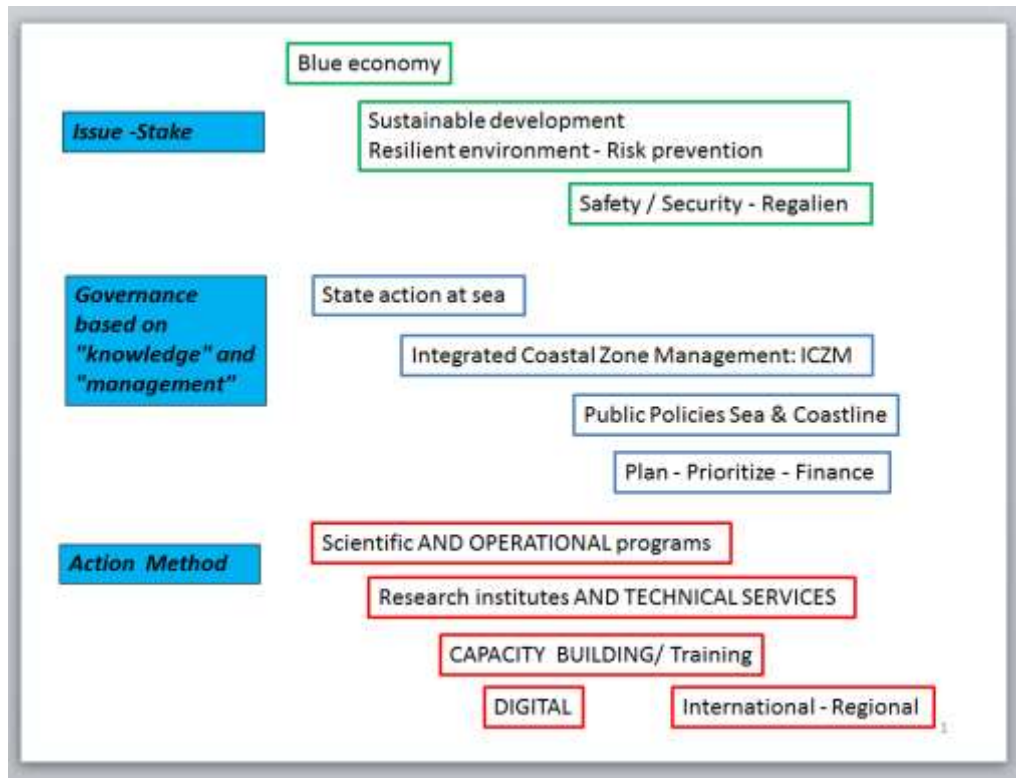
<sup>1</sup> Reference : <https://iho.int/uploads/user/Inter-Regional%20Coordination/CBSC/MISC/Templates%20Procedures/PDF/Procedure%2011.pdf>

		to be in particular in conformity with the SOLAS convention. Once phase 2 has been initiated in a sustainable manner, it will be possible to enter a phase of co-production of nautical charts with the Shom. This phase will benefit from the know-how of CIGN
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**On a national level :**

- **National Hydrographic Committee (NHC/CNH) or better National Hydrographic, Oceanographic and Marine Cartographic Committee (NHOCC/CNHOC)**
  - Such a committee does not exist. Its need was widely accepted by all the services / actors encountered: many common needs, skills that can be shared, resources to be pooled (through agreements, budgetary compensation if necessary);
  - It could explicitly integrate other themes than hydrography such as: oceanography, marine cartography or even navigational aids (NHC → NHOCC).
  - The purposes (political level, state governance) of such a committee could be recalled: national coordination, national planning, prioritization, representation in international hydrographic commissions. It is useful to refer to the IHO publication M2 "The need for national hydrographic services":  
[https://iho.int/uploads/user/pubs/misc/M-2\\_3.0.7\\_E\\_06142018.pdf](https://iho.int/uploads/user/pubs/misc/M-2_3.0.7_E_06142018.pdf)
  - Stakeholders: maritime navigation, marine environment and research, State Action at Sea, maritime training, cartography, etc. Stakeholders able to contribute to long-term projects and may also be part of the program budget. Already identified: PAA (hydrography, piloting, harbor master's office), Navy, DGAMP, CIGN, CRO, WACA, ARSTM;
  - A note will be drawn up by PAA for the benefit of SEPCIM to explain the interdepartmental issues of the NHOCC. In particular, it will be necessary to find the best framework for constituting this committee and its steering (chairman, technical secretariat to support, etc.);
  - Note: such a committee does not, however, constitute an operational national research, development and production body. This is what Côte d'Ivoire is lacking to complete phase 2 of its hydrographic development. The constitution of such an operational body deserves a lot of reflection and discussion and above all an in-depth knowledge of the country. It is therefore recommended to conduct a definition study which would specify: its status, governance, budget, material and human resources, etc. Rather than creating such a service ex-nihilo, it may be appropriate to rely on the existing operational structure of the PAA (hydrography department) whose vocation is not (at least currently) national in character. The establishment of operational structures and resources falls under the "Action / Method" level in the following figure.





- **Permanent Secretary of the Interministerial Committee for State Action at Sea (SEPCIM)**
  - L'interdisciplinarité précédemment signalée pourrait donc être soutenue par le
  - The previously mentioned interdisciplinarity could therefore be supported by the Interministerial Committee for State Action at Sea.
  - The SEPCIM is an authority reporting to the Prime Minister particularly well positioned to lead a CNHOC.

#### **Autonomous Port of Abidjan (PAA)**

PAA plays a major (but almost exclusive) role in nautical information (correspondent NAVAREA II) and in the transmission of new bathymetric surveys to the Shom. According to IHO Publication P-5 (List of Non-Member States), its Managing director represents Côte d'Ivoire at meetings of this organization. In the past, the Head of the Hydrography Department of the Engineering and Contracting Authority has actively participated in IHO meetings and seminars.

#### **General Directorate of Maritime and Port Affairs. (DGAMP)**

The DGAMP is a national authority of prime importance for the safety of navigation; Its director was able to:

- support the proposals for signing an Administrative Arrangement and setting up a CNHOC, the latter constituting a structure adapted to the settlement of discrepancies (to "designate those responsible") raised during the 2016 IMO audit;
- agree that "by default" PAA was obligated to manage national aids to navigation;

- indicate that he wished to receive a copy of the letter that PAA will send to the Minister of Transport in support of an Administrative Arrangement;
- point out that PAA and the DGAMP had the same supervision, namely the Ministry of Transport.

### **Geographic and Digital Information Center (CIGN)**

This is an important center (backed by the BNEDT) whose capacities may be essential for the development of phase 3 (mapping) of capacities.

To note:

- strong professional skills in geomatics and georeferenced data management;
- CIGN has already produced a nautical chart of State Action at Sea which has been deposited with the United Nations (DOALOS: Division for Ocean Affairs and the Law of the Sea):



[https://www.un.org/Depts/los/LEGISLATIONANDTREATIES/PDFFILES/MAPS/CIV\\_MZN119\\_2016\\_00233.jpg](https://www.un.org/Depts/los/LEGISLATIONANDTREATIES/PDFFILES/MAPS/CIV_MZN119_2016_00233.jpg)

### **Navy (Marine Nationale : MN)**

The missions of the Ivorian Navy fall under maritime defense, maritime police, risk management related to maritime activity, etc.

