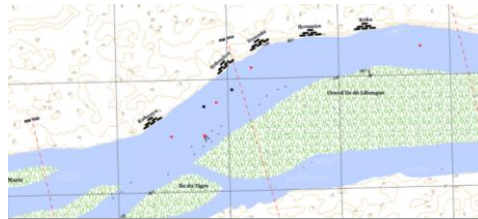
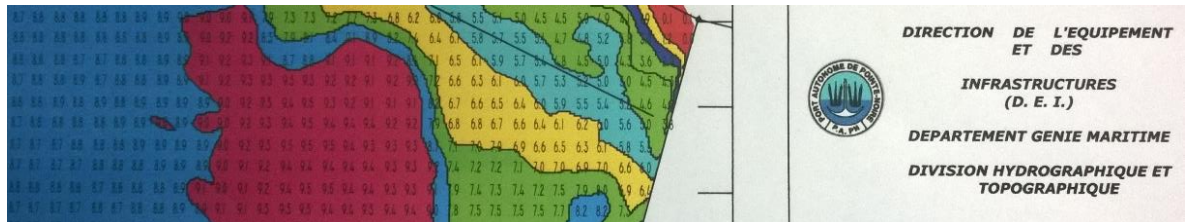




**IHO - Capacity Building
Work Programme
TECHNICAL VISIT TO
CONGO
REPORT
14 -24 Novembre 2021**



Our thanks to .../...

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Secrétariat Permanent du
Comité Interministériel de
l'Action de l'État en Mer et
dans les Eaux Continentales
SEPCIM AEMEC

Ministère des transports, de
l'aviation civile et de la marine
marchande
MTACMM

Ministère de la défense
nationale
Marine Nationale

-
Direction Générale de la
Marine Marchande
DIGEMAR



Groupement d'Intérêt Économique pour le
Service Commun d'Entretien des Voies
Navigables Congo RCA
GIE SCEVN



Port Autonome de Pointe-Noire
PAPN



Institut National de recherche en Sciences
Exactes et Naturelles
IRSEN



Institut Géographique National du Congo
IGN



CONTENTS

CONTENTS	4
ABSTRACT	6
INTRODUCTION	13
1 Preparation of the technical visit	13
2 Team composition	13
PART A – OVERALL ASSESSMENT OF THE SITUATION IN THE REGION.....	14
3 Effectiveness of the Technical Visit	14
4 International and regional cooperation - Defense	15
PART B – CONGO - EVALUATION.....	16
5 Involvement in the Regional Hydrographic Commission (EAtHC).....	16
6 Preliminary contacts.....	16
7 Technical Visit - Points of contact - IHO Correspondents (P5-Yearbook) of EAtHC and Shom	16
8 National Maritime Affairs - Actors	17
9 Maritime trade and traffic - Marine cartography / CATZOC	21
10 Responsibility for the safety of navigation.....	24
11 Responsibilities of the defense forces (Navy)	25
12 Coastal zone management and environmental protection	25
C-55 INDICATORS.....	25
13 Status of hydrographic surveys in the national maritime area	25
14 Collection and circulation of nautical information.....	25
15 Hydrographic survey capacity	26
16 Independent nautical chart production capacity	27
COORDINATION AND CAPACITY BUILDING PROPOSAL.....	28
17 National Hydrographic Committee (NHC): CNHC: National Commission for Hydrography and Marine Cartography	28
18 Phase 1 Hydrographic capacities: MSI and GMDSS.....	28
19 Phase 2 Hydrographic capacities: conducting surveys.....	29
20 Phase 3 Hydrographic capacities: production of nautical charts	29
21 Summary of the assessment of national hydrographic capacities - Table	30

FORMATION	31
22 Basic training of hydrographic technicians (not only!).....	31
23 Continuous training in hydro-oceanography and related activities (navigation aids, port infrastructure development and coastal protection) - Management.....	33
ANNEX	35
Annex A : Abbreviations	35
Annex B: Terms of reference of the visit team of the Regional Hydrographic Commission.....	37
Annex C : Reference texts	38
Annex D : List of main contacts - Telephones - Mails.....	39
Annex E : Agenda – Events	42
Annex F : Photos.....	44
Annex G : Possible interdisciplinary projects	50

ABSTRACT

The development of the Republic of the Congo, in terms of hydrography and marine / river cartography, is quite contrasted:

- with a hydrography and topography division with limited means at the Autonomous Port of Pointe-Noire (PAPN), but the absence of a dedicated operational structure at the national level;
- for river navigation, with a very modest hydrographic (and cartographic) service at the Economic Interest Group - Common Service for the Maintenance of Congo - RCA waterways (GIE-SCEVN);
- with competent players - in search of motivations - in fields related to hydrography (oceanography, hydrology, geodesy, geomatics, navigation, etc.) but, dispersed, not pooling their human and material potential to further meet the needs of the country as a whole: navigation safety (hydrography and cartography) but also support for public policies, in particular in terms of coastal management and resilience, the blue economy and finally State Action at Sea, not to mention the issues in Continental Waters (Congo River, Oubangui, Sangha);
- with the recent creation of the Permanent Secretariat of the Interministerial Committee for State Action at Sea and in Continental Waters (SEPCIM AEMEC) which will be able to promote the interdisciplinarity previously described;
- with the establishment of the National Commission for Hydrography and Marine Cartography (CNHC), which has not yet met;
- with a state structure dedicated to maritime safety, the General Directorate of the Merchant Marine (DIGEMAR), but which in fact largely delegates to the PAPN (targeted area of intervention and limited geographical influence) responsibilities of a sovereign nature such as organization of navigation aids and maritime safety information;
- by being a member of international organizations such as the IMO, but not (yet) the IHO;
- 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 (this which results in non-conformities during IMO audits);

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

Regarding maritime navigation, the Congo's capacities are in terms of 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 Shom. It is nevertheless necessary to consolidate the process at the national level beyond the current geographical limits of the PAPN;
- **partially acquired for phase 2: hydro-oceanographic surveys** through data acquisition and archiving. **The function should be extended to all Congolese waters and not just its main port;**
- **not acquired for phase 3,** namely the **production of official charts (provided by the Shom).**

Regarding river navigation, the Congo's capacities are extremely small in comparison, out of all proportion to the challenges.

This report includes a set of findings and proposals for action. To make it more accessible, it can be broken down into targeted actions. The CNHC will be able to distribute and plan the tasks between its various stakeholders.

MAIN COMMENTS, RECOMMENDATIONS

The majority of the recommendations are to be followed within the CNHC and therefore placed on the agendas of the first meetings.

