



**IHO Capacity Development Programme
TECHNICAL VISIT AND
VISIT TO TRAINING CENTRES
IN GABON
10-13 February 2019
REPORT**



Ministry of Transport and Logistics



**Direction Générale de
la Marine Marchande
- Service de
signalisation maritime**

Port operators



**Office des Ports et
Rades du Gabon**



**Gabon Port
Management**



**Special
Economic
Zone
Management**

University



**CNDIO: National
Oceanographic
Data and
Information
Centre**

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Abbreviations

<i>CBSC</i>	<i>Capacity Building Sub-Committee</i>
<i>CBWP</i>	<i>Capacity Building Work Programme</i>
CNDIO	Centre National de Données et de l'Information Océanographiques <i>National Oceanographic Data and Information Centre</i>
<i>EAtHC</i> CHAtO	<i>Eastern Atlantic Hydrographic Commission</i> Commission Hydrographique de l'Atlantique oriental
DGMM	Direction Générale de la Marine Marchande (on which the maritime aids to navigation service depends)
<i>ENC</i>	<i>Electronic Navigational Chart</i> Cartes électronique de navigation
<i>GMDSS</i> SMDSM	<i>Global Maritime Distress and Safety System</i> Système mondial de détresse et de sécurité en mer
<i>GSEZ</i>	<i>Gestion Spécial Economic Zone</i>
<i>IALA</i> AISM	<i>International Association of Marine Aids to Navigation and Lighthouse Authorities</i> Association Internationale de Signalisation Maritime
<i>IOC</i> COI	<i>Intergovernmental Oceanographic Commission</i> Commission Océanographique Intergouvernementale
<i>IHO</i> OHI	<i>International Hydrographic Organization</i> Organisation Hydrographique Internationale
<i>IMO</i> OMI	<i>International Maritime Organization</i> Organisation Maritime Internationale
LARESPO	laboratoire de recherche sur les systèmes portuaires
<i>MBES</i>	<i>Multi-Beam Echo Sounder</i> Sondeur multifaisceau
<i>MSI</i> RSM	<i>Maritime Safety Information</i> Renseignement de Sécurité Maritime
<i>MOWCA</i> OMAOC	<i>Maritime Organization of West and Central Africa</i> Organisation Maritime de l'Afrique de l'Ouest et Centrale
<i>MSDI</i>	<i>Maritime Spatial Data Infrastructure</i>
NC	Nautical Charts Carte marine
<i>NHS</i>	<i>National Hydrographic Service</i>
<i>NHC</i> CNH	<i>National Hydrographic Committee</i> Comité National Hydrographique
NtMs	Notice to Mariners Avis aux navigateurs
OPRAG	Office des Ports et Rades du Gabon
<i>PCA</i>	<i>Primary Charting Authority</i> Autorité cartographique principale
<i>PMAWCA</i> AGPAOC	<i>Port Management Association of West and Central Africa</i> Association de Gestion des Ports de l'Afrique de l'Ouest et du Centre
<i>RHC</i> CHR	<i>Regional Hydrographic Commission (EAtHC)</i> Commission Hydrographique Régionale (CHAtO)
<i>SAR</i>	<i>Search And Rescue</i>
<i>SBES</i>	<i>Single Beam Echo Sounder</i> Sondeur mono-faisceau
Shom	Service hydrographique et océanographique de la marine (France) <i>French Hydrographic and Oceanographic Service</i>
<i>SOLAS</i>	<i>[United Nations] Convention for the Safety of Life at Sea</i>
<i>WACA</i>	<i>West Africa Coastal Areas Management program</i>
<i>WWNWS</i> SMAN	<i>World-Wide Navigational Warning Service</i> Service Mondial d'Avertissements de Navigation

FOLLOW-UP ACTIONS - RECOMMENDATIONS

Table of the main "short-term" actions (other actions are identified in the report)

§	Object	Ongoing - Done	Following actions
3	IHO contact references (P5-Yearbook)	Updated: Appendix E-1	<ul style="list-style-type: none"> • IHO/Secretariat (website)
3	EAtHC contact references	Updated: Appendix E-2	<ul style="list-style-type: none"> • IHO/Secretariat (website)
3	Administrative Arrangement (AA) with the current chart producer: France (Shom) (SOLAS Obligation)	Draft AA provided to DGMM	<ul style="list-style-type: none"> • Gabon: additions • France (Shom): exchanges • France (ambassador) and Gabon: signatures
3	Move from observer to associate member of EAtHC	Presentation of the statutes: https://www.iho.int/mtg_docs/rhc/statutes/EAtHC_STATUTES.pdf	<ul style="list-style-type: none"> • Gabon: signature of the statutes
3	Become an IHO Member	Presentation of the procedure: https://www.iho.int/iho_pubs/iho_ms/join_IHO_FR_Information_on_the_IHO_MembershipProcess.pdf	<ul style="list-style-type: none"> • Gabon: launch the accession process
5	Next EAtHC of 2020 in Lisbon (Portugal)		<ul style="list-style-type: none"> • Gabon - Participation (initiative: DGMM)
5	Next IHO-IALA seminar in Rabat (Morocco) in October 2019		<ul style="list-style-type: none"> • Gabon - Participation (initiative: DGMM)
17	National Hydrographic Coordination Committee (NHC)	A model constitutive text has been provided https://www.iho.int/mtg_docs/CB/CBA/Model_decret_creation_committee.pdf	<ul style="list-style-type: none"> • Gabon - creation (initiative: DGMM)
18	Transmit coastal "MSI" (Maritime Safety Information) using the NAVAREA II (Shom) coordinator	See Annex F (Shom/NAVAREA II Offer)	<ul style="list-style-type: none"> • Gabon (initiative: DGMM)
22	Basic training in hydrography	Link to list of accredited programs provided	<ul style="list-style-type: none"> • Gabon : <ul style="list-style-type: none"> ○ Enroll in CAT B approved schools ○ Practical training in port performing dredging operations
22	Basic training in port charting		<ul style="list-style-type: none"> • Gabon : <ul style="list-style-type: none"> ○ Acquire specific software ○ (+ associated training)
23	Continuous training courses Managerial training	List of IHO seminars provided	<ul style="list-style-type: none"> • Gabon

See also the IHO M-2 publication and its additional documents:

- https://www.iho.int/iho_pubs/IHO_Download.htm
- https://www.iho.int/iho_pubs/misc/M-2_3.0.7_E_06142018.pdf

PRIMARY ONGOING ACTION

The main ports (Libreville/Owendo, Port Gentil) must first of all maintain permanent relations with the NAVAREA II coordinator, who is also a current producer of nautical charts (France/Shom) so that MSI (Maritime Safety Information) are distributed in time to mariners (e.g. on SafetyNet in emergencies) and nautical documents (e.g. nautical charts) updated at an appropriate frequency (e.g. notices to mariners, new map editions).

MSI transmission :

coord.navarea2@shom.fr or coord.navarea2@gmail.com (emergency email address)

Tel: +33 2 56 31 24 24 24 (D7 - H24) Fax: +33 2 98 22 22 16 65

Non-urgent nautical information:

Hydrographic surveys, harbour plans: bri@shom.fr + copies na-etr@shom.fr and dmi-rex-d@shom.fr

Other nautical information: na-etr@shom.fr + copies: bri@shom.fr and dmi-rex-d@shom.fr

Postal address: "

Département "Informations et Ouvrages Nautiques"

Service hydrographique et océanographique de la marine (Shom)

CS 92803 - 29228 BREST CEDEX 2

INTRODUCTION

1 Introduction - Programming

The visit was planned as part of the IHO capacity development activity programme for the year 2018 (postponed to 2019):

- CBWP 2018: A-01;
- Training Center Visits (PART 2 Gabon - Cameroon).

This visit is a follow-up to similar visits made:

- in Ivory Coast in September 2015 (in particular at ARSTM: Académie Régionale des Sciences et Techniques de la Mer - Regional Academy of Science and Technology of the Sea of Abidjan);
- in Ghana in March 2016 (particularly in the RMU: Regional Maritime University of Accra);
- in Nigeria in March 2017 (particularly at the NNHS: Nigeria Navy Hydrographic School);

It was followed by a comparable visit to Cameroon (in particular to the University of Douala: 13-16 February 2019).

IHO's Capacity Building Programme aims to coordinate the development of hydrographic surveys and marine charting for its members. It was thus decided:

- promote regional cooperation in capacity building in West and Central Africa (CHAtO: Commission Hydrographique de l'Atlantique Orientale de l'OHI – EAAtHC: Eastern Atlantic Hydrographic Commission of IHO);
- to identify the potential of national and regional training centres;
- to explore the possibilities of organizing regional seminars.

The trip was used to:

- conduct a visit to the Omar Bongo University in Libreville as part of a "training-employment" forum of the regional Master's degree (Gabon - Cameroon) "Integrated management of coastal and marine environments" (GIELM: « gestion intégrée des environnements littoraux et marins);
- conduct a technical visit in addition.