Three important points:

1. The Navy participates in the collection (Navy has a front row seat to observe) and the dissemination of nautical information;

2. The Navy has many ships (patrol boats, boats, launches) which are as many supports (maritime platforms) for the installation (at least occasional) of portable systems for acquisition of hydrographic and oceanographic data that Côte d'Ivoire does not currently have outside PAA. The rapid development of phase 2 (acquisition of data at sea, surveys) also appears to have to rely on these existing national resources. The Navy has, in the past, participated in oceanographic projects of the CRO;
3. The Navy will send one of its officers to follow a CAT B certified hydrography course next September in France (Shom school). The preparation conditions for this training and the organization of a subsequent practice phase were discussed during the technical visit. This is excellent news which shows Côte d'Ivoire's interest in hydrography beyond the port limits.

### **Oceanological Research Center (CRO)**

- The potential of this center is not developed due to a lack of (lost) resources in equipment and personnel;
- Its capacities (rare in Côte d'Ivoire) in terms of oceanographic data management (ODINAFRICA) and hydrodynamic modeling (recent CROCO code - Coastal and Regional Ocean COMMunity model - reported) that should be developed. The satisfaction of hydrodynamic modeling needs (eg: marine currents, tides, sediment transport, etc.) of the country by an organization in the country depends on it;
- As evidenced by the cooperation put in place with foreign universities and oceanographic laboratories (eg: French Ocean Physics Laboratory), the CRO knows how to work in a network, an essential condition for development;
- At the level of the Côte d'Ivoire, framework cooperation agreements have been signed with the Autonomous Port of San Pedro and the Félix HOUPHOUËT-BOIGNY University;
- Note also the support that the Navy has occasionally been able to offer by providing an opportunity vessel for data acquisition at sea;
- The CRO will be able to bring all its experience to the CNHOC.

### **WACA (*West Africa Coastal Areas Management program*)**

- It has simply been noted, but it is fundamental, that the data required by hydrographers and marine cartographers are the same as that of the WACA West African Coastal Zone Resilience program;
- Beyond this observation, the discussions also led to the need for data sharing. "*We must unite energies - everyone has a little data*". The role that a national integrated coastal management agency (ANAGIL) with an Environmental Information Management System (SGIE) could play would allow the networking (*Geoportal*) of all data producers and those in need ;
- The strengthening of national structures that collect data has been affirmed. The WACA program, if it receives grants from the World Bank, will not be able to buy all the necessary equipment or ensure long-term monitoring;
- The Côte d'Ivoire did not benefit from the WACA / FFEM (French Fund for Global Environment) program which enabled the digitization of old documents (hydrographic surveys, aerial photos of the coast, nautical charts) in Senegal, Togo and Benin. Valuable historical archives are therefore still to be digitized and shared;

- The Ivorian actors of the WACA program are intended to participate in the CNHOC (perennial structure) previously presented. Their experience in setting up and leading federative and regional projects will also be very useful.

### **ARSTM (Regional Academy of Marine Sciences and Techniques)**

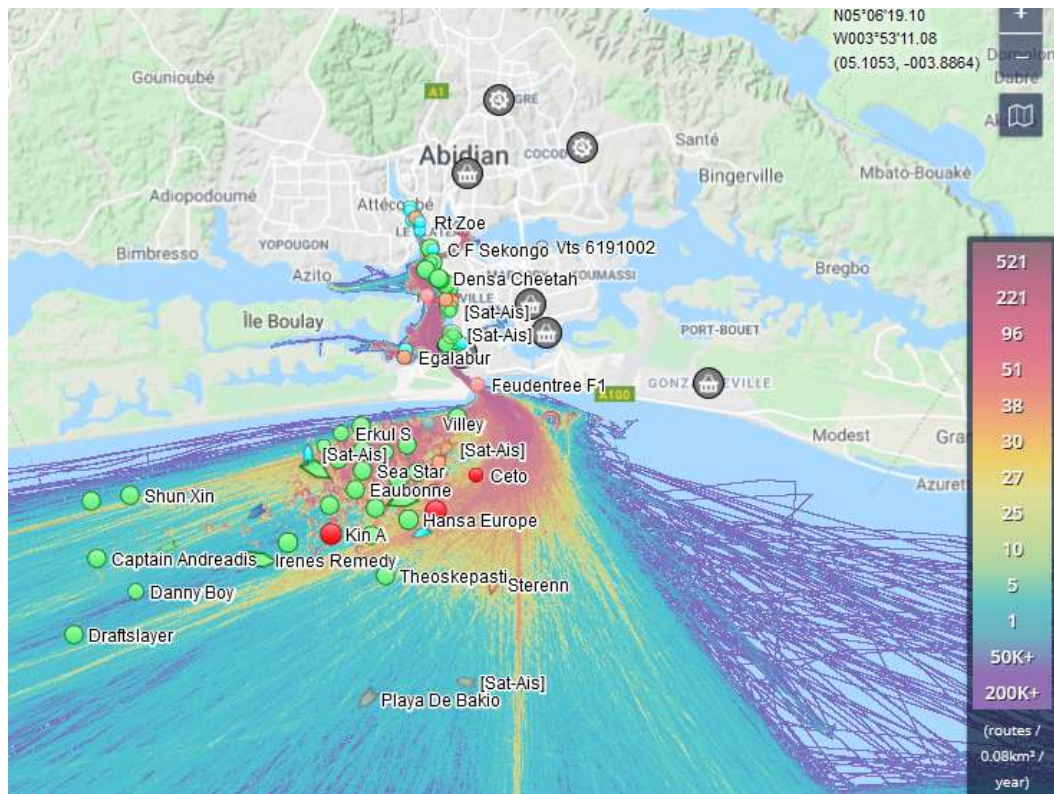
- This regional school (training followed by many countries of West and Central Africa) welcomes in particular the Higher School of Navigation (ESN) and the ISMI (Interregional Maritime Safety Institute). It offers licenses and masters;
- Its training offers, in various forms (seminars, initial qualifying courses) could integrate hydrographic concerns extended to physical oceanography and marine cartography;
- To initiate the organization of such training, it would be necessary to:
  - define professional objectives (jobs to be satisfied);
  - detail the content of the programs (syllabus);
  - formalize the process with the official support of the IHO. The school should indeed have a reference partner. It would involve writing formally to the government of Côte d'Ivoire which will follow.