Object	Comments – Recommendations
	Phases 1, 2 and 3 of development
Phase 1 development Maritime Safety Information (MSI)	<ul style="list-style-type: none"> • Clearly identify all the players in the maritime world who can provide nautical information and benefit from it (PAPN, MN, Oil companies, etc.) • In accordance with international regulations (IMO-IHO) and national texts, specify through an interministerial instruction the methods of collecting and disseminating (urgent, rapid, deferred) nautical information (MSI: Maritime Safety Information) • Take steps to extend the services already provided at the port level to all waters under Congolese jurisdiction • The PAPN maritime operations direction should continue to issue local AVURNAVS
Phase 2 development Hydro-oceanographic surveys from data acquisition to archiving	<ul style="list-style-type: none"> • Identify all the national needs in terms of surveys (PAPN, Navy, IRSEN, Coastal environment, etc.) and prioritize them • Identify all the possibilities of pooling in material (ships / boats) (GPS, sounders, tide gauges) and human resources (geomatics, hydrographers, oceanographers) • Specify, execute, qualify, restore a first national hydrographic survey in 2022. Be simple on a first transversal project such as the bay of Loango, then provide feedback to consolidate the lasting conditions of a national organization • As a reminder: are needed floating resources, scientific and IT equipment, logistics support infrastructure and of course staff in sufficient quality and quantity (all professions combined: hydro-oceanographers, IT specialists, logistics specialists, managers) • Training: a certified IHO category B hydrographer is strongly recommended
Phase 3 development Cartographic production	<ul style="list-style-type: none"> • The co-production of charts with Shom (Coordinator of INTERNATIONAL cartography for Region G and primary chart authority) must continue within the framework of the Administrative Arrangement

	<ul style="list-style-type: none"> • It is nevertheless logical and necessary that Congo can gradually gain autonomy and already respond itself to specific cartographic needs such as sovereignty maps of State Action at Sea • It is therefore necessary to clearly identify the already existing capacities in terms of geomatics in order to pool them through joint projects • Set up a national database in charge of collecting, qualifying and making hydrographic data available (depths, tides, nature of the seabed, topography, coastline, landmarks, beaconing, etc.). This database must be initialized by existing data (including historical data from Shom and those from oil companies) • Designate one or more national referents by type of data • Produce an initial support map for public maritime policies: meet the needs relating to State Action at Sea (institutional limits, EEZs, extension of the continental shelf, fishing zones, marine protected areas, etc.) • Training: a IHO category B certified marine cartographer is strongly recommended
	International relations: IHO, Regional / EAtHC, France
Join IHO	<p>Be present at the international level</p> <ul style="list-style-type: none"> • Join the international community such as already IMO and IALA. Benefit much more from IHO training support. IHO capacity development actions are limited to phase 1 for non-member countries • MTACMM then MAE → apply the simplified membership procedure provided. Transmission to the Minister of Foreign Affairs of Monaco
Involvement of the Regional Hydrographic Commission (EAtHC)	<p>Be present at the regional level</p> <ul style="list-style-type: none"> • Participate at the next EAtHC (17th) plenary in 2022 which should take place in Cape Verde (subject to confirmation) https://iho.int/fr/commission-hydrographique-de-l-atlantique-oriental • In particular participate in the seminar which will precede at the same place on maritime safety information (MSI), the co-production of nautical charts with a third country, risk assessment (cartography / navigation) and the specification of hydrographic surveys. Contact point: henri.dolou@shom.fr
Administrative Arrangement (AA) with France	<ul style="list-style-type: none"> • This arrangement dates from 2011 and allows Congo to be in compliance with SOLAS • The role of the CNHC may lead to adjusting the obligations of the parties currently limited to the Shom for France and the PAPN for the Congo • AA which may evolve to promote the progressive autonomy of the Congo

	<ul style="list-style-type: none"> Beyond the cooperation themes already indicated, it will be opportune to address the subject of databases, the importance of which was mentioned during the Technical Visit.
Surveys - results: Updating nautical charts	<ul style="list-style-type: none"> 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 PAPN surveys Contact all the operators who have survey data and send them to the Shom with the metadata (archive these data in Congo) It should be noted that without the explicit authorization 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 explicit written consent of the owners
	Congo
Constitution of one or more national databases	It is essential that the Republic of Congo archive all the data previously cited in a sustainable manner for free and shared valorization.
CNHC	Develop a national framework: the National Commission for Hydrography and Marine Cartography <ul style="list-style-type: none"> Support and develop the CNHC Congo (MTACMM): schedule the first inaugural meeting while ensuring: <ul style="list-style-type: none"> to closely associate scientific and / or technical organizations to launch concrete stimulating projects for all stakeholders: suggestions in appendix G
SEPCIM AEMEC	<ul style="list-style-type: none"> Set up an operational organization of national coordination for the collection and dissemination of nautical information In accordance with international regulations (IMO-IHO) and national texts, specify through an interministerial instruction the methods of collecting and disseminating (urgent, rapid, deferred) nautical information (MSI: Maritime Safety Information) Promote the launch of interdisciplinary inter-agency projects: hydro-oceanographic surveys, cartography, hydrodynamic modeling, etc.
GIE SCEN	<ul style="list-style-type: none"> "Take advantage" of the future membership of the Congo at IHO to promote the satisfaction of needs in river navigation Defend within the IHO the challenges of inland waterway navigation in connection with other regional countries facing the same challenges (including the DRC)

	<ul style="list-style-type: none"> Promote your own hydrography and electronic cartography capabilities to address national issues
IGN	<ul style="list-style-type: none"> Take advantage "of the creation of the CNHC to publicize its technical and human capacities and become part of national transversal projects Provide in particular skills in geodesy, leveling and geomatics
DIGEMAR	<ul style="list-style-type: none"> essential "regulatory" actor, in connection with its MTACMM supervision, to approach SEPCIM AEMEC to first and foremost define the framework for the operational organization of the national coordination in terms of collecting and disseminating nautical information.
Navy	<ul style="list-style-type: none"> Navy consists of nautical skills and sea intervention capabilities. It will be one of the first beneficiaries of the development of hydrography Make available, according to rules to be defined, its nautical capacities of intervention at sea Specify his needs in terms of nautical documentation and AEM Initiate the production of specific AEM maps, identify surveys needs at sea, propose collaboration with IRSEN and PAPN or even IGN
PAPN	<p>Direction of Equipment and Infrastructures - Maritime Engineering Department</p> <ul style="list-style-type: none"> Have functional material means to comply with IHO specifications that fit updating official nautical charts In particular, have a tide gauge (radar) Get closer to IRSEN oceanographers or academics (geomorphologists from Marien Ngouabi University of the Faculty of Sciences of Brazzaville) to better understand sediment transport and their possible impact on channel filling (optimization of surveys or even dredging) In terms of skills and workforce management planning, consider having a new agent follow the hydrographer training at Shom school (scientific / IT profile)
PAPN	<p>Piloting</p> <p>Specify the needs that can be met by the hydrography division:</p> <ul style="list-style-type: none"> Basic data for PPU (topography of docks, high density and accuracy bathymetry, etc.) Real time tides
PAPN	<p>Aids to navigation</p> <ul style="list-style-type: none"> Ensure that nautical charts correctly reproduce the positions and characteristics of the boys. Rely on the hydrography and topography division to send Shom any updates to be made

IRSEN	<p>A structure that only asks to be reborn (ORSTOM, Ird). Qualified researchers (Master of physical oceanography in Benin). Huge need for data</p> <ul style="list-style-type: none"> • Offer their skills to PAPN (sediment transport) • From now, join forces with the PAPN, which will be equipped with a new tide gauge which will offer new opportunities beyond even the treatment of surveys: in particular studies of mean sea level in connection with climate change • Participate in the work of the CNHC by defending in particular the need for “marine geoscience” data • Participate in the inventory of existing maritime data (including meteorology) (France, ORSTOM / Ird, Oil companies), promote their acquisition and sharing • For memory: the MTACMM has a National Center for Nautical Information and Documentation in the DIGEMAR premises at Pointe-Noire • Always in an inter-agency framework, take part in responses to international calls for tender (climate studies, resilience of coastal areas, etc.)
Formation - training	
Basic training approved by the IHO (CAT B) for senior technicians in hydrography and cartography	<p>Training in hydrography (data acquisition) is, to date, the one that has been almost exclusively organized. It remains essential.</p> <p>However, it is now necessary to develop in the country, own capacities to offer products and services directly to users without necessarily going through a third country. It is therefore also necessary to train cartographers, considering the needs at sea and inland waters.</p>

MAIN CONTINUING ACTION

The main harbor (Pointe-Noire) must above all maintain permanent relations with the NAVAREA II coordinator, who is also the primary chart authority for the waters of Congo Brazzaville (France / Shom), so that MSI (Maritime Safety Information) are distributed on time to mariners (e.g. via SafetyNet in case of emergency) and that nautical documents (e.g. nautical charts) are updated at the appropriate frequency (e.g. nautical instructions, new chart editions).