The preparations were carried out in conjunction with:

- for the "technical visit" part: Office of the Minister of Transport (Ludovic Edgard MOUNDOUNGA Head of the Aids to navigation Department);
- for the "visit of training centres":
 - Ird (Institut de recherche pour le développement - France);
 - Omar Bongo University in Libreville (regional master's degree in integrated management of coastal and marine environments: GIELM). Mr François Edgard FAURE from CNDIO (National Centre for Oceanographic Data and Information) - Research Officer at CENAREST - National Coordinator ODINAFRICA (IOC-UNESCO).

Terms of Reference: Appendix A.

2 Composition of the team

The visiting team was composed of:

<u>Name</u>	<u>Role</u>
Henri DOLOU	Head for Shom (France for IHO)

The preparation of the visit has closely involved:

- Mr Vincent LAMARRE, Head of the Shom's "External Relations" Division;
- Mr Ludovic Edgar MOUNDOUNGA, Head of the Aids to navigation department (Office of the Minister of Transport);
- Mr François Edgard FAURE, Doctor in Sea Geography, Head of Research at CAME, Director of the Water & Climate Department at CENAREST (Centre National de la Recherche Scientifique et Technologique - National Centre for Scientific and Technological Research), Chairman of the IOC-UNESCO National Committee.

PART A - OVERALL ASSESSMENT OF THE SITUATION IN THE REGION

3 Effectiveness of the Technical Visit

This effectiveness must be measured in relation to the objectives of the mission and the achievement of immediate actions that can be launched.

Participations :

- The main stakeholders in the chain of actors ranging from the Ministry of Transport (merchant navy) to the port operators of Libreville were met;
- Apart from maritime transport, the ministries and central administrations were not met.

Findings: it is necessary to speak of a "rethinking" of relations between Gabon and IHO (secretariat, other IHO members, associate members and observers of EAtHC):

- it is already a question of updating the references of the correspondents in Gabon
- it's then a question of:
 - to maintain renewed relationships:
 - with France, which has special responsibilities in the EAtHC area within the IHO (NAVAREA II, cartographic coordinator, cartographic officer in charge of waters under Gabon's jurisdiction, capacity development coordinator)
 - with other African countries with which it is desirable to develop exchanges and cooperation
 - start again to carry out actions together (see the following chapters)
- it's finally about:
 - to become an associate member of EAtHC (and not just an observer)
 - to join IHO.

Findings	Actions
The relational network is to be reconstituted	<ul style="list-style-type: none">• Update the P5 publication (Yearbook: https://www.iho.int/iho_pubs/periodical/P5YEARBOOK_ANNUAIRE.pdf) : elements in Appendix E-1• Update the list of contacts of EAtHC Member

	States https://www.iho.int/mtg_docs/rhc/EAtHC/EAtHC_Misc/EAtHC-CHAtO_Contacts.pdf : elements in Annex E-2
Gabon participates little in the work, meetings and seminars organized by IHO The relational network must work	<ul style="list-style-type: none"> • Check the IHO website for news and planned events (especially those of EAtHC)
Gabon is not meeting all its international commitments (SOLAS)	<ul style="list-style-type: none"> • Establish an Administrative Arrangement (AA, a project was submitted to the DGMM during the visit) with France (Shom) in order to formalize the role of charting authority for Gabon ("de facto" role ensured). This type of AA remains a transitional solution pending Gabon's establishment of the hydrographic services necessary to establish and disseminate the nautical information necessary for the safety of navigation in its waters. • Ministries concerned: transport, foreign affairs, defence
Gabon is only an observer of EAtHC	<ul style="list-style-type: none"> • Sign the statutes of EAtHC to become an associate member
Gabon is not a member of IHO	<ul style="list-style-type: none"> • Become a member

It should be noted that the technical exchanges covered the obligations of the SOLAS Convention (Chapter V) as well as the expected economic benefits. As such, hydrographic investments can generate financial savings, particularly through optimization:

- dredging operations
- ship loading

The visits made it possible to identify real areas for improvement in training and education. They are not limited to enrolments in training courses outside Africa.

4 Cooperation - Defence

a. [International and Regional Organizations]

IHO/OHI Status	Regional Hydrographic Commission	IMO/OMI	IALA/AISM	OMAO/MOWCA
Non-Member	Simple observer CHAtO/EAtHC	Member	Member	Member

b. [Defence and security arrangements]

Subject not covered during the visit

PART B - GABON - EVALUATION

5 Involvement in the Regional Hydrographic Commission (EAtHC)

Findings	Actions
Gabon does not systematically participate in EAtHC meetings	<ul style="list-style-type: none">• Participate in the next EAtHC of 2020 in Lisbon (Portugal): https://www.iho.int/mtg_docs/rhc/EAtHC/EAtHC16/EAtHC16_Docs.html
	<ul style="list-style-type: none">• In particular, participate in the IHO-IALSA seminar to be held in Rabat (Morocco) in October 2019 (supported through the IHO Capacity Development Programme)

6 Preliminary contacts

The visit was prepared by Henri DOLOU (Shom) in close collaboration with Mr Ludovic Edgar MOUNDOUNGA Head of the Aids to navigation department (Office of the Minister of Transport).

The IHO questionnaire was used and proved to be very useful. He was briefed by Mr MOUNDOUNGA during a preliminary meeting in the presence of the following departments:

- Aids to navigation department (Office of the Minister of Transport);
- The « Office des Ports et Rades du Gabon »: OPRAG (M.OPAPE);
- Gabon Port Management GPM (M.LELE);
- GSEZ Mineral Port (M.OSSIBA);
- The dredging company DEME (Mr. Mathieu EVERAERT).

7 Contact points

The contact points are listed in Appendix B.

The names of the IHO correspondents (P5- Yearbook) and more specifically those of the EAtHC have been updated and are specified in Appendix E.

DESCRIPTION OF MARITIME ACTIVITIES

8 National Maritime Affairs

The duration of the visit was mainly used to meet the main stakeholders, ranging from the Ministry of Transport and Logistics (General Directorate of Merchant Shipping) to the port operators of Libreville.

Other stakeholders :

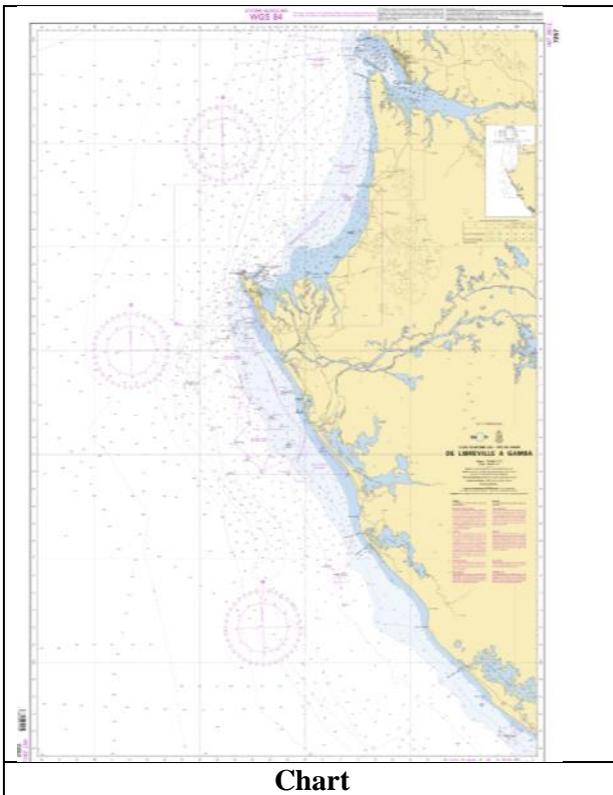
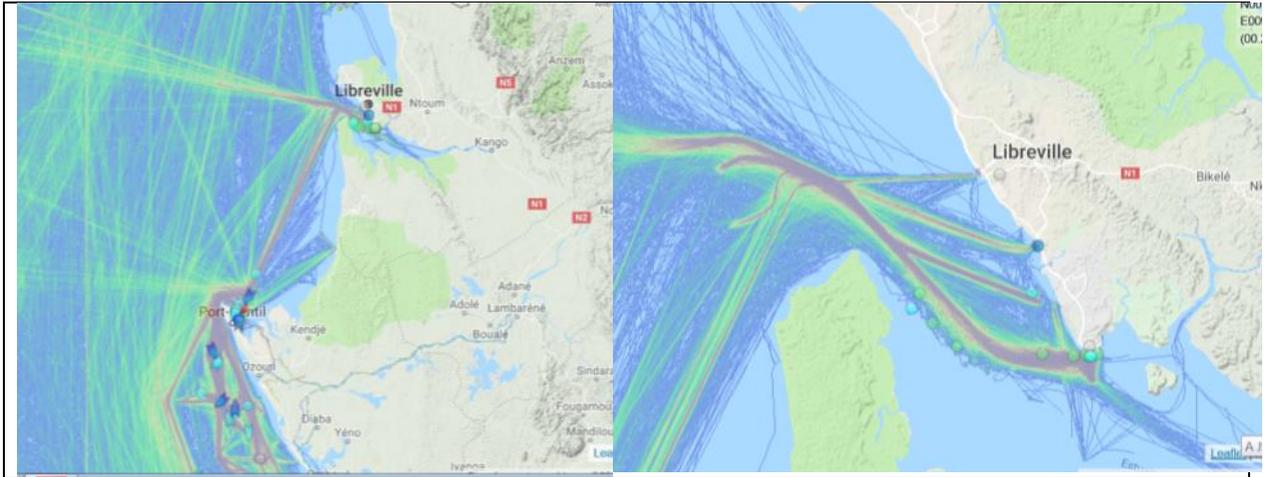
- the Department of National Defence;
- the Ministry of Water and Energy;
- the Ministry of Petroleum;
- the Ministry of Economy;
- the Ministry of Higher Education;
- the Ministry of Forests and Environment;
- the Ministry of Mines;

- the Ministry of National Education;
- the Ministry of Foreign Affairs.