## **9 Trade and Maritime Traffic - Marine cartography. /CATZOC**

**AIS data (source : <https://www.marinetraffic.com> )**



**General situation of maritime traffic in the Gulf of Guinea**



**Maritime traffic within the port of Abidjan**

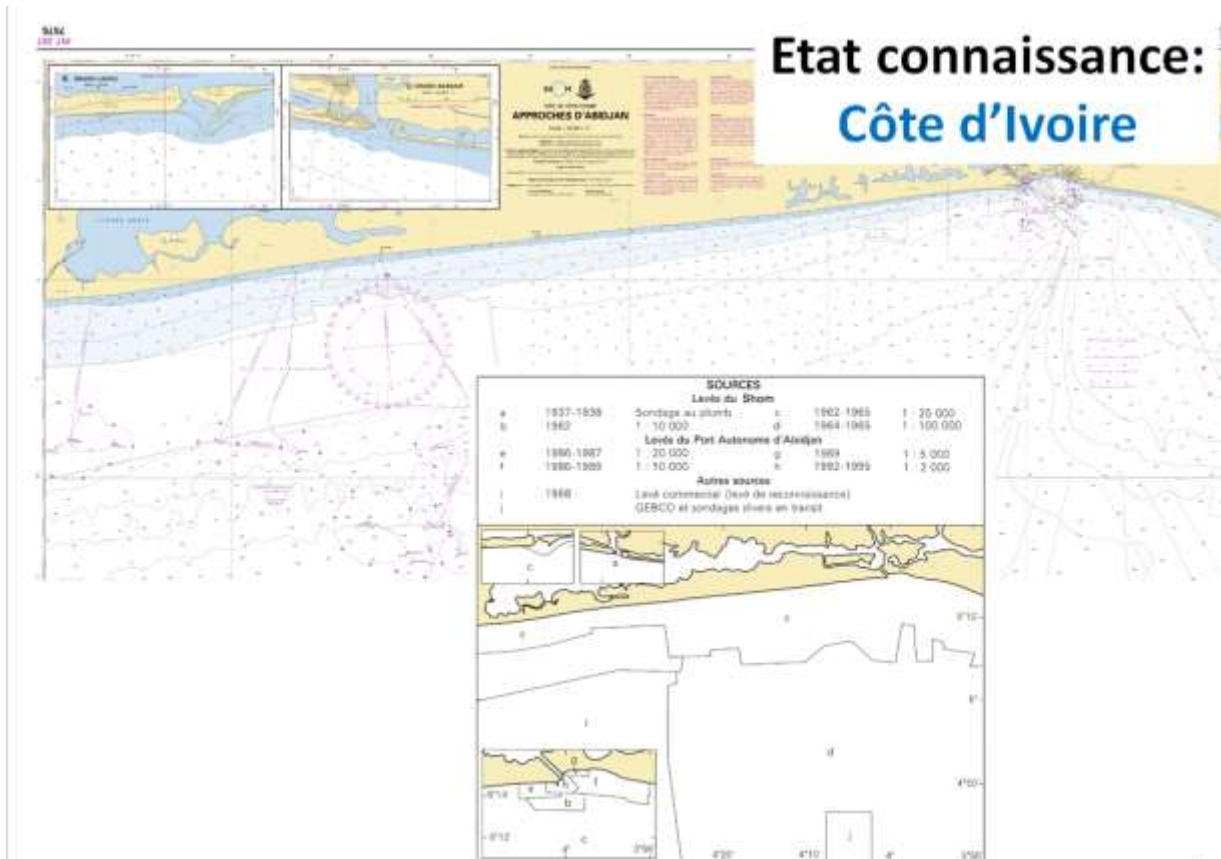
### **Official cartography (nautical) of the Côte d'Ivoire**

France de facto ensures (pending co-production with Côte d'Ivoire) the function of "Primary Chart Authority" through the production of nautical documentation made by the Shom (its national hydrographic service) on the Ivorian waters. Other chart producers like UKHO also have an offer based on the same data.

Ivorian waters are covered by a significant set of paper charts, digital rasters in GeoTiff format and electronic navigation charts (ENC). These products cover the most important known navigation needs. Nevertheless:

- Some charts (details at scales between 1: 20 000 - 1: 10 000) are based on old information (1960s). The environment may have changed; the hydrographic techniques of the time may no longer meet current requirements, which is already the case with geolocation in WGS84. Under these circumstances, there cannot be digital charts requiring geolocation (GeoTiff or ENC);





Source : <https://iho.int/en/iho-c-55>

### Côte d'Ivoire (G)

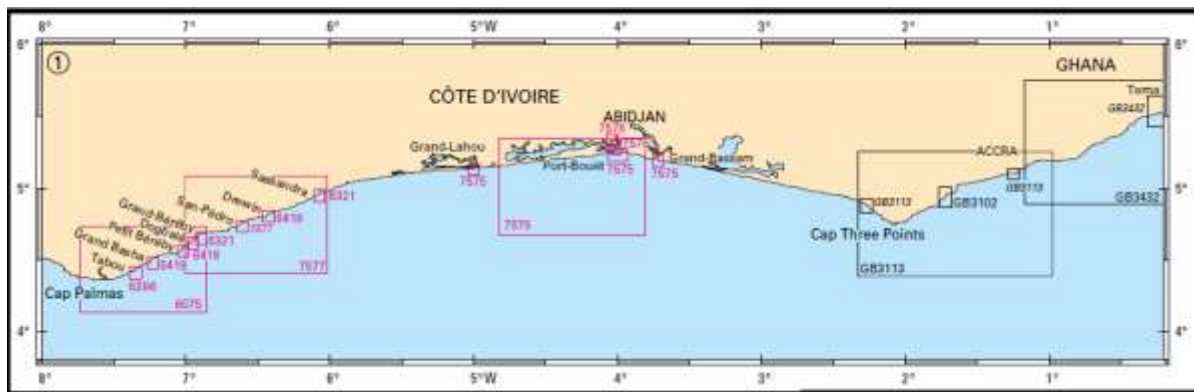
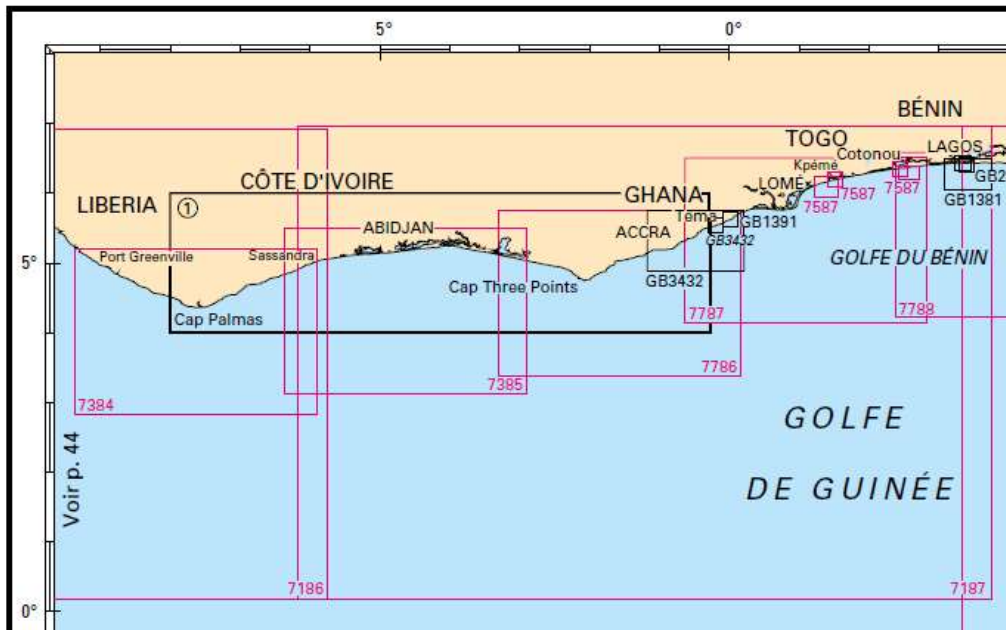
Nautical charting / Cartographie marine / Cartografía náutica