Transmission of MSI

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 56 31 24 84

Non-urgent nautical information :

Hydrographic surveys, port plans: 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

Postal 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

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

- CBWP 2021: action A-04 - « Technical visit to Congo».

It was initiated by Henri DOLOU (Shom) in close relation with Mr. Winther-Grenier TCHISSAMBOU AMBANA, head of the hydrography and topography division of PAPN (official correspondent of Congo to the IHO) and Commander Gilles AUBRY, advisor of the Chief of Staff of the Congolese National Navy.

It was under the authority of the MTACMM that this visit was then structured, in particular by establishing a visit program and making appointments. The terms of reference for the visit are recalled in Annex B.

2 Team composition

For IHO, the visiting team consisted of:

<u>Name</u>	<u>Role</u>
Henri DOLOU	Senior advisor for capacity building in Africa (France on behalf of IHO)

For Congo, in addition to the representative of PAPN (Mr. TCHISSAMBOU), the MTACMM has set up a delegation made up of:

- Daniel NGANGA, Port Economy Advisor to the Minister (head of delegation)
- Germain Aimervy Pierryl NGOUALA, Administrative and Legal Attaché
- Murcia Armel MAKAYA-KOKOLO Attaché to the Merchant Navy - Immediate adviser to M MOMBO

This delegation took part in all the visits, enriched the discussions and facilitated the drafting of recommendations.

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 before the visit itself through discussions and analyzes of existing reports and texts;
- that the Minister of Transport, Civil Aviation and Merchant Marine (MTACMM) has set up a visiting delegation made up of the new harbour economy advisor (head of delegation), a Legal Administrative Attaché and finally an Attaché to the Merchant Navy;
- that in conjunction with the head of the hydrography and topography division of the Port Autonomous Harbor of Pointe-Noire (PAPN), the MTACMM office was able to obtain all the following desired appointments:
 - **At Brazzaville (chronological order) :**
 1. the Minister of Transport, Civil Aviation and the Merchant Navy, represented by his Chief of Staff (MTACMM);
 2. the Chief of Naval Staff of the National Navy (CEMMAR)
 3. the Minister Delegate, Permanent Secretary of the Interministerial Committee for State Action at Sea and in Continental Waters (SEPCIM AEMEC);
 4. the coordinator (director) of the Economic Interest Group of the Congo-RCA Common Waterway Maintenance Service (GIE-SCEVN)
 5. the director of the National Geographic Institute (IGN)
 6. the head of the hydrology and oceanography department of the National Institute for Research in Exact and Natural Sciences (IRSEN)
 7. the Defense Attaché of the French Embassy
 - **At Pointe-Noire (chronological order)**
 8. The director of administration, finance and seafarers of the General Directorate of the Merchant Navy (DIGEMAR)
 9. The commanding officer of naval group N ° 31 in charge of the COM (Maritime Operations Center) Navy
 10. the Deputy Director General of PAPN
 11. the head of the Maritime Engineering Department (PAPN)
 12. the head of the hydrography and topography division (PAPN)
 13. the IRSEN zone director in Pointe-Noire
 14. the Director General of PAPN
 15. the head of piloting and the head of the aids to navigation division (PAPN)
 16. representatives of the oil companies TotalEnergies and PERENCO
 17. the maritime operations advisor, the harbor master (PAPN)
 18. the chief of staff of SEPCIM AEMEC
- that a feedback meeting at the end of the visit was held with operational services such as the Navy, the PAPN directorates in charge of development and safety of navigation and oil companies. A scientific and technical body was present: IRSEN. At state level, MTACMM, DIGEMAR and finally SEPCIM AEMEC took part;

- that the actors able to collect nautical information were again made aware of the SOLAS obligations ensured by Congo in connection with France (NAVAREA II, cartographic coordinator, producer of nautical documentation in force in the waters under jurisdiction of the Congo, capacity development coordinator).

The discussions were professional and constructive. Recommendations have been made. Some of them can be carried out in the very short term like (PRIMORDIAL):

- the inaugural meeting of the CNHC without which the national requirements that must be met within an interministerial framework cannot be met;
- membership to the IHO;
- others may take time. It will be up to the CNHC to set the right pace and the method (“project” spirit). Feasibility / definition studies may be necessary. Concrete projects (some are proposed in appendix G) may be launched in due time.

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, in particular via:

- minimization of dredging operations;
- optimization of ship loading;
- the reception of new vessels with much greater capacities but with much more larger dimensions in terms of navigation constraints.

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

Beyond the technical knowledge of Mr. Winther-Grenier TCHISSAMBOU AMBANA of PAPN, the MTACMM also has attachés (Germain Aimervy Pierryl NGOUALA and Murcia Armel MAKAYA-KOKOLO of technical background), who for having assiduously participated in the visits and progress points may have a driving role within the CNHC, of which they are, moreover, the secretaries.

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 (1)	Associated member CHAtO/EAtHC	Member	Member	Member

(1) a membership application will be conducted. The IHO membership procedure can be found at: [https://iho.int/uploads/user/About%20IHO/Member%20States/Process to join the IHO and temp lates.pdf](https://iho.int/uploads/user/About%20IHO/Member%20States/Process%20to%20join%20the%20IHO%20and%20temp%20lates.pdf)

b. [Defense and security arrangements]: Subject not covered during the visit.

PART B – CONGO - EVALUATION

5 Involvement in the Regional Hydrographic Commission (EAtHC)

Findings	Actions
The Republic of Congo participates almost systematically in EAtHC meetings. It is then represented by the PAPN.	<ul style="list-style-type: none">• Participate in the next EAtHC (17th) plenary in 2022 which should take place in Cape Verde (subject to confirmation) https://iho.int/fr/commission-hydrographique-de-l-atlantique-oriental
	<ul style="list-style-type: none">• In particular participate in the seminar which will precede at the same place on maritime safety information (MSI) the co-production of nautical charts with a third country, risk assessment (cartography / navigation) and the specification of hydrographic surveys.• Point of contact : henri.dolou@shom.fr

6 Preliminary contacts

The visit was mainly prepared through discussions with the PAPN and the collection of open information on the Internet.

Shom was consulted as:

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

Shom provided copies (GeoTiff and paper on site) of the nautical charts:

- 7588 : De Gamba à Pointe-Noire à l'échelle 1 : 350 000 ;
- 7585 : Abords et Port de Pointe-Noire aux échelles 1 : 40 000 et 1 : 10 000 ;
- 7791 : De Gamba à Luanda à l'échelle 1 : 1 000 000.

They have proven to be essential in explaining the issues and the meaning to be given to hydrography.

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

The points of contacts for the Technical Visit are listed in Annex D. At this stage there is no need to change the representation of the Republic of Congo at IHO and EAtHC. Membership at IHO and the appointment of state and technical officials to the National Commission for Hydrography and Marine Cartography will eventually review these representations.

OHI links :

- Yearbook/P-5 : http://iho.int/iho_pubs/periodical/P5YEARBOOK_ANNUAIRE.pdf
- CHAtO : <https://iho.int/en/basic-commission-documents-2>

DESCRIPTION OF MARITIME ACTIVITIES

8 National Maritime Affairs - Actors

The duration of the visit (10 days) made it possible to meet the main actors.