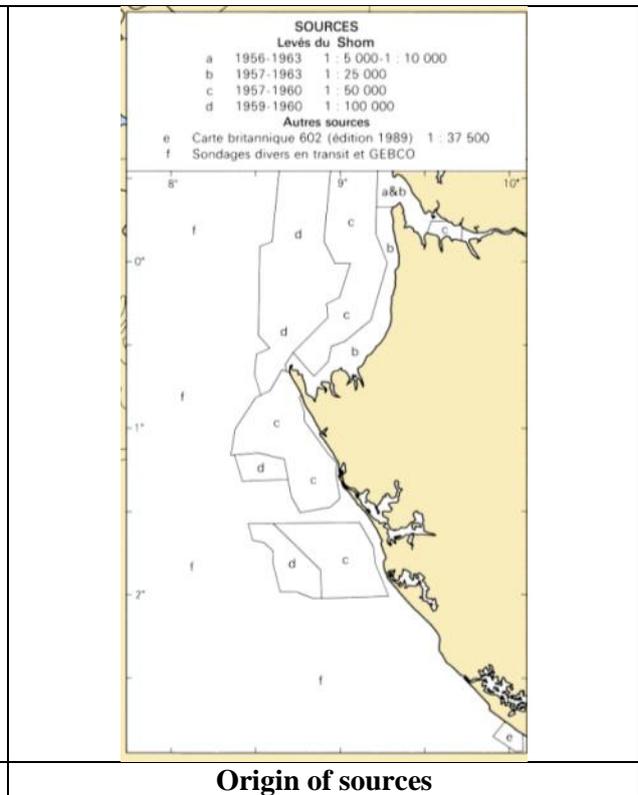
The list of these ministries allows to identify the stakeholders of a national hydrographic (oceanographic) coordination committee.

9 Maritime trade and traffic

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



Chart



Origin of sources

Findings	Actions
<p>Although there are marine charts, the data used to produce them are often very old, apart from direct access to the main ports.</p>	<ul style="list-style-type: none"> • Check if there are no other data (Bathymetry, port plans, oil company <i>surveys</i>) that could be compiled in nautical documentation (marine charts in particular). Information to be transmitted to Shom for exploitation • Verify whether current shipping routes are properly hydrographically designed with regard to the characteristics of future ships and the foreseeable evolution of traffic (increase in tonnages and draughts) • Beyond that, quantify the economic gains made possible by efficient hydrographic services (precise bathymetric surveys, tide forecasting / observation) in terms of load optimization (pilot foot of ships adjusted to the right need. Common interest with the optimization of dredging operations

Note: the actions mentioned above could usefully be discussed at the Rabat seminar scheduled in October 2019. This will present (workshops) risk analysis methods (navigation and hydrography/OHI and buoyage/AISM) (*Risk Assessment*).

10 Responsibility for the safety of navigation

The Directorate General for Merchant Navy (Ministry of Transport and Logistics) is responsible for this at national level.

The “Office des Ports et Rades du Gabon” (OPRAG) is under the supervision of the Ministry of Transport and Logistics.

11 Responsibilities of the Defence Forces

Subject not covered during the visit

12 Coastal zone management and environmental protection

The information provided (full text in Annex G) by Mr François Edgard FAURE of CENAREST (Centre National de la Recherche Scientifique et Technologique) and Chairman of the IOC-UNESCO National Committee illustrates in detail Gabonese (and regional) initiatives in coastal and marine research.

It is to be noted:

- that activities relating to maritime space are based on an extensive network of actors:
 - national:
 - the National Agency of National Parks (Agence Nationale de Parcs Nationaux : ANPN),
 - the National Oceanographic Data and Information Centre (Centre National des Données et de l’Information Océanographiques : CNDIO),
 - the National Climate Council (Conseil National Climat : CNC),
 - the Gabonese Agency for Space Studies and Observation (Agence Gabonaises d’Etudes et d’Observation Spatiales AGEOS),

- the General Directorate for the Law of the Sea of the Ministry of Foreign Affairs (Direction Générale du Droit de la Mer du Ministère des Affaires Etrangères),
 - the Directorate General for the Environment (Direction Générale de l'Environnement),
 - the General Directorate of Fisheries and Aquaculture (Direction Générale des Pêches et de l'Aquaculture),
 - the National Council for the Sea (Conseil National de la Mer CNM),
 - Omar Bongo University in Libreville and Masuku University of Science and Technology (Université Omar Bongo de Libreville et l'Université des Sciences et Techniques de Masuku).
- and international
 - in the first place the IOC of UNESCO,
 - the International Atomic Energy Agency (IAEA),
 - the "Centre de Gestion Intégrée du Littoral et de l'Environnement » (Togo),
 - the Geolittomer Laboratory of the University of Nantes (France),
 - the ARGO International Centre (France),
 - the French Research Institute for Development (Ird)
- that "Integrated Coastal Zone Management and Environmental Protection" is addressed in the reference document "National Strategy for the Adaptation of the Gabonese Coastal Region to the Effects of Climate Change" (*« stratégie nationale d'adaptation du littoral gabonais face aux effets des changements climatiques »*)
- that many programs have been launched, including:
 - the "Gabon Bleu" Programme: Development of the Exclusive Economic Zone for sovereignty and economic purposes (including renewable marine energies, tourism, fisheries, etc.),
 - the Emerald Arc programme (Knowledge of marine and coastal environments around the Komo estuary): hydrodynamic and sedimentary modelling, etc,
 - Gabon's coastal zone planning programme with CNDIO, Gabon's leading data management and research centre specializing in marine and coastal areas,
 - the international Argo program: an international ocean monitoring network (buoys),
 - the national programme for monitoring and understanding coastal erosion, which is currently being developed in a subregional framework with Congo-Brazzaville and Cameroon,
 - the Guinea Current - Large Marine Ecosystem (GCLME: Ecosystème Marin du Courant de Guinée) programme,
 - the Satellite-Assisted Environmental Monitoring (AGEOS) programme,
 - the Regional Master's Programme on Integrated Coastal and Marine Environmental Management (GIELM: Master Régional sur la Gestion Intégrée des Environnements Littoraux et Marins) (Gabon and Cameroon).

OUTLINE C55- ANALYSIS

13 Status of hydrographic surveys in the national maritime area

The following table summarizes the status of the surveys as it was established by Shom as the charting coordinator during the last EAHC of 2018 (Lagos - Nigeria)

Reference: https://www.iho.int/mtg_docs/rhc/EAHC/EAHC15/EAHC15-04B-National_Report-France.pdf

GABON	(en km2)	Surface ref < 200m	A Net	B Net	C Net	Surface ref > 200M	A Net	B Net	C Net
		41039	145,22	5953,2	34940,58	142377	68998	6387,6	66991,4
		100%	0,4%	14,5%	85,1%	100%	48,5%	4,5%	47,1%

With :

- A: Correctly hydrographic
- B: Requiring new surveys
- C: Never systematically hydrographic

Note:

- these indicators are based solely on the data available to the Shom (there must be surveys carried out by private companies, in particular for the benefit of oil companies, which are not known to the Shom)
- they clearly show the weakness of hydrographic knowledge as already pointed out in § 9 Trade and maritime traffic

14 Collection and circulation of nautical information

Ports should provide data to the Aid to navigation department (State) which will transmit them to the Shom in order to update nautical publications, in particular by notices to mariners.

The information flow must include:

- marine charts (e.g. new bollards, new docks, new buoys, removed wrecks, underwater cables, etc.);
- sailing instructions;
- list of lights
- tides (the harmonic constants used to make predictions should be made more reliable and accurate using continuous observations made at different locations).

Improvements in these information flows are discussed in Chapter 18.

15 Hydrographic survey capacity

Gabon Port Management (GPM) SA has modern port hydrography capacities. This includes:

- Launches means
- Bathymetry: single and multibeam
- Location: GNSS RTK
- Processing software Hypack, Hysweep
- Tide measurements

- ADCP (Acoustic Doppler Current Meter) Currents

References: GPM brochure on the hydrographic service of the technical direction:



Hydrographic launch



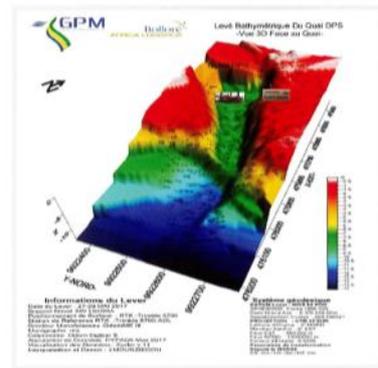
Transducer unit base



Attitude central



ADCP



3D Bathymetry



La salle Hydrographique

16 Independent chart production capacity

There is no capacity to produce charts, update and distribute them.
See Chapter 20.