Coverage of charts published Couverture des cartes publiées Cubertura de cartas publicadas		Offshore passage Navigation au large Pasaje offshore			Landfall and Coastal passage Atterissage et navigation côtière Recalada y Pasaje costero			Approaches and Ports Approches et ports Aproches y puertos		
0%	Covered by INT or other paper charts meeting S-4 Couvert par des cartes papier INT ou autres conformes S-4 Cubiertas por cartas de papel INT o otras cumpliendo S-4	100	0	100	100	0	100	67	0	16.6
0%	Covered by RNC meeting S-61 Couvert par des RNC conformes S-61 Cubiertas por RNC cumpliendo S-61									
0%	Covered by ENC meeting S-57 Couvert par des ENC conformes S-57 Cubiertas por ENC cumpliendo S-57									
Paper charts showing depth in meters Cartas papier avec les profondeurs en mètres Cartas de papel con profundidades en metros		Paper charts referenced to a satellite datum Cartes papier rattachées à un système géodésique satellitaire Cartas de papel referidas a un datum satelital			Data source Source des données Origen de los datos			FRANCE		
Notes Notas Notas	1. Data provided by France, courtesy of Côte d'Ivoire. 2. Large scale : missing coverage on Sassandra and Grand Béréby. San Pedro coverage done by GB3099. 3. Data derived from EatHC visit.									

- Continuous “1: 100 000” chart coverage is not offered (between Sassandra and Grand-Lahou). This does not constitute a difficulty since coastal navigation is not developed everywhere.

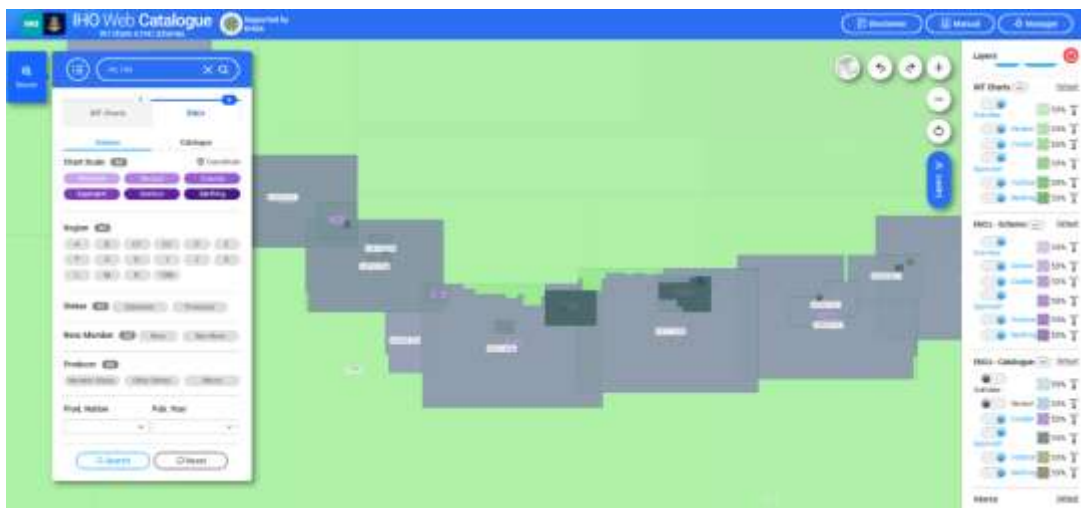
Sources/ paper chart :

[https://diffusion.shom.fr/media/wysiwyg/catalogues/Grand\\_Catalogue\\_2021\\_Web.pdf](https://diffusion.shom.fr/media/wysiwyg/catalogues/Grand_Catalogue_2021_Web.pdf)



Sources/ ENC :

<http://chart.iho.int:8080/iho/main.do>



Comments:

- This chart covering must be enriched by all surveys carried out in waters under Ivorian sovereignty or jurisdiction. The hydrographic surveys received by the Shom (metadata included) have so far only come from the PAA and PASP. The official cartography is therefore not enriched by all the surveys carried out such as oil exploration seismic surveys. This is a subject to be submitted to CNHOC;
- There are areas where hydrographic knowledge is insufficient. By correlating this knowledge with the current and above all planned navigation zones, it will be possible to conduct a risk analysis and prioritize the hydrographic surveys to be carried out. This is again a subject to be submitted to CNHOC (navigation aids included)

## **10 Responsibility for Safety of Navigation**

The General Directorate of Maritime and Port Affairs (DGAMP) is responsible, under the authority of the Minister of Transport, for the conduct of transport policy, maritime, port and river-lagoon affairs, maritime safety and security and ports and maritime cooperation.

## **11 Responsibilities of the defense forces (Ivoirian Navy)**

The missions of the Navy fall under maritime defense, maritime police, risk management related to maritime activity, etc.

## **12 Coastal zone management and environmental protection**

CRO and WACA - MOLOA (West African Coastal Observation Mission) program are very concerned in terms of knowledge (acquisition of marine geophysical data included). Other Ivorian or foreign or even international university organizations or structures (ie IOC) are most likely involved but have not been met.



## OUTLINE C-55 ANALYSIS






### 13 Status of hydrographic surveys in the national maritime zone

Sources :

- <https://iho.int/uploads/user/pubs/cb/c-55/c55.pdf>
- Shom (values communicated in May 2021)

The following table reflects the coverage of the surveys, to within a few % are in accordance with the latest calculations by Shom:

#### Côte d'Ivoire (G)

Hydrographic surveying / Levés hydrographiques / Levantamientos hidrográficos							
Survey coverage Couverture hydrographique Cobertura hidrográfica		Depth < 200m Profondeur < 200m Profundidad < 200m			Depth > 200m Profondeur > 200m Profundidad > 200m		
	Adequately surveyed Correctement hydrographié Adecuadamente levantado	0	4	96	7	22	71
	Re-survey required Nécessitant de nouveaux levés Requiere nuevo levantamiento						
	Never systematically surveyed Jamais hydrographié systématiquement Nunca levantado sistemáticamente						
Notes Notes Notas	1. Data provided by France, courtesy of Cote d'Ivoire. 2. Depths fall away rapidly at the edge of the narrow continental shelf. 3. Routine re-surveys are required following dredging in Port d'Abidjan. 4. Data now derived from survey GIS polygonal surfaces method. New values might divert significantly.						

Note:

- these indicators are only based on the data available to the Shom: there may be surveys carried out by private companies, in particular offshore (surveys) which are not known to the Shom and therefore not used on nautical charts and in the C-55 indicator;
- they clearly show the weakness (apart from harbor accesses) of hydrographic knowledge as has already been pointed out previously.

### 14 Collection and circulation of nautical information

Harbors (technical services, harbormaster's offices) and any observer at sea (Navy in particular) should provide information to the Shom in order to issue NAVAREA messages (rapid dissemination on Inmarsat) and update publications in a timely manner; in particular nautical publications by notice to mariners. The transmission should be based on an Ivorian state organization (ie: DGAMP).