General context, levels of development

The talks focused on the issues associated with hydrography: beyond the safety of navigation (international commitments - SOLAS), economic performance through port capacities for accommodating ships (including larger ones) and the optimization of their loading (through the depths shown on the 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. That its mastery necessarily intervenes in coastal protection (coastal planning) thus emphasizing the transversal nature of hydrography (physical oceanography is part of it) and consequently, at government level, its interministerial ambition. In terms of capacities, according to the phases of development of the 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 publications in particular nautical charts to the Shom	Achieved. <i>"The country fulfils its national obligations in a sustainable manner"</i> ¹ The actors (pilots, Navy, PAPN, oil companies) are well sensitized. PAPN is in contact with Shom and regularly sends information there. Persistent difficulties exist on the metadata of the hydrographic surveys sent to the Shom. It will be necessary to ensure that the collection and transmission of MSI covers all Congolese waters and not only those of the PAPN. This should go through interministerial instruction where efficiency should count above all
2	Hydrographic and oceanographic surveys through data acquisition	Incomplete <i>"The country is aware of its national obligations but does not have "national" means to do it"</i> Even if PAPN is endowed with sufficient means (through refurbishment and the acquisition of a new tide gauge), these are mainly implemented only in the port area of Pointe-Noire. There are no national capacities. The focus must now be on phase 2 for a response to "national" needs and not just "port" needs

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

3	Production of nautical charts and publications	<p>In the long term</p> <p><i>“The country fulfils its national obligations through a third party”</i></p> <p>An administrative arrangement currently organizes cooperation with France and in particular makes it possible to comply with the SOLAS convention. It is nevertheless logical and necessary that Congo can gradually gain autonomy and already meet specific cartographic needs such as sovereignty maps for State Action at Sea. It is therefore necessary to clearly identify the already existing capacities in terms of geomatics in order to pool them through joint projects. This is one of the first actions to be carried out within the CNHC.</p> <p>Note: PAPN, GIE-SCEVN, IRSEN and IGN have, at various levels of experience, such skills.</p>
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The Ministry of Transport, Civil Aviation and the Merchant Navy (MTACMM) and the General Directorate of the Merchant Marine (DIGEMAR)

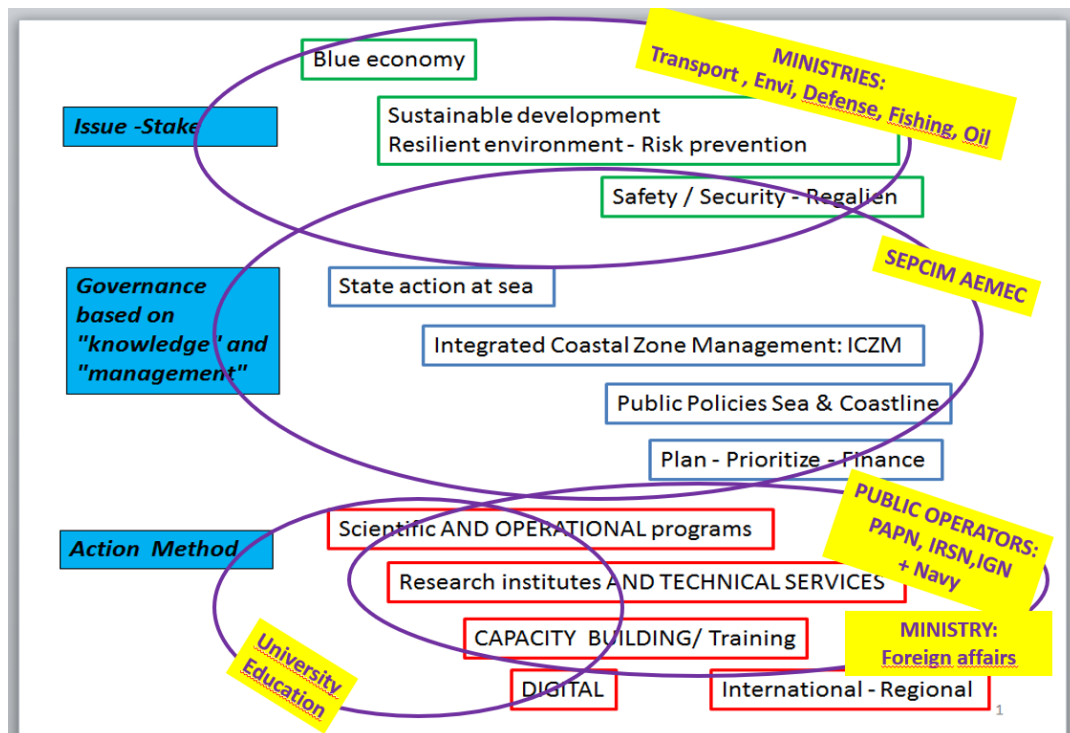
The organizational chain of maritime transport is in place. It is made up of the MTACMM, then the DIGEMAR and finally the PAPN (the last two under the supervision of the MTACMM).

Through the work of the CNHC, it will be able to consider both the regulatory and operational measures necessary for the development of the country's capacities. In addition to the work of CNHC, IHO membership will "pull up" the country's ambition.

The National Commission for Hydrography and Marine Cartography (CNHC)

- Such a commission has just been created by the MTACMM. Its need is 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 such as physical oceanography (hydrology for the river side) and broaden participation (multidisciplinary and interministerial nature);
- The preparation of its inaugural meeting will depend on its success and sustainability. In particular, beyond state governance, it will be necessary to properly involve scientific and technical players in the "field". Reference for memory: IHO publication M2 "The need for national hydrographic services": https://iho.int/uploads/user/pubs/misc/M-2_3.0.7_E_06142018.pdf;
- Concretely, it could be judicious to launch projects (including the setting up of resources) such as those proposed in appendix G;
- Note: such a commission does not nevertheless constitute an operational national body for research, development and hydro-oceanographic production. Do we need such an operational body which would require a heavy investment to study and constitute it (statute, governance, budget, its material and human resources, etc.)? Rather than creating such a service ex-nihilo, it may be more appropriate to rely on existing structures, including that of the PAPN (hydrography division), whose vocation is not (at least currently) of a national character. The establishment of operational structures and resources falls under the "Action

/ Method" level in the following figure. The subject is obviously to be debated within the CNHC.



Permanent Secretary of the Interministerial Committee for State Action at Sea and in Continental Waters (SEPCIM AEMEC)

- The previously mentioned interdisciplinarity could therefore be supported by the SEPCIM AEMEC.
- SEPCIM AEMEC is an authority reporting to the Prime Minister particularly well positioned to deal with interministerial matters.

Autonomous Port of Pointe-Noire (PAPN)

The PAPN (deep-water and coastal shipping port) plays a major (but almost exclusive) role in terms of nautical information (NAVAREA II correspondent) and transmission of new bathymetric surveys to Shom. According to IHO Publication P-5 (List of Non-Member States), its Director General represents the Republic of Congo at meetings of this organization. In the past, the Head of the Hydrography and Topography Division of PAPN has actively participated in IHO meetings and seminars. The PAPN is ISO 9001 (Reception of ships) and 14001 certified.

National Geographic Institute (IGN)

This is an important organization whose skills may be essential for the development of phase 3 (mapping/charting) of capacities. Note more specifically the great professional capacities in geolocated data management, leveling and geomatics.

Navy (MN)

The sovereign missions (defense) of the National Navy are known. It is worth recalling here the importance it now has in AEMEC.

Furthermore:

1. Navy participates in the collection (Navy has a front row seat to observe) and the dissemination of nautical information;
2. Navy has ships which are as many supports (maritime platforms) for the transport (at least occasional) of portable systems for acquiring hydrographic and oceanographic data which the Republic of Congo does not currently have in place, outside the PAPN. The rapid development of phase 2 (acquisition of data at sea, surveys) also appears to have to rely on these existing national resources;
3. Depending on its hydrography ambitions, Navy could send one of its officers to a CAT B certified hydrography course.