PROPOSAL FOR COORDINATION AND CAPACITY BUILDING

17 National Hydrographic Coordination Committee

The interest of such a coordination committee (interdepartmental, inter-agency) was explained (SOLAS, investment efficiency, data sharing which can have multiple applications...) based on the publication M2 (https://www.iho.int/iho_pubs/misc/M-2_3.0.7_E_06142018.pdf), extracts of which were provided.

The example of the IHO Institutional Agreement was also provided.

This committee will be responsible for:

- develop a national charting scheme (not just ports) and monitor its implementation and updating;
- coordinate and plan the hydrographic surveys necessary for the development of this charting scheme;
- identify and recommend the necessary actions in terms of staff training and the purchase of equipment for the execution of the programme;
- to coordinate the development of national maritime security;
- to submit an annual report to the supervisory authorities.

Note1: Data collection and sharing has been widely advocated (one data - several applications). This raises the problem of data archiving and dissemination at the national level. Techniques and tools are increasingly mastered with databases and communication and download portals.

Note 2: The committee must be formally recognized by the government as part of its response to national responsibilities under IMO instruments such as the SOLAS Convention or the GMDSS organization.

Findings	Actions
Such a committee does not exist	<ul style="list-style-type: none">• set up a National Hydrographic Coordination Committee which will be extended to activities relating to the environment of coastal areas based on the IHO model: https://www.iho.int/mtg_docs/CB/CBA/Model_decret_creation_committee.pdf

18 Phase 1 Hydrographic Capacities: MSI and GMDSS

Introduction:

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

The dissemination of these MSIs is based on the Global Maritime Distress and Safety System (GMDSS), an international system that uses telecommunications for maritime search and rescue and accident prevention.

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

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

- a. MSI (Maritime Safety Information). At now, there does not seem to be a real MSI organization. Services to seafarers could be offered on SafetyNET through the NAVAREA II coordinator (France / Shom) although it was noted that little contribution had been received in a long time.

NAVTEX should be the optimal solution for ships sailing in Gabonese waters and approaching its main ports. There is no such thing. As long as this situation persists, SafetyNET (NAVAREA II, France / Shom) may be used for coastal warnings (see Appendix F).

The MSIs must be made available to **NAVAREA II:**

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 24 (Duty Officer, H24)

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

Fax: +33 2 56 31 25 25 84

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

coord.navarea2@gmail.com (spare)

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

- b. Nautical information on ports and their accesses. The Shom publishes notices to mariners and maintains nautical publications (list of lights, sailing direction, etc.).

This subject was not discussed in detail, the following table was provided based on the information received

Master Plan	A1 Area	A2 Area	A3 Area	NAVTEX	SafetyNET	Notes
No (1)	VHF	No	No	No	No	

- (1) Information on facilities dedicated to terrestrial and satellite communications (latest version: GMDSS.1/Circ.12 on 30 April 2010)

Findings	Actions
<p>The NAVAREA II Zone Coordinator does not receive MSI ("URGENT" Maritime Safety Intelligence) from Gabon.</p> <p>The Shom, which produces and distributes official nautical documents (marine charts in particular) for waters under Gabon's jurisdiction, does not systematically receive the information needed to update them: in addition to not being in conformity with international commitments (SOLAS), these gaps can be a source of mistrust for mariners in the region.</p>	<ul style="list-style-type: none"> • Pending the establishment of a national MSI organisation, the various port authorities must systematically transmit the MSIs to the NAVAREA II coordinator (France - Shom) within an appropriate time frame • request the assistance of the NAVAREA II coordinator to transmit coastal notices via SafetyNet on a transitional basis pending the establishment of a NAVTEX transmission capacity (see Annex F)

Note : transmission of non-emergency nautical information:

Hydrographic surveys, harbour plans: bri@shom.fr + copies na-etr@shom.fr and dmi-rex-d@shom.fr

Other nautical information: na-etr@shom.fr + copies: bri@shom.fr and dmi-rex-d@shom.fr

Postal address:

Département "Informations et Ouvrages Nautiques"

Service hydrographique et océanographique de la marine (Shom)

CS 92803 - 29228 BREST CEDEX 2

19 Phase 2 Hydrographic Capabilities: Surveys

If there is capacity in the port of Owendo (GPM: see Chapter 15), it is only possible to conduct port or estuarine surveys. They are not designed for hydrographic work along the entire coastline and in particular on the high seas.

20 Phase 3 Hydrographic Capabilities: Production of nautical charts

Gabon does not yet have the capacity to produce official national charts. France (via the Shom) is *de facto* the charting authority for waters under Gabon's jurisdiction. To be in accordance with the SOLAS Convention, relations between Gabon and France (Shom) must be formalized.

The co-production of maps is a development step to be considered with the current cartographic manager (France/Shom).

Findings	Actions
The Shom can continue this task to ensure that nautical information is regularly disseminated worldwide. It cannot do so without the active assistance of Gabon (at least information from all major ports in Gabon).	<ul style="list-style-type: none"> Systematically forward to Shom the information that will allow the nautical documents to be updated. Use emergency procedures appropriately
	<ul style="list-style-type: none"> To be in accordance with the SOLAS Convention, relations between Gabon and France (Shom) should be formalized by finalizing the draft administrative arrangement (AA) provided

21 Table 1: Summary of the National Hydrographic Capacity Assessment

IHO	EAtHC	NHC	Phase 1 Capacity	Phase 2 Capacity	Phase 3 Capacity	Notes
NO Member	Observer	NO	Partial	Partial	NO	

TRAINING

22 Basic training of hydrographic technicians

Formation of hydrographers

The operational services in charge of hydrography (e. g. GPM) must have a sufficient number of qualified hydrographic technicians.

The recommended training is offered by schools whose programmes are accredited by the FIG/OHI/ACI (International Federation of Surveyors, International Hydrographic Organization/International Cartographic Association) Category B (CAT B).

The practical training that complements the theoretical training of the schools will be carried out in a port operating dredging operations and having a hydrography department.

CAT B hydrographers will be able to train the hydrographic assistant the country needs ("CAT C") upon their return.

The priority is not to have CAT A hydrographers. This may be considered once the decision to develop national capacity (to cover all the country's waters) has been taken.

Given the number of staff to be trained (limited turnover rate) it is not appropriate to institute recurrent training of category B hydrographers on site in Gabon. The absence of qualified trainers on site does not facilitate the organization of highly specialized training. Until approved regional training (West and Central Africa) is in place, there is currently no alternative but to enrol officers for training in hydrography schools outside the African continent. They may be French or English-speaking. The contacts that IHO has had so far in West and Central Africa have not really made it possible to identify the structures (schools, academies, etc.) that could host approved hydrographer and cartographer training courses. At most, some structures such as the ARSTM (Académie Régionale des Sciences et Techniques de la Mer) in Abidjan (Ivory Coast), the RMU (Regional Maritime University) in Accra (Ghana) and the NNHS (Nigerian Navy Hydrographic School) in Port Harcourt (Nigeria) have been identified as potentially capable of hosting courses with accredited programmes.

The IHO website lists accredited training programs:

https://www.iho.int/mtg_docs/com_wg/AB/AB/AB_Misc/Recognized_Programs.pdf

Training of cartographers

In the short and medium term, as long as a hydrographic service with national competence has not been established, it does not seem necessary to train marine cartographers at the technical (CAT B) or engineering (CAT A) level.

Pending the development of such a hydrographic service with national competence, it is essential that hydrographic information be transmitted to the charting authority responsible for the production and dissemination of nautical documentation on waters under Gabonese jurisdiction.

On the other hand, it is necessary for port entities carrying out hydrographic surveys to have cartographic restitution facilities adapted to their internal uses.

Port cartographic restitution software (in digital format S57) now makes it possible to quickly edit electronic vector port navigation charts. A port can thus create its own port charts with a level of detail and at the pace of dredging and control works, in order to meet the needs of maritime pilots in particular. It can then be made available to them (but also to the mooring service or captains' offices) applications (GPS + vector maps) running on smartphones or tablets (e. g. PPU Portable Pilot Unit, ePilotBook). The marine pilot can thus benefit from navigation tools based on near real-time data (e.g. at the immediate end of a dredging operation and a hydrographic survey).

The acquisition of such port charting systems would be accompanied by targeted training courses in the area of interest of the Autonomous Port

Findings	Actions
<p>Technical level Since it must be considered to replace or supplement the staff of the hydrographic (and dredging) services, there is a need to train in hydrography and port charting</p>	<ul style="list-style-type: none"> • Train a sufficient number of hydrographers in a school whose program (theoretical training) is CAT B certified. In French or English according to language skills • Ensure that they receive practical training in a port that operates dredging and has a hydrography department. Use of partnerships that could exist with foreign port centres • Train a sufficient number of port cartographers in digital charting production tools specific to

	ports
Managerial level: senior engineering staff may have initial training away from dredging, hydrography and navigational aids activities	<ul style="list-style-type: none"> • Already follow the seminars that IHO organizes • Know how to specify hydrographic surveys and prioritize them according to the risks involved • Identify the best training courses for staff • Know how to communicate with users (maritime pilots, shipping companies), the Shom, the IHO and finally all the national stakeholders identified for the coordination committee.