The information flow should focus on:

- nautical charts (eg new docks, new navigation aids, wrecks removed, submarine cables, etc.);
- sailing directions;
- list of lights;

- tides (the harmonic constants used for predictions to be made more reliable and precise using observations of water levels in Abidjan and San Perdro).

## 15 Hydrographic survey capacity

If there are no national capacities, PAA has significant resources.

Source:

- Communication from M Sangaré SEYDOU within the framework of the preparation of the next EAtHC;
- Visit on site.

### General context :

- At PAA, the Hydrography service is housed in the Hydrography Department of the Directorate of Engineering and Project Management. Created on July 23, 1953, it is one of the first services set up as part of the creation of the port of Abidjan;
- Its initial mission was to follow the movements of sediments in the canal (Vridi) and thus ensure the safety of navigation throughout the port area;
- Today and in addition to this mission, it monitors the evolution of seabed and dredging works, and serves as technical and scientific support in hydrography to national and international structures working on the Ivorian coast;
- Concretely, PAA is invested in:
  - The study of currents (measurement system to be provided for the Vridi canal) and tide (mainly in the lagoon area);
  - Exchanges with foreign partners (Sea Level Observation Network with France) and national (F.H. Boigny University: climate, oceanography, hydrodynamics, etc.);
  - Welcoming students (end of studies work and theses);
  - Training.

### Means :

- Staff: the department has around thirty agents, including seven hydrographers;
- systems :
  - two hydrographic launches and inflatable boats. One of the launches, a pilot boat, was acquired last October and is perfectly equipped;
  - RTK positioning system;
  - multibeam echo sonar systems;
  - bathymetric software;
  - 3 radar tide gauges.

France (Shom) only occasionally operates in waters under Ivorian jurisdiction.



## 16 Independent chart production capability

There is no official capacity to produce nautical charts, nor to update and distribute them.

Nevertheless, as already pointed out, the Center for Geographic and Digital Information (CIGN):

- has great professional skills in geomatics and georeferenced data management;
- has already produced a nautical chart of State Action at Sea which has been deposited with the United Nations (DOALOS: Division for Ocean Affairs and the Law of the Sea).

## COORDINATION AND CAPACITY BUILDING PROPOSAL

### 17 National Hydrographic Committee (NHC) or National Hydrography, Oceanography and Marine Cartography Committee (CNHOC) for coordination

Côte d'Ivoire does not yet have such a committee, the vital interest of which was presented in the National Maritime Affairs chapter. This committee (inter-ministerial, inter-agency) will be an essential link in the operational organization of the Ivorian State (technical service, data management, production, etc.) to be set up (and therefore to be financed) for the execution of development programs in hydrography, oceanography and marine cartography. The organization and execution of training in Côte d'Ivoire and abroad is part of the development programs and therefore of the subjects of the committee.

#### Propositions :

- to collect the needs (navigation, environment) for hydrographic surveys, prioritize them and plan them by identifying the organizations (to be supported) or companies (to be contracted) that can carry them out;
- data collection can only be conceived economically if it is widely shared (one data - several applications) and exploited. This raises the problem of archiving and disseminating data at the national level. Techniques and tools are better and better mastered with databases and communication and download portals. The fact remains that this requires IT structures and dedicated skills to be set up;
- to coordinate the own work of the CNHOC with that of the DGAMP if ever Aids to Navigation were not included.

### 18 Phase 1 Hydrographic capability: MSI organization and GMDSS

#### Introduction:

Maritime Safety Information (MSI), as defined in resolution A.705 (17) of the International Maritime Organization and detailed in the joint IHO / IMO / WMO manual on MSIs ( IHO Special Publication S-53), consist of the collection and dissemination of navigational and meteorological warnings, search and rescue information and other urgent safety-related information, including nautical information relating to nautical documentation.

The dissemination of these MSIs is based on the GMDSS (Global Maritime Distress and Safety System), an international system which uses telecommunications means for search and rescue at sea (SAR) and the prevention of maritime accidents.

In addition, MSIs, in their broadest sense, include updating navigation charts and other nautical publications (list of lights, radio signals, sailing directions, etc.).

MSIs need an organization (procedures for collecting, transcribing and transmitting information, equipment maintained, trained personnel) with a national MSI coordinator in relation with the navigators, the cartographic authority (France / Shom) and NAVAREA II (France / Shom).

- a. MSI (Maritime Safety Information).

PAA and PASP disseminate information to the NAVAREA II coordinator (France / Shom). The Ivorian Navy and French forces in the Côte d'Ivoire may also occasionally contribute.

However, this is not officially organized at the national level by the Ivorian State (DGAMP).

**For memory: MSI - NAVAREA II**

MSIs must be transferred to the NAVAREA II coordinator:

Département "Informations et Ouvrages Nautiques"

Service hydrographique et océanographique de la marine (Shom)

CS 92803 - 29228 BREST CEDEX 2

Tel: +33 2 56 31 24 24 (Duty Officer, H24)

+33 6 24 80 08 92 (Duty Officer, spare)

Fax: +33 2 56 31 25 84

Email: [coord.navarea2@shom.fr](mailto:coord.navarea2@shom.fr) (H24),

[coord.navarea2@gmail.com](mailto:coord.navarea2@gmail.com) (spare)

Website: <http://diffusion.shom.fr/navarea-en-vigueur>

- b. Nautical information on harbours and their accesses. Shom publishes notices to mariners and keeps nautical publications up to date.

**For memory: Non-urgent nautical information.**

Continue to transmit non-urgent nautical information (update of charts, list of lights, Sailing directions ...)

Hydrographic surveys, harbors plans : [bri@shom.fr](mailto:bri@shom.fr) + copy [na-om@shom.fr](mailto:na-om@shom.fr) and [dmi-rex-d@shom.fr](mailto:dmi-rex-d@shom.fr)

Other nautical information: [na-om@shom.fr](mailto:na-om@shom.fr) + copy : [bri@shom.fr](mailto:bri@shom.fr) and [dmi-rex-d@shom.fr](mailto:dmi-rex-d@shom.fr)

Address : Département "Informations et Ouvrages Nautiques"

Service hydrographique et océanographique de la marine (Shom)

CS 92803 - 29228 BREST CEDEX 2

- c. The Global Maritime Distress and Safety System (GMDSS) is an international system which uses telecommunications means for search and rescue at sea and the prevention of maritime accidents.

This subject was not discussed.