Institute for Research in Exact and Natural Sciences (IRSEN)

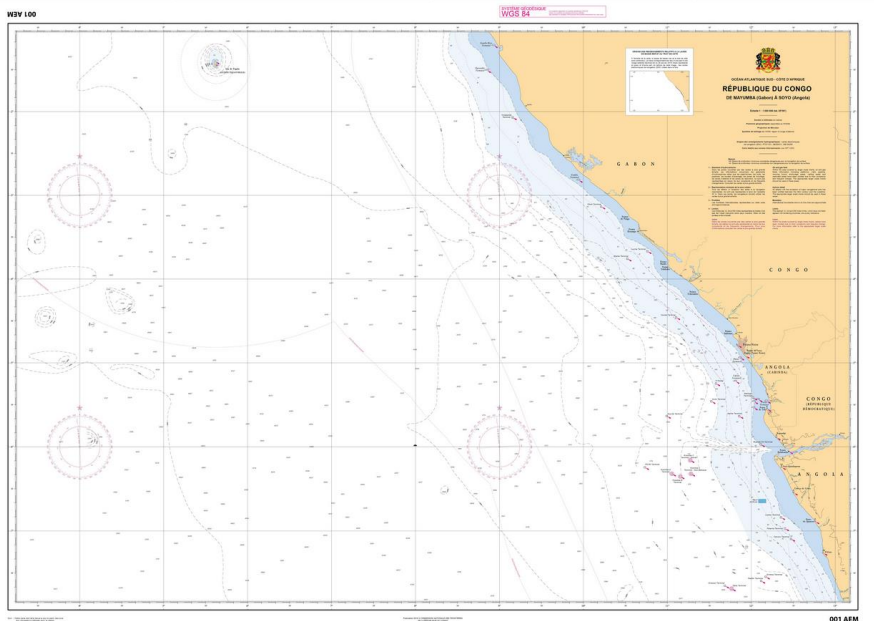
The human potential (physical oceanography) of this institute deserves to be known and valued. There is a potential for cooperation in Pointe-Noire that cannot ignore solid scientific knowledge. IRSEN's missions relate to projects supporting the monitoring of the marine and coastal environment which cannot be carried out without a precise description of the marine geophysical environment and therefore hydrography and marine cartography.

The studies of this institute are very dependent on data which is sorely lacking. Upstream, the establishment of data acquisition systems and their management in shared databases. This is currently cruelly lacking.

Economic Interest Group Congo RCA Waterways Maintenance Service (GIE SCEVN)

This service plays a major role in ensuring the safety of navigation on the Congo River, the Ubangi and the Sangha: bathymetry, dredging control, beaconing, topography of quays, cartography, physico-chemical samples ... This service is very undersized compared to some 2,000 km in length of rivers and navigable rivers. The fact remains that the achievement of the first IENCs by its hydrographic service was a great first at the level of the sub-region. Several rivers are thus affected, such as the Oubangui, Kasai and Sangha rivers. This is a testament to the value of its agents, whose numbers and qualifications will need to be adjusted. The existing training courses for hydrographers and marine cartographers (basic training type CAT B and seminars) deserve to be opened to them. In any case, membership to IHO of Congo should also be beneficial to them. For example, to help them manage technical problems such as integrating the semantics of markup in the CEMAC-RDC zone on the IHO S52 standard

For the memory: Ministry of Foreign Affairs (map deposited at the United Nations / DOALOS : Division for Ocean Affairs and the Law of the Sea) :

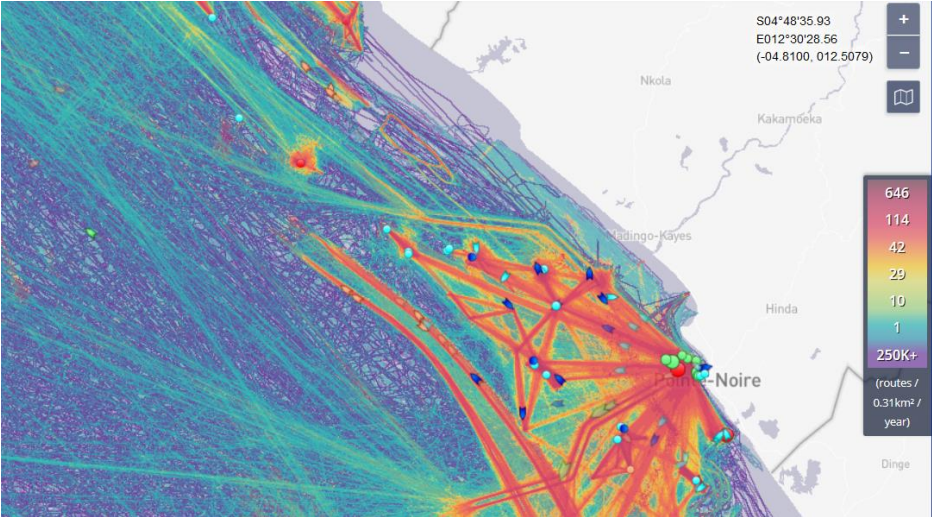


[M.Z.N. 133.2018 LOS of 8 March 2018](https://www.un.org/Depts/los/LEGISLATIONANDTREATIES/PDFFILES/MAPS/COG_MZN133_2018_00232.jpg): Deposit by the Republic of the Congo of a chart and lists of geographical coordinates of points, concerning the baselines for measuring the breadth of the territorial sea, contiguous zone and exclusive economic zone of the Republic of the Congo.

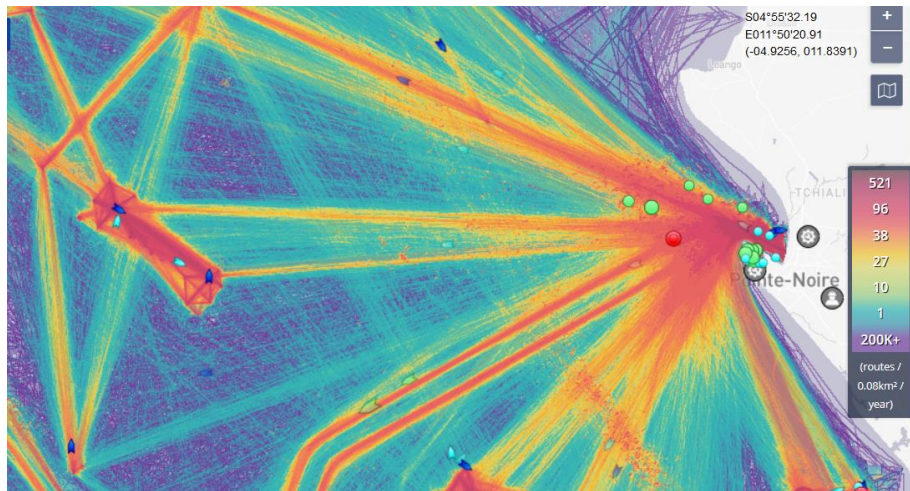
https://www.un.org/Depts/los/LEGISLATIONANDTREATIES/PDFFILES/MAPS/COG_MZN133_2018_00232.jpg