23 Continuing education (IHO, IALA, IOC, University of Libreville, national service provider companies)

Above all, it is important to be present at the seminars that IHO organizes in the EAtHC area:

- From 21 to 24 October 2019: risk analysis, specification of surveys in Rabat (Morocco)
- End of September 2020: in Lisbon (Portugal)
- Note: it is also important to pay attention to the offers of SAIHC : Southern Africa and Islands Hydrographic Commission for its proximity

But there are other international opportunities to be seized on related themes:

- IALA training courses (for navigational aids) (contact: jacques.manchard@iala-aism.org)
- IOC formations, UNESCO Intergovernmental Oceanographic Commission (for oceanography)
- Specifically concerning the tide, the Shom organizes the "REFMAR 2019 Days" in Paris - La Défense. From 27 to 29 March 2019, they will bring together data producers and users of water level measurements <https://www.sonel.org/27-29-mars-2019-Journees-REFMAR-Paris-la-Defense.html>

Where national centres of expertise exist, they should be used as a basis. We may note the potential that can be offered:

- universities such as Libreville for coastal and marine environments, since complex systems such as tides in estuaries and coastal erosion phenomena must be controlled, it may be necessary to promote upstream research efforts and then translate them into operational applications;
- training centres offering cross-functional techniques such as geomatics, GIS (Geographic Information Systems), database data management, remote sensing, land mapping, etc.

Editor

Henri DOLOU

APPENDICES

Appendix A: Terms of Reference of the Regional Hydrographic Commission Visit Team

Background information

IHO's Capacity Development Programme aims to coordinate the development of hydrographic surveys and marine charting for its members. It was thus decided:

- promote regional cooperation in capacity development in West and Central Africa (EAAtHC: IHO Eastern Atlantic Hydrographic Commission)
- identify the potential of national and regional training centres
- to explore the possibilities of organising regional seminars

1. The technical visit team is invited to visit the country to discuss issues of mutual interest in the fields of hydrography and maritime safety information.

Preparation

2. The team members, with the assistance of the staff of the Service hydrographique et océanographique de la marine français (Shom), should plan this visit after having obtained all the necessary information from the relevant organizations at the international (IHO in particular) and national levels.

Objectives of the project

3. It is expected that the visiting team:
- a. contacts the decision-making authorities of the country visited, stressing the importance of hydrography for coastal States and therefore the need to include hydrographic activities and associated nautical charts in national plans;
 - b. assesses national capacities for planning and implementing the collection and processing (restitution) of hydrographic data to enable the production of maps and publications both locally and by providing data to hydrographic services with international charting portfolios;
 - c. reviews and advises on measures that can be taken to improve the capacity of nations to carry out the above;
 - d. stresses the fundamental importance of a national data collection system, such as port and dredging plans and local notices to mariners, which have an impact on mariners' interests;
 - e. provides advice on assistance to be obtained in close liaison with the IHO Secretariat, IMO and funding agencies in order to achieve sustainable capacity building.

Report

4. A report on the team's activities and recommendations should be submitted to the President of the CHR (Regional Hydrographic Commission) at the end of the visits.

Appendix B: Contact List

Prénom NOM	Fonction	Tél (+237)	Mail
DGMM : Direction Générale de la Marine Marchande			
Martin NDOUTOUME	Directeur Général	07 34 49 39	
Cabinet du ministre des transports			
Ludovic Edgar MOUNDOUNG A	Chef du service de signalisation maritime Lieutenant-Colonel	06 05 21 11	departementj@gmail.com emoundounga@gmail.com
Steve Hervé EYOUNE NZE	Chef de la division hydrographie (relations GPM)	06 67 79 64	steveherveyoune@gmail.com
OPRAG : Office des Ports et Rades du Gabon			
Honorat OPAPE AMBOUROUE	Chef de Service	02 27 77 49	opambourat7@gmail.com opambourat@yahoo.fr
Régis LACCRUCHE-LELABOU	Directeur général de l'OPRAG		regis.laccruche@gmail.com laccruche.regis@Yahoo.fr
Directeur Port Libreville			
Anciennement Régis LACCRUCHE-LELABOU	Commandant du port d'Owendo		
Directeur Port Libreville			
GPM : Gabon Port Management			
Bertrand LELE	Directeur Technique	05 99 18 27 Tel : +241 01 70 32 74 Mob: +241 06 27 17 76	blele@gpmgabon.com
Joël MOUNZIEGOU	Ingénieur Géographe Responsable Service hydrographique	Tél: (+241) 0170 3274 (Poste 2018) Mob: (+241) 0754 5580 / 0699 8348	jmounziegou@gpmgabon.com mounziegou_joel@yahoo.fr
Franck Junior OKENET			fokenet@gpmgabon.com
GSEZ Gabon Spécial Zone Minéral port Economic			
M OSSIBA			
CNDIO Centre National des données et de l'information (Université) (Instituts) Océanographiques			
Prof. Jean-Bernard MOMBO	Responsable Master GIELM, Département de Géographie Vice-président CNO	Tél (07 85 11 20)	jb.mombo@yahoo.fr
François Edgard	Directeur du département	(241) 07 53 65 15	faured@yahoo.fr

FAURE	Eau et Climat Chargé de recherche au CENAREST/CNDIO Président du Comité National d'Océanographie (CNO) Coordonnateur national ODINAFRICA (OCI-UNESCO)		
M. Brice KOUMBA MABERT	Directeur du CNDIO-GABON.	(04 33 97 77)	koumbamabertb@gmail.com
Dr. Nicaise Rabenkogo	CNDIO-GREH-LARESPO	07 19 61 66	
Landry IZANDJI	Météorologue		izandji@yahoo.fr
Guy Merlo MADOUNGOU	CENAREST/LARESPO		madoungoumerlo@gmail.co
CNM : Conseil National de la Mer Action Etat en mer			
M Léandre Edgard NDJAMBOU	Secrétaire permanent du CNM		ndjambou_leandre@yahoo.fr
Christian WALI WALI	Coordonnateur administrative	07061701 06368358	waliwalichristian@gmail.com cwalwal@yahoo.fr
Ministère	Des Affaires Etrangères	Direction Générale	Du droit de la mer
Fernand - Pierre OSSOUBITA	Conseiller des Affaires Etrangères Chargé d'Etudes au Cabinet du DGDM	07.57.16.01.	ossoubitapierre@yahoo.fr
Aminatou NDONG NZE	Ambassadeur, Directeur Général Adjoint des Droits de la Mer	00241 02 16 03 68	syllaminatou@yahoo.fr
Ambassade	France	Yaoundé	
CF Franck Schaller	Conseiller du Chef d'Etat-Major de la Marine Nationale Gabonaise	(241) 06 77 14 01 - (241) 05 40 55 14	conseillermarinegabon@gmail.com
Shom	France	(+33)	
Henri DOLOU	Expert	(0) 6 86 15 14 82	henri.dolou@shom.fr
Vincent LAMARRE	Chef de la division des relations extérieures	(0) 2 56 31 97 81 / (0) 6 03 20 13 77	dmi-rex-d@shom.fr vincent.lamarre@shom.fr

Appendix C: Agenda - Events

Hourly Date	Subject - Institution concerned	Contact Information
Sunday 10/02/19		
19h35	Arrival at Libreville airport	H Dolou
Monday 11/02/19		
	Omar Bongo University Department of Geography CENAREST/IRSH/DREC/CNDIO; National Centre for Geographic Data and Information Scientific activities in oceanography (including data acquisition and management)	Mr. Ludovic Edgard MOUNDOUNGA Dr. François Edgard FAURE and CNDIO team Mr. Brice Koumba Mabert, Director of CNDIO-GABON.
14h30- 16h00	Meeting with Aid to navigation department	Mr. Ludovic Edgard MOUNDOUNGA Mr Steve Hervé EYOUNE NZE
Tuesday 12/02/19		
	Participation in the Forum organized by the GIELM Master (Integrated Coastal and Marine Environment Management - Gestion Intégrée des Environnement Littoraux et Marins) of the Omar Bongo University	University - Institutes Ird (Research Institute for Development - Institut de recherche pour le développement) AUF (Agence Universitaire Francophone) OPRAG - GPM - GSEZ
Wednesday 13/02/19		
	Interview with: - Office des Ports et Rades du Gabon (Mr Honorat OPAPE AMBOUROUE) ; - Gabon Port Management (Mr. Bertrand LELE, Technical Director) ; - GSEZ Port Cargo (hydrography department)	H. AMBURUOUS VALVE (OPRAG) Bertrand LELE (GPM) + CNDIO + Aid to navigation department
	- Ministry of Foreign Affairs / Directorate General for the Law of the Sea	Mr Fernand-Pierre OSSIBITA (DGMM)
	Visit of the Owendo port complex	OPRAG - GPM
	Conclusions, "IHO" recommendations	
16h00	Departure for airport (for Douala)	Mr. Henri Dolou