**For memory:** Information provided by IMO in the « MASTER PLAN OF SHORE-BASED FACILITIES FOR THE GLOBAL MARITIME DISTRESS AND SAFETY SYSTEM (GMDSS MASTER PLAN)”: GMDSS.1/Circ.19 on 20 July 2016);

STATUS OF SHORE-BASED FACILITIES FOR THE GMDSS

O =Operational

T =Under trial

P =Planned or to be decided

COUNTRY	COAST STATIONS						SES for RCC	MSI BROADCAST SERVICE				Cospas-Sarsat		
	DSC			Inmarsat LES				NAVTEX	SafetyNET			HF NBDP	MCC	LUT
	A1	A2	A3 & A4	B	C	Inmarsat Fleet F77			NAV	MET	SAR			
Côte d'Ivoire	O	O	O					P						

**Note: France reiterates its offer to use SafetyNet to make up for the lack of NAVTEX (possibility already offered to Nigeria and Togo during IHO technical visits)**

## 19 Phase 2 Hydrographic capability: surveys

The only existing capacities (launches and equipped boats) identified on site are those of PAA. They are perfectly suited to port (San Pedro included) and lagoon surveys. However, these resources remain dedicated to the needs of PAA in its area of responsibility. They therefore do not cover other national needs, whether navigation or the environment.

Have a permanent national capacity. It will be able to develop by relying on all the resources already available and therefore poolable with PAA, the Navy (which owns vessels and will train a hydrographer), at the CIGN (localization), within the framework of the WACA project, etc.... This could be defined within the framework of the CNHOC to be set up.

## 20 Phase 3 Hydrographic capability: chart production

Côte d'Ivoire does not yet have the capacity to produce (and distribute throughout the world) official national charts. France (via the Shom) assumes de facto the role of the cartographic authority for the waters under the jurisdiction of Côte d'Ivoire. This will have to be formalized in an Administrative Arrangement between the Côte d'Ivoire (Ministry of Transport) and France (Ministry of Defense, guardianship of the Shom) to be in accordance with the SOLAS convention.

### Proposition

The co-production of official nautical charts constitutes a development stage to be considered with the current cartographic producer (France / Shom) for maritime navigation (SOLAS).

Due to less significant regulatory constraints (standards, updating and dissemination), cartographic documents (geomatics) for various applications such as coastal development, environmental monitoring or specific maps for State sea action have already been produced. These existing capacities should be able to meet the needs identified in the lagoons.

**21 Summary of the assessment of the national hydrographic capability –  
Table**

OHI	CHAtO	CNHOC	Phase 1 Capacity	Phase 2 Capacity	Phase 3 Capacity
NON Member	Associated Member	NO	YES for Harbour	YES for Harbour	NO (1)

(1) Although there are related national competences in particular in terrestrial geomatics. State Action at Sea charts were produced

## FORMATION

### 22 Basic training of senior hydrographic technicians (not only!)

#### Initial training of hydrographers

The operational services which are or will be responsible for hydrography must have qualified senior hydrographic technicians in sufficient number (to be defined). The recommended training is that offered by schools whose programs are approved by the FIG /IHO/ ACI (International Federation of Surveyors, International Hydrographic Organization, International Cartographic Association) with Category B (CAT B).

The practical training which complements the theoretical formation of the schools will be conveniently carried out in a port operating dredging and having a service in charge of hydrography.

The Shom's school (French-speaking) offers approved Category B training: the Superior Hydrographers Certificate, the program of which can be viewed (page 43) on:

[https://www.shom.fr/sites/default/files/2020-10/Offre\\_formation\\_2020-2021\\_Web.pdf](https://www.shom.fr/sites/default/files/2020-10/Offre_formation_2020-2021_Web.pdf).

Point of contact at Shom: Chief hydrographer Aude Tychensky Director of education, then Chief hydrographer Ronan Le Roy from September 2021: [drh-for-d@shom.fr](mailto:drh-for-d@shom.fr).

This formation, a license level 3, is very demanding in terms of initial knowledge in mathematics and physics. It can be followed by young people who already have experience in geomatics, geodesy, physical oceanography or even maritime navigation.

This training will give sufficient versatility to future students to meet almost all the skills needs necessary for data acquisition at sea (lakes, lagoons and rivers also) and on the coast. The CAT B hydrographers will be able on their return to train the hydrograph assistants that the country needs ("CAT C").

**Note :** the Ivorian Navy will send to the Shom school, next August, the lieutenant Karamoko MOUSSA (karamoko89moussa@gmail.com) from the BGEM (Bureau Génie Maritime.)

The priority is not to have CAT A hydrographers immediately. This could be considered in the longer term.

#### Initial training of marine cartographers

There are enough initial skills in Côte d'Ivoire to specialize at least one scientist in nautical cartography. Category B (CAT B) training is recommended. The Shom school (French-speaking) offers such a CAT B training: Preparatory technician course in marine cartography, the program of which can be consulted (page 48) again on

[https://www.shom.fr/sites/default/files/2020-10/Offre\\_formation\\_2020-2021\\_Web.pdf](https://www.shom.fr/sites/default/files/2020-10/Offre_formation_2020-2021_Web.pdf).



### **Also have "support" and "managerial" skills - Apply**

To get off to a "good start" and have long-lasting skills, there is no escaping:

- a solid initial training (CAT B - Hydrographer). This has been acquired for the PAA and will soon be for the Navy;
- immediately followed by practice: get operational by conducting surveys exploited by marine cartographers or specialists in environment;
- which supposes having also complementary skills / capacities which can be classified as follows:
  - "Support" function in specific materials (GPS, echo sounder, tide gauges, etc.): maintenance of equipment, IT (software, databases, webmaster, etc.). It should be noted here that this support function is not very different from that of land surveyors or cartographers;
  - "Navigation" function: provision of boats for data acquisition at sea (these are also many additional skills that should not be neglected!);
  - ... without forgetting the management function;
- All this cannot in fact be successful without global management (and therefore having corresponding skills):
  - it is necessary to organize the development of hydrographic capacities (beyond even training) under project procedure according to classic managerial practices (objectives, costs, deadlines);
  - It is therefore advisable to have in mind development's objectives in a comprehensive manner by entrusting the CNHOC with a study to define the capacities to be put in place at first for data acquisitions:
    - completeness of the needs (to be planned) to be satisfied (navigation, coastal development, coastal protection, etc.);
    - identification of all stakeholders (public and private) who have an interest in cooperating to get benefits (they come together to pool capacities);
    - definition of the production systems to be implemented: hydro-oceanographic functions and support (logistics);
    - definition of the means of intervention at sea (boats, launches);
    - definition of onshore infrastructure;
    - definition of governance (supervision, contracts of objectives and resources, therefore funding, agreements);
    - definition of human resource needs in sufficient quantity and quality for all professions;
    - Note: such a study would be conveniently carried out by a pair made up of an organizational expert (development project manager) and an expert in hydro-oceanography. This would result in a development plan to be executed;
    - As soon as this definition study has therefore been carried out and the development conditions have been met (therefore the means), move on to the development and implementation phase:
      - by recruiting and training staff (multi-skilled hydro-oceanographers, IT specialists, administrative staff, managers, etc.) who may be lacking;

- by making infrastructure available;
- by procuring data acquisition and support equipment that may be missing;
- finally moving to operational activities by conducting surveys.

## 23 Continuous training in hydro-oceanography and related activities (navigation aids, port infrastructure and coastal protection) - Management

### At the international level in hydrography

There are actually many opportunities and facilities to maintain knowledge in hydrography. Nevertheless need to know them and be encouraged to follow them.