9 Maritime trade and traffic - Marine cartography / CATZOC

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



General situation of maritime traffic off the Congo

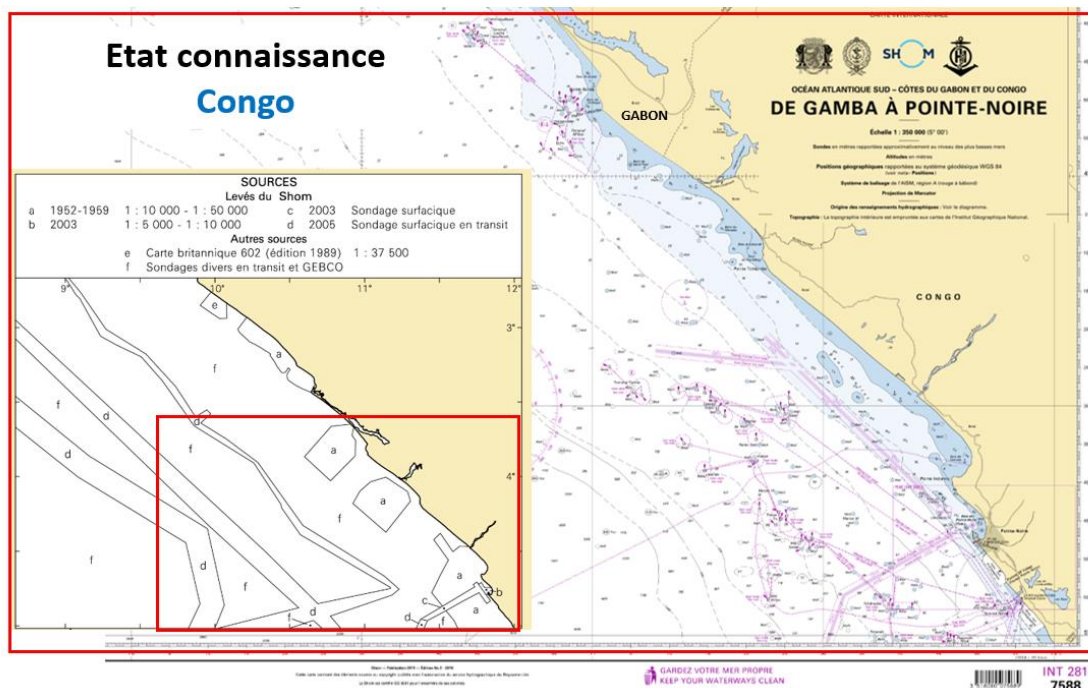


Maritime traffic at the port of Pointe-Noire

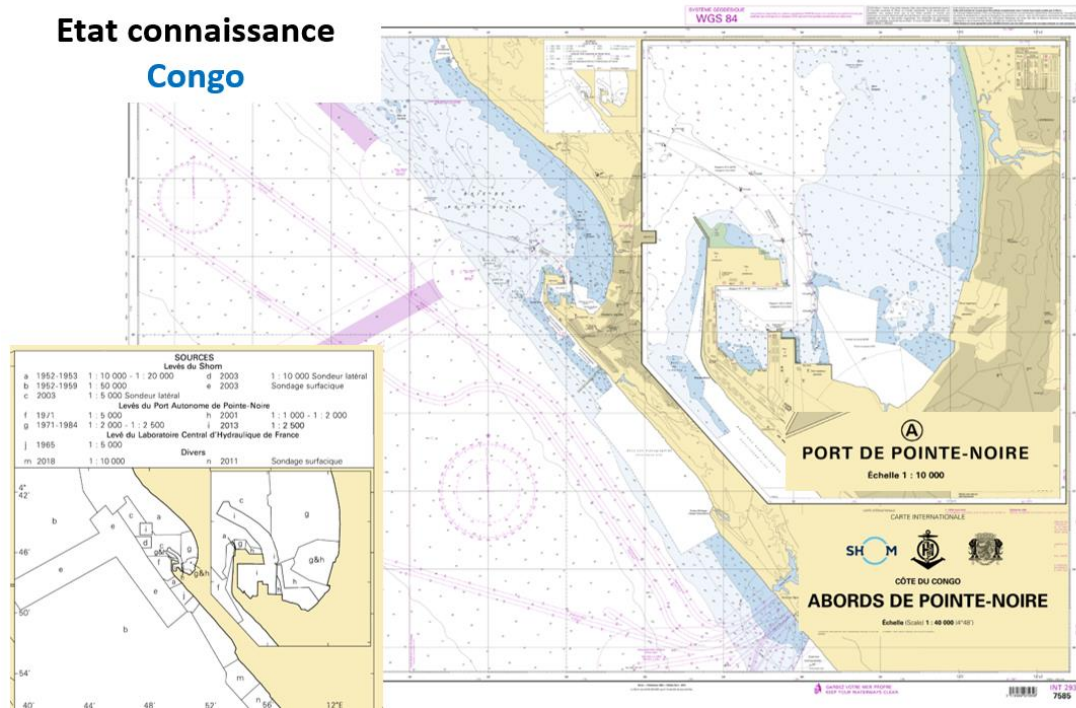
Official cartography of the Republic of the Congo

France ensures (pending greater autonomy from the Republic of Congo) the function of "Primary Chart Authority" through the production of nautical documentation made by the Shom on Congolese waters, this cartographic responsibility being defined by an administrative arrangement between France and Congo signed in 2011.

Congolese waters are covered by a set consisting of paper charts, digital rasters in GeoTiff format and electronic navigational charts (ENC). These products cover the most important known navigation needs. The fact remains that the charts are often based in shallow waters on old information (1950s). The environment may have changed, the hydrography techniques of the time may no longer meet current requirements, which is already the case with geolocation in WGS84. If the accesses to Pointe-Noire may have been the subject of recent hydrographic surveys, the rest of the territory is very poorly hydrographed even though there is cabotage.



Etat connaissance Congo



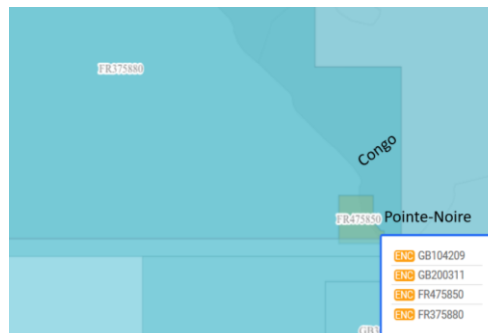
Congo (G)

Nautical charting / Cartographie marine / Cartografía náutica

Coverage of charts published Couverture des cartes publiées Cobertura 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		
% 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	100	0	100	
% Covered by RNC meeting S-61 Couvert par des RNC conformes S-61 Cubiertas por RNC cumpliendo S-61										
% 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 Cartes papier avec les profondeurs en mètres Cartas de papel con profundidades en metros	100 %	Paper charts referenced to a satellite datum Cartes papier rapportées à un système géodésique satellitaire Cartas de papel referidas a un datum satelital			100 %	Data source Source des données Origen de los datos			France	
Notes Notes	1. Data provided by France according to FR-CG bilateral agreement. 2. Medium scale coverage done by GB306.									

Sources/ ENC :

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



(GB104209 : Overview – GB200311 : General – FR375880: Coastal – FR475850/A: Harbour)

Sources/ paper charts:

https://diffusion.shom.fr/media/wysiwyg/catalogues/Grand_Catalogue_2021_Web.pdf

<ul style="list-style-type: none"> • Chart 6758 (INT 209 – ENC : GB104209) : De Freetown à Luanda 1 : 3 800 000 	<ul style="list-style-type: none"> • Chart 7791 (INT 2089 – ENC : GB200311) : De Gamba à Luanda 1 : 1 000 000 • Chart 7588 (INT 2813 – ENC : FR375880) : De Gamba à Pointe-Noire 1 : 350 000

<ul style="list-style-type: none"> • Chart 7585 (INT 2931 – ENC475850/A) : Abords de Pointe-Noire 1 : 40 000 Port de Pointe-Noire 1 : 10 000

Comments:

- This charting must be enriched by all surveys carried out in waters under Congolese sovereignty or jurisdiction. The hydrographic surveys received by the Shom (metadata included) have so far only come from the PAPN. 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 the CNHC;
- There are areas where hydrographic knowledge is insufficient. By correlating this knowledge with the current navigation zones (including cabotage) and especially planned, it will be possible to conduct a risk assessment and prioritize the hydrographic surveys to be carried out. This is again a subject to be submitted to the CNHC (aids to navigation included).