Appendix D: Photos



Omar Bongo University - Libreville



University: CNDIO National Centre for Oceanographic Data and Information



Omar Bongo University - Libreville - Regional Master's degree: GIELM : Integrated Coastal and Marine Environment Management



Owendo Port University and Services



GPM: Gabon Port Management



Round table on the theme of coastal erosion



GPM



GPM



**Yellow vests: GPM (hydrographic launch) - IHO
Orange vests: OPRAG (Office des Ports Rades du Gabon)**



GPM Tidal Observatory



GPM - OPRAG

Appendix E-1: IHO Publication P5 – Yearbook

Gabon / Gabon

Country information / Informations sur le pays / Información sobre el país

-Declared National Tonnage -Tonnage national déclaré -Tonelaje Nacional Declarado	
-National day -Fête nationale -Fiesta naciona	17 août

Official Representative to IHO (as designated by Member Government)

Représentant officiel à l'OHI (tel que désigné par le Gouvernement Membre)

DIRECTION GENERALE DE LA MARINE MARCHANDE

Directorate of the Merchant Navy

Contact information / Informations de contact / Información de contacto

- National Hydrographer or equivalent - Hydrographe national ou équivalent - Hidrógrafo Nacional o equivalente	Directeur Général de la Marine Marchande Martin NDOUTOUME
- Other point(s) of contact - Autre(s) point(s) de contact - Otros punto(s) de contacto	Chef du service de signalisation maritime (cabinet du ministre des transports) <ul style="list-style-type: none"> • M Ludovic Edgar MOUNDOUNGA <ul style="list-style-type: none"> ○ departementj@gmail.com ○ emoundounga@gmail.com ○ (+241) 06 05 21 11
- Web site - site web - sitio web	

Agency information / Information sur l'agence / Información sobre la agencia

- Top level parent organization - Organisme mère - Organización asociada de nivel superior	Ministère des transports et de la logistique
- Principal functions of the organization or the department - Attribution principales de l'organisme ou du département - Principales funciones de la Organización o el departamento	
-Other information of interest -Autres informations utiles -Otra información de interés	Les cartes marines papier, les cartes électroniques de navigation et les autres publications nautiques (livres des feux, annuaires des marées, instructions nautiques ...) sont réalisées par des pays tiers. La France (Shom : Service hydrographique et océanographique de la marine) est responsable cartographique) GPM : Gabon Port Management dispose de capacités hydrographiques

Appendix E-2: EAthC Contact List

LIST OF CONTACTS IN EAthC MEMBERS (MS), ASSOCIATED MEMBERS (AM) AND OBSERVERS (OB)

*Liste des contacts dans les Etats membres, membres associés et observateurs de la CHAtO
(as known of February 2019 / tels que connus en février 2019)*

Note : Names of focal points have been emphasized in yellow/ *Les noms des contacts principaux ont été surlignés en jaune*
Obsolete E-mail

I. EAthC Member States / Etats Membres de la CHAtO	Name / Nom	Role/Fonction	Institution	Tel, Fax & E-mail
Gabon/Gabon	M Ludovic Edgar MOUNDOUNGA	Chef du service de signalisation maritime	Cabinet du ministre des transports	Tel : + 241 06 05 21 11 E-mail: departementj@gmail.com emoundounga@gmail.com
	M Honorat OPAPE AMBOUROUE	Chef de Service	Office des Ports et Rades du Gabon	Tel : + 241 02 27 77 49 E-mail: opambourat7@gmail.com opambourat@yahoo.fr
	M Bertrand LELE	Directeur Technique	Gabon Port Management	Tel : + 241 06 27 17 76 E-mail: blele@gpmgabon.com

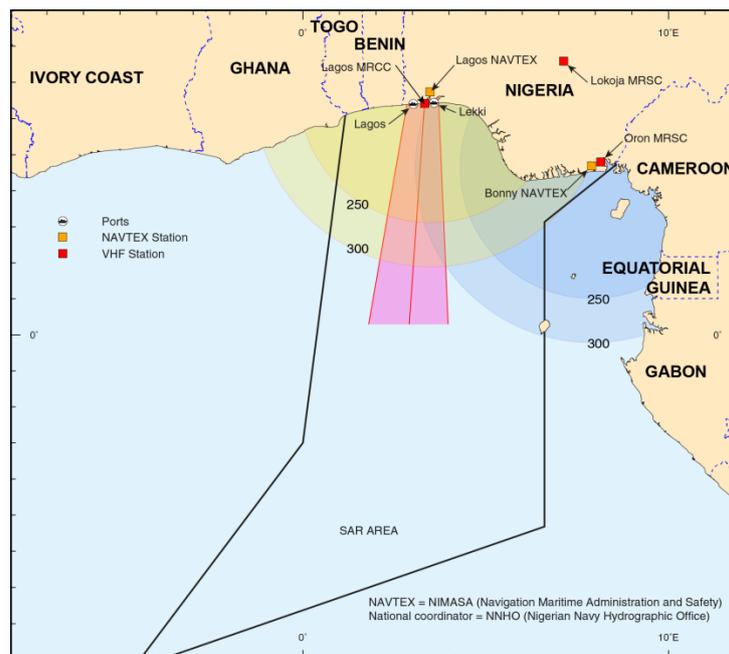
Appendix F: AVURNAV Coastal in West Central Africa - Substitution of NAVTEX by SafetyNet

Reference to be consulted: "Dissemination of Maritime Safety Information (MSI)" at:

http://www.ihp.int/mtg_docs/rhc/EAtHC/EAtHC15/EAtHC15-07.5A-Perspectives_NAVTEX.pdf

1. While the normal and regulatory means of disseminating coastal warnings is NAVTEX, setting up stations (Liberia, Nigeria, Ghana) or keeping them operational (Cape Verde, Senegal, and even CORSEN in France) seems to be a financial, technical, organizational and human challenge.
2. Faced with these difficulties, some countries are tempted to declare their coastal waters as A3 and thus broadcast by SafetyNET instead of NAVTEX stations (Ghana, Nigeria).
3. Given the limited number of coastal warnings, the provisional emitting by the NAVAREA II coordinator by SafetyNET, until NAVTEX stations are set up or until countries are declared A3, seems the most pragmatic solution. This provision, which is already being applied for Senegal and Nigeria, could be proactively offered to other countries. This is what the Americans are doing for NAVAREA IV and XII areas, where the problems are similar with many states that do not have stations. Coastal States shall send to the NAVAREA coordinator their draft coastal AVURNAVs which are issued in the form of NAVAREAs after control of substance and form (local AVURNAVs must be issued locally by radiotelephony as provided for in the IMO regulatory texts).

An example: Nigeria



In the absence of NAVTEX stations it is possible to issue coastal warnings by SafetyNET. This can be done in two ways.

- Officially and permanently:
A country can choose to declare itself to the IMO in zone A3 instead of A2, and broadcast by SafetyNET instead of NAVTEX. This is the choice France made for its 5 overseas national delegate coordinators, certainly for reasons of convenience and because of the size of the maritime areas concerned.
- On an ad hoc and transitory basis:
The ultimate objective remains to distribute by NAVTEX. In the meantime, emissions are made by SafetyNET.

The constraints between its two options are not the same.

SafetyNET Solution Nigeria declared A3

The procedure for declaring a country in zone A3 to the IHO (WWNWS) goes through the following steps:

- Declaration in zone A3: This step includes the definition of an area (corresponding to SafetyNET coverage), an identification letter (for receiver selection) and the determination of shift schedules. All specialized publications related to GMDSS (such as radio signal books) should be corrected. The INMARSAT receiver software will have to be modified to integrate this new zone.
- Staff training: the NAVAREA II coordinator will have to ensure the training of MSI operators.
- Emission control: Nigeria will need an Inmarsat C receiving chain to control its emissions.
- Establishment of a contingency plan: Preventive measures to be defined in the event of equipment damage (local or external back-up, emissions via NAV II).
- MSIP (Maritime Safety Information Provider) certificate: obtained from IHO, the first steps have been taken.
- SafetyNET access contract: contract to be concluded directly with Inmarsat or through a service provider for SafetyNET access.

This procedure is evaluated over several months (1 year or more) and involves the IMO, the NAVAREA II coordinator, Nigeria and Inmarsat (or intermediate provider).

TRANSITORY SafetyNET Solution

Pending an official solution of type A2 (NAVTEX) or A3 (SAFETYNET), Nigeria's coastal warnings may be issued by the NAVAREA II Zone Coordinator according to the following principles:

- Drafting of coastal warnings by NNHO (Nigeria Navy Hydrographic office) MSI cell in accordance with the MSI manual;
- Sending coastal warnings by email to the NAVAREA II coordinator;
- Controls by the NAVAREA II coordinator and integration of warnings into the 04h30z and 16h30z shifts;
- Technical inspection of the emission by the NAVAREA II coordinator;

This procedure has been effective since May 2018 for Nigeria. It has also been in place for Senegal since 2012.