- IHO:
  - which offers training materials at: <https://iho.int/fr/publications-sur-le-renforcement-des-capacites>. In particular, it is a high quality manual on hydrography;
  - who organizes seminars. Those of EAtHC are now known. The next one will take place during the next EAtHC (16th) plenary in 2021 (27 and 28 September 2021) if possible in person in Lisbon (Portugal) otherwise in webinar: <https://iho.int/en/eathc16-2021>;
- Shom (<https://www.shom.fr/>) which in addition to the initial formation of its school also offers opportunities for training in tide gauges (<https://www.sonel.org/>);
- AFHy: Francophone Hydrographic Association (<https://www.afhy.fr/>).

### At the international level on related issues

We should not deprive ourselves of international training offers on related subjects

- AISM training (for navigation aids) (contact: [jacques.manchard@iala-aism.org](mailto:jacques.manchard@iala-aism.org)). This will favorably bring together hydro-oceanographers and managers of navigation aids, whose purposes are similar in terms of navigation;
- IOC training, the Intergovernmental Oceanographic Commission of UNESCO (for oceanography) (<http://www.unesco.org/new/fr/natural-sciences/ioc-oceans/>); This will favorably bring together hydro-oceanographers and oceanographic researchers (an opportunity to recall the active role played by research institutes for development in the region);
- finally the training of the FIG (International Federation of Surveyors) <https://www.fig.net/about/general/language/leaflet-french.asp>. This will favorably bring together hydro-oceanographers and surveyors.

### At the regional level (West and Central Africa)

There is a need for regional training schools in hydro-oceanography-cartography. It is necessary to get out of the current situation where there would be no other alternative than to register the agents to be trained in hydrography schools outside the African continent.

<https://iho.int/uploads/user/pubs/cb/c-33/C47E-SEPT09-UPDATED-APRIL11.pdf>

[https://www.iho.int/mtg\\_docs/com\\_wg/AB/AB\\_Misc/Recognized\\_Programmes.pdf](https://www.iho.int/mtg_docs/com_wg/AB/AB_Misc/Recognized_Programmes.pdf).

They can be French or English speaking. The contacts that IHO has been able to have so far in West and Central Africa have not really made it possible to identify the structures (schools, academies, etc.) ready immediately to host training for approved hydrographers and cartographers.

The following were thus identified as potentially capable of accommodating courses with approved programs:

- RMU (Regional Maritime University) of Accra (Ghana)
- NNHS (Nigerian Navy Hydrographic School) in Port Harcourt (Nigeria);
- ARSTM (Regional Academy of Marine Sciences and Techniques) of Abidjan (Côte d'Ivoire).

### **ARSTM**

Regarding ARSTM met during the technical visit: nothing is against the organization of traineeships (there have already been some in hydrography) or initial qualifying training. The latter must now be put in place. This requires a significant initial investment (expert in training organization, training of trainers, etc.) which has so far not been possible. The 2016 HydroMAOC (IHO) project had defined what should be done but could not be followed up. Five years later, nothing has changed.

As already indicated in the paragraph "National Maritime Affairs": to initiate the organization of such training, it is necessary:

- define professional objectives (jobs to be satisfied);
- detail the content of the programs (syllabus);
- formalize the process with the official support of the IHO. The school should indeed have a reference partner. It would involve writing formally to the government of Côte d'Ivoire which will follow.

### **French-speaking universities**

Finally, it should be noted that the Omar Bongo University of Libreville (UOB) and the universities of Yaoundé (UY) and Douala (UDo) offer a regional master's degree in "integrated management of coastal and marine environments" (GIELM with which IRD is associated :French Research Institute for Development) which deal with hydro-oceanography topics. There is certainly a wealth of skills there to explore.

### **At the national level (Côte d'Ivoire)**

It is certainly national competences (public, private) that the technical visit was not able to inventory, it is in particular:

- qualified land surveyors and cartographers;
- specialists in remote sensing (a method widely used in hydrography);
- professionals in GIS (Geographic Information Systems) (in support of the aforementioned professions);
- IT specialists skilled in databases and websites;
- researchers who have participated in scientific or data acquisition programs (eg WACA) whose skills need to be shared;
- engineers and technicians from engineering companies.

These are cross-functional skills that are essential for the development of hydro-oceanography-cartography. They constitute a base of skills to be shared on which the Côte d'Ivoire can count.

## Management

No development without managers who, beyond their administrative and human responsibilities, will also have to:

- know how to communicate with users (maritime pilots, shipping companies, developers, etc.), with Shom, with IHO and finally all the national stakeholders identified for the coordination committee;
- know how to specify hydro-oceanographic surveys and prioritize them according to risks analysis ;
- identify the best training courses for personnel;
- master all possible sources of funding at the national, regional (West and Central Africa) and international (Donors) levels.

These skills will be particularly important within the CNHOC. Participation in IHO meetings (at a minimum EAtHC meetings and seminars) allows interaction with counterparts.

Report writer



Henri DOLOU

## ANNEXES

### Annex A: Abbreviations

ANAGIL	Agence nationale pour la gestion intégrée du littoral <i>National Agency for Integrated Coastal Zone Management</i>
ARSTM	Académie Régionale des Sciences et Techniques de la Mer <i>Regional Academy of Marine Sciences and Techniques</i>
BNEDT	Bureau National d'Études Techniques et de Développement <i>National Bureau of Technical Studies and Development</i>
CBSC	<i>Capacity Building Sub-Committee</i> Sous-comité de renforcement des capacités
CBWP	<i>Capacity Building Work Programme</i> Programme de travail de renforcement des capacités
CIGN	Centre d'Information Géographique et du numérique relevant du BNEDT <i>Geographic and Digital Information Center under the BNEDT</i>
CRO	Centre de Recherches Océanologiques <i>Oceanological Research Center</i>
DGAMP	Direction Générale des Affaires Maritimes et Portuaires <i>General Directorate of Maritime and Port Affairs</i>
EAtHC	<i>Eastern Atlantic Hydrographic Commission</i>
CHAtO	Commission Hydrographique de l'Atlantique oriental
ENC	<i>Electronic Navigational Chart</i> Cartes électronique de navigation
FFEM	Fonds français pour l'environnement mondial <i>French Facility for Global Environment</i>
GMDSS	<i>Global Maritime Distress and Safety System</i>
SMDSM	Système Mondial de Détresse et de Sécurité en Mer
IALA	<i>International Association of Marine Aids to Navigation and Lighthouse Authorities</i>
AISM	Association Internationale de Signalisation Maritime
IOC	<i>Intergovernmental Oceanographic Commission</i>
COI	Commission Océanographique Intergouvernementale
IHO	<i>International Hydrographic Organization</i>
OHI	Organisation Hydrographique Internationale
IMO	<i>International Maritime Organization</i>
OMI	Organisation Maritime Internationale
PAA	Port autonome d'Abidjan <i>Autonomous Port of Abidjan</i>
PASP	Port Autonome de San Pedro <i>Autonomous Port of San Pedro</i>
MSI	<i>Maritime Safety Information</i>
RSM	Renseignement de Sécurité Maritime
MOLOA	Mission d'Observation du Littoral Ouest Africain <i>West African Coastal Observation Mission</i>
MOWCA	<i>Maritime Organization of West and Central Africa</i>
OMAOC	Organisation Maritime de l'Afrique de l'Ouest et Centrale
MSDI	<i>Maritime Spatial Data Infrastructure</i>