10 Responsibility for the safety of navigation

At the state and regulatory level, this responsibility falls to the Ministry of Transport, Civil Aviation and the Merchant Navy (MTACMM) and the General Directorate of the Merchant Navy (DIGEMAR).

11 Responsibilities of the defense forces (Navy)

See the chapter “National Maritime Affairs - Actors”: Navy.

AEM exercise requires hydrography and nautical cartography support

12 Coastal zone management and environmental protection

The subject was not specifically addressed except through discussions on accretions (including possible filling of the access channel to the PAPN) and erosion in the Pointe-Noire region. There are programs in West Africa such as WACA - MOLOA (West Africa Coastal Areas - Mission d'Observation du Littoral Ouest Africain) that have been launched and now deal with coastal environmental challenges in an operational manner. These programs necessarily need marine geophysical data. Note that Shom, through a program funded by the FFEM (French Global Environment Fund), was able to digitize historical data (Senegal, Togo, Benin) such as bathymetric charts and aerial photos which are extremely useful for studies evolution over time of the coastline (erosion rates).




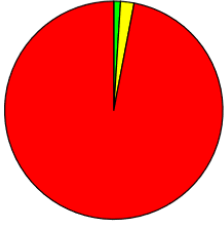
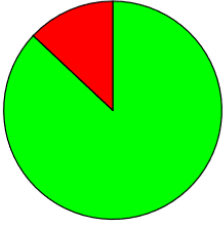
C-55 INDICATORS

13 Status of hydrographic surveys in the national maritime area

Source : <https://iho.int/uploads/user/pubs/cb/c-55/c55.pdf>

Congo (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		
	1	2	97	87	0	13
<p> Adequately surveyed Correctement hydrographié Adecuadamente levantado</p> <p> Re-survey required Nécessitant de nouveaux levés Requiere nuevo levantamiento</p> <p> Never systematically surveyed Jamais hydrographié systématiquement Nunca levantado sistemáticamente</p>						
Notes Notes Notas	<p>1. Data provided by France according to FR-CG Technical Agreement signed on December 30th 2011.</p> <p>2. A routine resurvey programme is needed in unstable areas in the approaches to Pointe-Noire, and in the approach channel and port after dredging operations.</p> <p>3. Garoua can be operated from July to September, the navigable season on the River Benué.</p> <p>4. No FR survey coverage in C values (non FR surveyed areas).</p>					

Note:

- these indicators are only based on the data available at Shom: there may be surveys carried out by private companies, in particular offshore (surveys) which are not known by Shom and therefore not used on nautical charts and in the C-55 indicators;
- they clearly show the weakness (apart from port accesses) of hydrographic knowledge in depths of less than 200 m.

14 Collection and circulation of nautical information

It is up to PAPN and any observer at sea (Navy and oil companies in particular) to provide information to Shom in order to issue NAVAREA messages (rapid dissemination on Inmarsat) and to update

nautical publications in a timely manner, in particular by notice to mariners. The transmission should rely on a state organization to be set up.

The flow of information should focus on:

- nautical charts (eg: new depths, guaranteed dredging threshold, 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 at Pointe-Noire).

15 Hydrographic survey capacity

If there are no national capacities, the PAPN has significant resources.

Source:

- Report on the hydrographic activities of the maritime engineering department on which the hydrography and topography division depends ;
- Visit on site.

General context:

- At PAPN, the service in charge of hydrography is housed in the maritime engineering department, which depends on the Equipment and Infrastructure Direction.
- His mission:
 - Ensure the permanent monitoring of the depths in the port basin and in the anchorage area in the outer harbor by carrying out bathymetric surveys for the purpose of establishing and updating the nautical charts necessary for the safety of navigation in the limits of port waters;
 - Continuously monitor the evolution of the sand trap in order to prevent silting up of the access channel and schedule maintenance dredging operations accordingly;
 - Incidentally, and as far as possible, carry out measurements of currents and swells in the bay of Pointe-Noire

Means:

- Staff: the staff directly assigned to hydrography is made up of eight agents:
 - 1 harbor and coastal engineer;
 - 2 IHO CAT B certified hydrographers, trained by Shom;
 - 2 hydrographic assistants;
 - 1 hydrographic boat master
 - 1 mechanic;
 - 1 sailor.
- Equipment :
 - A hydrographic launch (*Kouyou*) 16 m long, 4.5 m wide and 1.25 m draft;
 - A small embarkation propelled by a 100 HP outboard motor for shallow water;
 - A TRIMBLE R8 differential GPS positioning system (RTK)
 - A single-beam sounder (CV100);
 - A HYPACK version 2020 hydrographic data acquisition and processing system;
 - A large format plotter (A0);

- A celerimeter;
- A tide observatory equipped with two tide gauges:
 - An OTT radar sensor provided by UNESCO in 2007 as part of the sea level rise observation project;
 - An FSI pressure sensor tide gauge installed in 2010 when the hydrographic boat was purchased.

Maintenance issues have been reported. There are no longer any particular tide observations. France (Shom) only occasionally operates in waters under Congolese jurisdiction (last mission in 2003).

16 Independent nautical chart production capacity

There is no official capacity for the production of nautical charts, nor for their updating and dissemination. This is entrusted to France (Shom) as part of an administrative arrangement with the Republic of Congo signed in 2011.

COORDINATION AND CAPACITY BUILDING PROPOSAL

17 National Hydrographic Committee (NHC): CNHC: National Commission for Hydrography and Marine Cartography

The Republic of Congo has just created very recently (October 14, 2021) such a commission. Its interest is vital.

This commission (inter-ministerial, inter-agency) will be an essential link in the operational organization of the Congolese State (technical services, 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 (hydrology and river cartography for inland waters).

The organization and execution of training in Congo and abroad is part of development programs and therefore subjects of the committee.

Propositions :

- First of all: bring together the CNHC for the first time to launch a dynamic at the institutional (as provided for in the composition of CNHC in Chapter II) and technical (then specifying the corresponding actors: hydrographers, oceanographers, hydrodynamicists, surveyors, geomatics specialists, cartographers without forgetting the support functions, in particular in IT);
- The collection of needs (navigation, environment) in hydrographic and oceanographic surveys will be an essential step before prioritizing them, planning them by identifying the organizations (to be supported) or companies (to be contracted out) that can carry them out;
- Data collection can only be conceived economically if it is widely shared (one piece of data - several applications - the SOLAS application through nautical documents being only one among others) 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. This is a fundamental structural point to put on the agenda of the first meeting: setting up a Maritime Spatial Data Infrastructure (MSDI).

18 Phase 1 Hydrographic capacities: MSI and GMDSS

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 MSI (IHO Special Publication S-53), consist of the collection and dissemination of navigational 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 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, maintained equipment, trained personnel) with a national MSI coordinator in relation with the navigators, the charting authority (France / Shom) and NAVAREA II (France / Shom).

PAPN disseminates information to the NAVAREA II coordinator (France / Shom). The Navy and oil companies can also occasionally contribute.

However, this is not officially organized at the national level by the Congolese state.

The conditions for processing MSIs (NAVAREA II) and non-urgent nautical information are specified at the beginning of the report in the chapter: MAIN COMMENTS, RECOMMENDATIONS.

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

19 Phase 2 Hydrographic capacities: conducting surveys

The only existing capacities (equipped launches) identified on site are those of the PAPN. They are perfectly suited to port and coastal surveys in shallow water.