Annex F: Report of the IOC-UNESCO National Committee to IHO

(Courtesy traduction by author's report. Please refer to the French text for first edition)

 <p>Organisation des Nations Unies pour l'éducation, la science et la culture</p>	 <p>Commission océanographique intergouvernement</p>	<p>GABONESE NATIONAL COMMISSION FOR UNESCO NATIONAL COMMITTEE OF THE COI-UNESCO National Oceanographic Data and Information Centre Centre National des Données et de l'Information Océanographiques B.P. 10.961 Libreville - Tel: (241) 07 53 65 15 E-mail: cndiogabon@yahoo.fr Avenue du Président Léon MBA - Omar BONGO University Campus</p>
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The Gabonese Government is highly committed to integrated management and protection of the marine environment and has created several bodies that are involved in addressing the various threats that make the national maritime areas vulnerable: the National Agency for National Parks (ANPN: Agence Nationale de Parcs Nationaux), the National Centre for Oceanographic Data and Information (CNDIO: Centre National des Données et de l'Information Océanographiques), the National Climate Council (CNC: Conseil National Climat), the Gabonese Agency for Spatial Studies and Observation (AGEOS: Agence Gabonaises d'Etudes et d'Observation Spatiales) and the National Marine Council (CNM: Conseil National de la Mer).

For the chapter on **Integrated Coastal Zone Management and Environmental Protection**, the reference document is the "Gabonese national strategy for adaptation of the coastal region to the effects of climate change" (« *stratégie nationale d'adaptation du littoral gabonais face aux effets des changements climatiques* »). This strategy was carried out within the framework of the project "Institutional capacity building for better adaptation in coastal areas in Gabon" (« Renforcement des capacités institutionnelles pour une meilleure adaptation en zone côtière au Gabon ») with the support of the United Nations Development Programme (UNDP) and the Government of Japan. The programme was validated in 2012 and developed under the direction of the Ministry of Environment and Nature Protection.

From this national programme, various projects and programmes are implemented by ministries and other technical structures, namely:

1. The "Gabon Bleu" Program

This programme, initiated by the National Parks Agency (ANPN: Agence Nationale des Parcs Nationaux) in 2012, consists of **developing the Exclusive Economic Zone**, which extends beyond the outer limit of the territorial sea, on which Gabon has the possibility of acting in the following ways:

- exercise sovereign rights in the exploration and exploitation, conservation and management of the natural resources of the seabed;
- to economically produce energy from water, currents and marine winds. The Programme recommends the creation of 20% of protected marine areas along the country's 885 km of coastline on its Atlantic coast.

All this is aimed at developing aquatic tourism on the country's Atlantic coast and thus contributing to the country's Gross Domestic Product (GDP). Various partnerships have made it possible to finance the programme. Thus, the 1998 Fisheries Partnership Agreement between Gabon and the European Union (EU), was enriched on 24 April 2013 by a new three-year (03) Memorandum of Understanding which has brought the country the sum of €1.35 million each year, of which €450,000 was intended to finance Gabon's fisheries policy. In addition, this protocol was an opportunity to set up new control tools to combat illegal fishing.

On 14 November 2014, while attending the VIth World Parks Congress of the International Union for Conservation of Nature (UICN: Union Internationale pour la Conservation de la Nature) in Sydney (Australia), the President of the Republic announced the creation of a network of marine parks in Gabon. This announcement, which confirms our country's position as a highly prescriptive country in terms of environmental policy, is in fact the culmination of an important process to improve the management of fisheries resources (living aquatic resources) that began in 2012. That year, the National Parks Agency collaborated with the National Geographic Society, the Non-Governmental Organization Wildlife Conservation Society (WCS), the National Oceanographic Data and Information Centre and the Wait foundation expedition on a major scientific expedition to explore the Gabonese seabed. This extraordinary adventure, called "MEGATRANSECT MARIN GABON 2012", has led national and international researchers to examine the depths of the maritime territory from Mayumba to Cap Esterias in order to collect valuable information on the richness of maritime resources, but also to identify the main threats to their sustainability. The information collected led the Government to define an effective strategy for the sustainable management of maritime resources, the implementation of which has been entrusted to ANPN, and which is being implemented along four main lines of intervention:

- the delimitation, development of the national maritime domain, as well as its recognition by international bodies and neighbouring countries;
- planning and strengthening of operational capabilities for surveillance and protection of the maritime domain;
- sustainable management and optimisation of fisheries resources, involving improving knowledge of the resource and of fishery products;
- the sustainable management and optimisation of oil and mining resources involving the fight against marine pollution, as well as the strengthening of the protection of oil installations;
- the development and rehabilitation of port infrastructure and the improvement and strengthening of the legal and regulatory framework for maritime and river activities.

The major result of the deployment of this strategy concerns the delimitation of the Exclusive Economic Zone covering nearly 231,300 km² and an internal hydrographic network of 10,000 km². The measure announced by the President of the Republic concerns the placing under protection of 23% of this domain.

2. The Emerald Arc programme - Le programme Arc d'Emeraude (Knowledge of marine and coastal environments around the Komo estuary).

The Emerald Arch consists of a belt of protected areas around Libreville, Gabon: Pongara National Park in the southwest, Raponda Walker Arboretum in the northwest and Akanda National Park in the north and east. This network of protected areas, established on two estuaries, includes vast areas of mangroves, sandy beaches, savannahs, equatorial rainforests and spectacular faunal and floristic biodiversity. The Agence Nationale des Parcs Nationaux - ANPN implements the " Emerald Arch" financial agreement as part of the debt conversion agreement between France and Gabon.

This project aims to conserve coastal ecosystems and their contribution to the sustainable development of the Libreville region. Its specific objectives are to improve scientific knowledge for the management of ecosystems and the environmental services they provide, to develop protected areas, to enhance their value for educational and recreational purposes, and to guide peri-urban development around protected areas according to green principles.

As part of the research component of the " Emerald Arch" project, lot n°1: **Modelling of hydrological and sedimentary circulation around the Emerald Arch** and lot n°2: **Characterisation and quantification of domestic, industrial and agricultural effluents** were carried out by a Consortium composed by CNDIO-GABON, IRD France, the University of Douala in Cameroon and the Bureau d'Ingénierie BRL (France). The results obtained from 2015 to 2018 have led to a better understanding of the dynamics in the Komo estuary and coastal region and its response to extreme forcings (floods, tides, swells, etc.). On the other hand, the results also made it possible to qualify and quantify pollution in marine ecosystems and fishery products and to evaluate the responses of exposed organisms and communities.

3. Gabon's coastal zone planning programme

Since its participation as a full member state of the Intergovernmental Oceanographic Commission (IOC) since 26 October 1977, Gabon has attended for years, without participating, all the research activities of foreign vessels in its own waters under the rights conferred on it by the Montego Bay Convention on the Law of the Sea. It was not until the creation of the National Centre for Oceanographic Data and Information, abbreviated (French) as CNDIO (Centre National des Données et de l'Information Océanographiques) , in 2003 at the initiative of the ODINAFRICA Programme that our country became effectively integrated into the research programmes developed by the IOC. The CNDIO perfectly meets Gabon's expectations that a general reflection on the ocean, sea and coastal issues will finally develop.

THE NATIONAL CENTRE FOR OCEANOGRAPHIC DATA AND INFORMATION is the first Gabonese data management and research centre specialising in the marine and coastal domain. It involves nearly twenty researchers specialized in various disciplines of the natural and social sciences. To better promote its activities, the CNDIO allowed the creation in 2005 of a department of marine sciences which is under the supervision of the National Centre for Scientific and Technological Research (CENAREST: Centre National de la Recherche Scientifique et Technologique), while waiting for the creation of a real Marine Research Institute.

Gabon has with the CNDIO a national network of oceanographic data managers created by the charter called "**Declaration of 08 November 2002**". This network is a platform for the exchange of data and information between the various institutions, public and private, national, actors or users of the marine and coastal environment. It is within this framework that the CNDIO has been leading the Gabonese Marine Turtle Database Management Platform, called the Gabonese Marine Turtle Partnership (Partenariat des Tortues Marines du Gabon), since 2005.

Since its creation, the CNDIO has implemented a **PLANNING** program for the **GABON COASTAL AREA**. This programme focuses on the use of the sea and the coast. To implement this planning operation, the centre is structured into two units: a documentation centre and a research centre responsible for carrying out fundamental and applied research in the field of the sea and coastline.

4. The Argo International Program

The Government of the Republic, aware of the importance of maritime areas in Gabon's development, has also initiated other projects in the wake of the creation of the CNDIO to make its maritime policy a reality.

This commitment by the Government has been reflected in various activities, including the holding of the 7th session of the Advisory Body of Experts on the Law of the Sea (IOC/ABE-LOS) in Libreville from 19 to 23 March 2007. At the end of this session, Gabon had the privilege of joining the **ARGO Programme**, which is an international ocean monitoring network that now has nearly 3000 buoys deployed in the world's various maritime areas. Since 9 April 2009, Gabon has had three oceanographic buoys deployed in its exclusive economic zone (EEZ) through the CNDIO. These buoys were donated to Gabon by the United States Federal Government under the auspices of IOC-UNESCO. These oceanographic measurement instruments have enabled our country to strengthen and improve its marine database in order to ensure a better knowledge of our maritime space. On 24 July 2009, the Council of Ministers of the Government agreed to the creation of an inter-ministerial platform on the Argo Programme, for which the CNDIO is responsible for scientific coordination.