	Infrastructures de données spatiales maritimes
NC	Nautical Charts
CM	Carte marine
NHC	<i>National Hydrographic Committee</i>
CNH	Comité National Hydrographique
NtMs	Notice to Mariners Avis aux navigateurs
PCA	<i>Primary Charting Authority</i> Autorité cartographique principale
RHC	<i>Regional Hydrographic Commission (EAthC)</i>
CHR	Commission Hydrographique Régionale (CHAtO)
SEPCIM	Secrétaire Permanent du Comité Interministériel de l'Action de l'État en Mer <i>Permanent Secretary of the Interministerial Committee for State Action at Sea</i>
Shom	Service hydrographique et océanographique de la marine (France) <i>French Hydrographic and Oceanographic Service</i>
SMAN	Système mondial d'avertissement de navigation <i>Worldwide Navigational Warning Service (WWNWS)</i>
SMDSM	Système mondial de détresse et de sécurité en mer <i>Global Maritime Distress and Safety System (GMDSS)</i>
SOLAS	<i>[United Nations] Convention for the Safety of Life at Sea</i> Convention pour la sauvegarde de la vie humaine en mer
WACA	<i>West Africa Coastal Areas Management program</i> Programme de gestion du littoral ouest-africain
WACA/FFEM	WACA/Fonds Français pour l'environnement Mondial <i>WACA/French Facility for Global Environment</i>
WACA/ResIP	Projet national d'investissement pour la résilience des zones côtières en Afrique de l'Ouest de WACA WACA National Coastal Resilience Investment Project in West Africa

## Annex B: Terms of reference of the visit team of the Regional Hydrographic Commission

### Technical visit to the Republic of Côte d'Ivoire led by hydrographer Henri DOLOU: action A-01 of the Capacity Building Working Program 2021

#### Context

The IHO (International Hydrographic Organization) Capacity Building Program aims to coordinate the development of the capacities of Member and Associate States in the field of hydrography and nautical cartography in order to meet the objectives of IHO and the obligations related to Chapter V of the SOLAS Convention, the United Nations Convention on the Law of the Sea and other international instruments.

It was thus decided:

- to promote regional cooperation in capacity building in West and Central Africa (EAtHC: IHO Eastern Atlantic Hydrographic Commission);
- to identify the potential of national and regional training centers;
- to study the possibilities of organizing regional seminars.

On the proposal of France, which coordinates the IHO capacity building program for EAtHC, the IHO Capacity Building Sub-Committee proposes to conduct a technical visit to the country.

#### Goals

The general objectives of the technical visits are as follows:

- discussions with the decision-making authorities of the country visited, emphasizing the importance of hydrography for coastal states and therefore the need to include associated hydrographic and nautical cartography activities in national plans;
- support the development of a national system for the collection and diffusion of maritime safety information (MSI) integrated within the Worldwide Navigational Warning Service (WWNWS);
- assessment of national capacities in terms of planning and carrying out the collection and use of hydrographic data in order to allow the production and updating of the nautical documentation essential for the safety of navigation and in support of others uses (infrastructure management, environmental protection, development of the blue economy, etc.);
- development of recommendations with the actors of the visited country in order to strengthen these capacities in a long-lasting and sustainable manner;
- preparation of IMO audits (IMSAS) and follow-up of recommendations in connection with hydrographic services;
- promote the emergence of development projects in the field of hydrography and nautical cartography in conjunction with IHO secretariat, IMO and funding agencies in order to obtain the sustainable establishment of capacities.

#### Report

A report on the activities and recommendations of the team will be submitted to the president of the CHR (Regional Hydrographic Commission) after the visits.

## Annex C: List of main contacts

First Name NAME	Function	Phone (+225)	E-mail
<b>PAA IHO representant</b>			
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<b>Marine Nationale</b>			



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## Annex D: Agenda – Events

Dates - Objects – Events	Main contacts
<b>J1 : Monday, May 31, 2021</b>	
PAA/Département hydrographie Chef du département hydrographie - NAVAREA II	M Sangaré SEYDOU
PAA/Direction de l'ingénierie et de la maîtrise d'ouvrage Directeur	M Kouadio André N'DOLI
PAA/Direction des opérations maritimes, de la sécurité et de l'environnement Directeur et Commandant du port	Colonel Yao Emmanuel Désiré COFFI
CRO Directeur Laboratoire de Physique et de Géologie Marine (PHYGEM)	Dr Siaka Barthélemy BAMBA Dr. YAO Kouadio Salomon
ARSTM Administrateur général des Affaires Maritimes et Portuaires	M Karim COULIBALY
<b>J2 : Tuesday 01 June 2021</b>	
PAA/Direction Générale Directeur Général et Président de la Communauté Portuaire	M Hien Yacouba SIE
DGAMP Directeur Générale des Affaires Maritimes et portuaires	Colonel Julien Yao KOUASSI
CIGN CIGN/ES Cartes Action de l'État en Mer	M Louis KOUAME M Denis KOFFY
WACA Coordinateur du projet, WACA-ResIP Côte d'Ivoire	Pr. Abé Delfin OCHOU
<b>J3 : Wednesday 02 June 2021</b>	
Marine Nationale CBO (Bureau Opération) Conseiller du Chef D'Etat-Major	CV Sran Achille DEMAN CF Stéphane LE BEON
CIM-AEM Secrétaire Permanent du Comité Interministériel en charge de l'AEM	M Abroulaye FOFANA
<b>J4 : Thursday 03 June 2021</b>	
PAA/Division logistique dont aides à la navigation Directeur Chef service en charge du balisage	M Kassoum TRAORE M Aristide COULIBALY
Ambassade de France Attaché de défense	Colonel Xavier CLOCHARD
<b>J5 : Friday 04 June 2021</b>	
Réunion de synthèse au PAA : PAA/DH ; PAA/Capitainerie ; PAA/pilotes ; CRO ; CIGN ; Marine Nationale	

## Annex E: Photos



**PAA/direction de l'ingénierie et de la maîtrise d'ouvrage : Sangaré SEYDOU chef du département hydrographie (PAA), Henri DOLOU (OHI), Kouadio André N'DOLI directeur**



**PAA/Direction des opérations maritimes (pilotage), de la sécurité et de l'environnement : en présence du directeur Commandant du port Colonel Yao Emmanuel Désiré COFFI (2nd from right) du PAA**



**CRO including 3rd from right Directeur SALOMON**



**ARSTM - ISMI Directeurs 3rd and 5th from the left**



**PAA : M Sanagaré et M Hien Yacouba SIE Directeur Général du PAA  
Président de la Communauté Portuaire**



**DGAMP : Directeur général Colonel Julien Yao KOUASSI**



**CIGN**



**WACA Pr. Abé Delfin OCHOU**



**Navy**





**SEPCIM Monsieur le secrétaire permanent Abroulaye FOFANA**



**PAA Direction de la logistique Service des phares et balises**



**Summary meeting: The “operational” services were there with the Ivory Navy, the harbor master's office and the chief pilot. Supported them: scientific and technical services such as CRO and CIGN.**