5. The national program for monitoring and understanding coastal erosion

Since 2008, the CNDIO has been developing a **national programme for monitoring and understanding coastal erosion**, which won the Omar ONDIMBA Grand Prize for Scientific Research in 2013. It is within this framework that IOC-UNESCO commissioned a technical mission to Gabon to assess the phenomenon of coastal erosion on the Gabonese and Congolese coasts, and more broadly the natural evolution of the coasts of these two Central African countries, whose real consequences of coastal erosion and marine flooding have been observed for several decades, particularly around emblematic coastal industrial cities such as Pointe Noire and Port-Gentil. The report prepared for the Government of Gabon has enabled national researchers to develop a more ambitious programme on the issue of the resilience of Gabon's coasts to climate change.

The results made it possible to diagnose the causes of erosion throughout the Gabonese coast and regular monitoring of the coastline is carried out by the team of researchers at the CNDIO. The programme could contribute to strengthening the sustainable development of marine national parks. The programme is being developed in a subregional framework with Congo-Brazzaville and Cameroon. **This programme, which represents an important challenge for Gabon, will be submitted to IOC-AFRICA for discussion during its fifth session in April 2019 in Nairobi and could be integrated into the WACA programme.**

6. The Guinea Current Large Marine Ecosystem (GCLME Grand Ecosystème Marin du Courant de Guinée) programme

Within the framework of cooperation in oceanographic research, Gabon has benefited from some Large Marine Ecosystem (LME) projects that have played a key role in the study and management of coastal areas in Africa. The implementation of these projects has been coordinated by various organizations of the United Nations system and related organizations such as the United Nations Industrial Development Organization (UNIDO) (Organisation des Nations Unies pour le développement industriel: ONUDI). It has implemented the **Guinea Current Large Marine Ecosystem (GCLME) Programme**, the main objective of which is to prevent and combat pollution, ensure the conservation of biological diversity, strengthen institutional and human capacities and aim to improve water quality and the coastal and marine environment of the Gulf of Guinea. In 2007, Gabon carried out an environmental profile of its coastal zone, a study commissioned by UNIDO, supervised by the Directorate General for the Environment and carried out by CNDIO GABON.

7. The International Programme on Harmful Algal Blooms

The RAF 7014 - Phase II programme led by the International Atomic Energy Agency (IAEA) is implemented in Gabon by CNDIO-GABON under the administrative supervision of the Ministry of Environment and Nature Protection. The objectives of this program are to improve knowledge of marine phytoplankton, ocean acidification and algal blooms. For the time being, CNDIO researchers have participated in training and the financial resources have not yet been put in place to effectively start the programme.

8. Gabon's Coastal Water Quality Program

Gabon's coastline is highly industrialized and urbanized without control. This is why the CNDIO launched the Gabonese Coastal Water Quality Programme in 2010. The first phase of the project covered the Komo estuary region, which is home to the Gabonese capital, Libreville, where nearly 60% of the country's population is concentrated. The results obtained made it possible to characterize the different sources of pollution, as well as the physico-chemical parameters of the bathing water of Libreville's beaches. The program welcomed a dozen students from French and Gabonese universities who supported their research theses. Finally, the programme is currently suspended due to a lack of financial resources from the public authorities.

CNDIO collaborates with several institutions, including (i) the General Directorate for the Law of the Sea of the Ministry of Foreign Affairs through the IOC-UNESCO ODINAFRICA project, (ii) the Directorate General for the Environment as part of the studies on climate change in the Gabonese coastal zone and the programme on acidification of the world ocean funded by the International Atomic Energy Agency (IAEA), (iii) the Directorate General for Fisheries and Aquaculture as part of the implementation of the “*Gabon Bleu*” programme. The CNDIO has also signed cooperation agreements with international institutions (Universities, Institutes, Research Centres, Laboratories and NGOs): the “*Centre de Gestion Intégrée du Littoral et de l'Environnement*” (Togo), the Geolittomer Laboratory of the University of Nantes (France), the “*Centre International ARGO*” (France), the *Institut des Sciences Halieutiques de l'Université de Douala*, the University of Science and Technology of Masuku (Gabon), the *Institut de Recherche pour le Développement français (IRD)*, the American NGO Wildlife Conservation Society (WCS).

In addition, as part of the reform of the National Commission for UNESCO, and in order to strengthen the work of its Permanent General Secretariat, a process of creating ten specialized committees was

initiated in 2013 with the appointment (*cf.* Ministerial Decision No. 0044/MENESTFPRSCJS/CAB/CNU/SGP of 17 October 2013) and the installation, on the occasion of the "Open Day" of the National Commission for UNESCO, organized on 25 October 2015, of ten (10) Chairs of national committees of UNESCO's international or intergovernmental scientific programmes. These committees, including the IOC-UNESCO committee, would be integrated as associate permanent bodies of the Gabonese National Commission for UNESCO.

9. The Satellite Assisted Environmental Monitoring Program

Created by the ordinance of 25 February 2010, the Gabonese Agency for Space Studies and Observation (AGEOS: Agence Gabonaise d'Etudes et d'Observation Spatiale) is responsible for contributing to the implementation of the Government's policy on the collection, analysis and availability of data from space observation of the national territory for the sustainable management of the environment, natural resources, land use, spatial planning and research and innovation.

Its flagship project: "*Satellite-Assisted Environmental Monitoring*" was developed in cooperation with the French Research Institute for Development (IRD) and the Brazilian Space Research Institute (INPE). It consists of satellite observation of the environment by conducting monitoring campaigns in specific areas. Thanks to a high-tech technical infrastructure, images from observation satellites are received in real time. Thus, the surveillance campaign of Gabon's Exclusive Economic Zone (EEZ) conducted from 24 June to 10 July 2016 made it possible to detect, in particular, oil pollution of more than 30 km² in national waters, an oil spill of more than 30 km off the coast, threats affecting the sustainability of fishing and, to identify vessels at the southern border of the zone whose presence strongly suggests the possibility of maritime traffic.

10. The Regional Master's Programme on Integrated Coastal and Marine Environmental Management (GIELM: Gestion Intégrée des Environnements Littoraux et Marins)

Since 2015, the CNDIO has been involved in the development of the marine science training programme in the Central African sub-region. Launched in October 2016, the Regional Master's Degree in Integrated Coastal and Marine Environment Management involves four universities: Omar Bongo University of Libreville, University of Yaoundé 1, Masuku University of Science and Technology and Douala University. The CNDIO is one of the host laboratories selected for this specialized training in ocean sciences. With this in mind, the CNDIO aims to become a Centre of Excellence for Marine Research and Geospatial Applications.

However, since 2002, there has been a **Professional Master's degree in Coastal and Maritime Activity Management** (ALM: Activités Littorales et Maritimes) supported by the Department of Geography of Omar Bongo University in Libreville. This training focused on maritime trades is divided into two options: Maritime Transport and Port Management.

However, there is no specific training module for hydrography in this Master's degree that would merit creating new offers in line with the concerns of the future National Hydrographic (and Oceanographic) Coordination Committee that IHO is advocating.

Finally, to coordinate the State's national policy on maritime affairs, Gabon has created an advisory body attached to the Presidency of the Republic, the Conseil National de la Mer (CNM).

The Conseil National de la Mer (CNM) was created on 19 September 2014. Its main mission is to design and coordinate government action in the area of:

- the delimitation, development and security of the maritime, river and lagoon areas;
- the development and protection of the marine, river and lagoon environment;
- sustainable and optimal management of fisheries, oil and mining resources;
- transport and maritime, river and lagoon trade.

Thus, as announced in 2014 by the President of the Republic at the VIth World Parks Congress in Sydney, the network of nine (09) marine protected areas (MPAs) in the form of marine parks and water reserves was approved on 26 April 2017, during the 2nd session of the National Marine Council. These areas are now officially protected. They aim to ensure the sustainable management of marine ecosystems with clearly identified areas for community fishing, industrial fishing and exclusion zones

for the protection of oil infrastructures. They also enable Gabon to increase its leadership in environmental matters.

As these challenges are everyone's business, Gabon makes it a point of honour to attend high-level international meetings related to sustainable development issues, such as the "Our Ocean" Conference in Washington (United States) from 15 to 16 September 2016, the Conferences of the Parties to the United Nations Framework Convention on Climate Change (COPs) (Convention-Cadre des Nations Unies sur les Changements Climatiques). This will also be the case at the United Nations Conference on the Ocean and ODD 14: Conserving and sustainably exploiting the oceans, seas and marine resources for sustainable development, which will be convened at United Nations (UN) Headquarters in New York (USA) from 5 to 9 June 2017, in parallel with World Ocean Day (08 June) 2018, in which the Gabonese President participated.

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