However, these resources remain dedicated to the needs of the PAPN in its area of responsibility. They therefore do not cover other national needs, be it navigation or the environment.

Proposal: To be able to build up, on shared projects (not necessarily on a permanent basis), the necessary capacities by relying on all the resources already available and therefore poolable at PAPN, in the Navy, etc.

20 Phase 3 Hydrographic capacities: production of nautical charts

The Republic of Congo does not yet have the capacity to produce (and distribute throughout the world) official national charts. France (via Shom) assumes the role of cartographic authority for the waters under the country's jurisdiction.

This is formalized in an Administrative Arrangement between the Republic of Congo (Ministry of Transport) and France (Ministry of Defense, supervision of the Shom) to be in accordance with the SOLAS convention.

Proposition

The co-publication of official nautical charts should continue with the current cartographic producer (France / Shom) for maritime navigation (SOLAS) while offering Congo the opportunity to gain autonomy.

Due to less significant regulatory constraints (standards, updating and dissemination), cartographic documents (geomatics) for various applications such as coastal development, environmental monitoring or specific “AEM” (state action at sea) maps can already be produced by Congo.

21 Summary of the assessment of national hydrographic capacities - Table

OHI IHO	CHAtO EAtHC	NHC CNHC	Phase 1 Capacity	Phase 2 Capacity	Phase 3 Capacity
NON Membre	Associated Membre	YES	YES for Harbour	YES for Harbour	NO (1)

(1) (1) Co-edition with France (Shom) as part of an administrative arrangement

FORMATION

22 Basic training of hydrographic technicians (not only!)

Initial training of hydrographers

There should be a pool of qualified hydrographic technicians in sufficient numbers. The recommended training is that offered by schools whose programs are approved by the FIG / IHO / ICA (International Federation of Surveyors, International Hydrographic Organization, International Cartographic Association) with Category B (CAT B). The practical training which complements the theoretical training of the schools will be, for port hydrographers, suitably 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

Point of contact at Shom: hydrographer Ronan Le Roy, head of the Shom's training division and director of education: drh-for-d@shom.fr.

This training at license level 3 is very demanding in terms of initial knowledge of 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 and on the coast. The CAT B hydrographers will be able on their return to their country to train the "hydrograph assistants" that the country needs ("CAT C").

Note - PAPN: within the framework of forecast management of staff and skills, it may already be envisaged to consolidate the hydrography and topography division of the PAPN by training an additional category B technician.

Note - Navy: depending on the part that the national navy wishes to play in the national hydrography, the training of a category B officer may be considered.

Initial training of "marine" cartographers

This is a fundamental topic as the country needs cartographic products and services to cover both sea and inland waters. It is moreover this "cartographic" desire that will generate data needs and therefore hydrographic surveys.

The progressive part that Congo will take in the production of nautical charts (therefore in connection with the Shom), its own capacity to produce sovereignty maps for AEM (boundaries included), the consolidation of the skills already acquired by the GIE-SCEVN in the IENC (Inland Electronic Navigational Chart) can only benefit from a solid training in cartography dedicated to maritime navigation (river included).

Category B (CAT B) training is recommended.

Shom's 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.

However, it should be noted that, unlike Shom's Category B approved hydrographer training, this cartographer training is not open every year but on an irregular basis depending on internal Shom needs.

Point of contact at Shom: hydrographer Ronan Le Roy, head of Shom's training division and director of education: drh-for-d@shom.fr.

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

To get a "good start" at the national level and have long-lasting skills, there is no escaping:

- a solid initial training (CAT B - Hydrographer). This is acquired for PAPN and could therefore be considered for the Navy;
- immediately followed by practice: be operational by conducting surveys immediately exploited by marine cartographers and environmental specialists;
- 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 in operational condition of equipment, IT (software, databases, webmaster, etc.). It should be noted here that this support function is not very different from that of a land surveyor or cartographer;
 - "Navigation" function: provision of boats for surveys 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) in project according to classic managerial practices (objectives, costs, deadlines);
 - it is therefore advisable to consider the development in a comprehensive manner which can be entrusted to the CNHC:
 - completeness of the needs (to be planned) to be satisfied (navigation, coastal development, coastal protection, etc.); Definition of the corresponding products (charts in particular);
 - identification of all stakeholders (public and private) who have an interest in cooperating to derive 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);
 - definition of onshore infrastructure;
 - definition of governance (supervision, contracts of objectives and resources, therefore funding, agreements);
 - definition of human resources needs in sufficient quantity and quality, all structures and all professions combined.

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

At the international level in hydrography

Il existe en réalité de très nombreuses opportunités et facilités pour entretenir ses connaissances en hydrographie. Encore faut-il les connaître et être encouragé à les suivre.

There are in fact many opportunities and facilities to maintain knowledge of hydrography. Still 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, there is a high-quality hydrography manual;
 - who organizes seminars. Those of EAtHC worth to be known. The next one will take place during the next EAtHC (17th) plenary in 2022 (September 2022) if possible face-to-face, probably in Cape Verde: <https://iho.int/en/eastern-atlantic-hc>
- Shom (<https://www.shom.fr/>) which in addition to the statutory training of its school also offers opportunities for training in tide gauges (<https://www.sonel.org/>);
- AFHy: Francophone Hydrography Association (<https://www.afhy.fr/>) where hydro-cartographers of ports and rivers can be found in particular.

Nota :

- Also follow the E-learning opportunities that will develop;
- There is a need for regional training schools (West and Central Africa) 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. They can be French-speaking 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 hydrographers training and approved 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) of Port Harcourt (Nigeria) ;
 - ARSTM (Académie Régionale des Sciences et Techniques de la Mer) of Abidjan (Côte d'Ivoire).

Universities

In addition to the “Oceanography and Application” master's degree from Cotonou in Benin (Universities of Abomey-Calavi and Toulouse) already followed by IRSEN researchers, it should be noted that the Omar Bongo University of Libreville (UOB) and the universities from Yaoundé (UY) and Douala (UDo) offer a regional master's degree in “integrated management of coastal and marine environments” (GIELM with which Ird, the Institute for Development Research is associated) which deals with hydro-oceanography topics . There is certainly a wealth of skills there to explore.

At the national level (Congo)

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

- qualified surveyors;
- remote sensing specialists (a method widely used in hydrography);
- professionals in GIS (Geographic Information Systems) (in support of the aforementioned professions);
- IT specialists skilled in databases and dissemination websites;
- 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 Congo 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 the 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 the risks incurred;
- 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 CNHC.

Participation in IHO meetings and more particularly in EAtHC meetings and seminars provides an opportunity to exchange views with counterparts from other coastal states of the Gulf of Guinea and West Africa.

Editor



Henri DOLOU

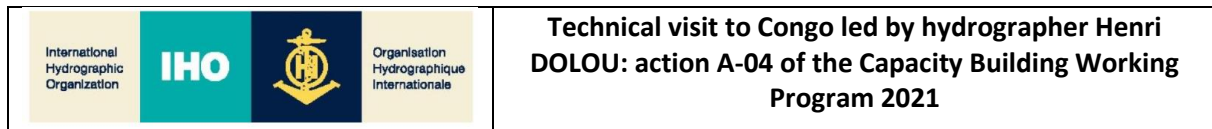
ANNEX

Annex A : Abbreviations

ARSTM	Académie Régionale des Sciences et Techniques de la Mer <i>Regional Academy of Marine Sciences and Techniques</i>
CATZOC	<i>Category Zone of Confidence</i>
CBSC	<i>Capacity Building Sub-Committee (IHO)</i> Sous-comité de renforcement des capacités
CBWP	<i>Capacity Building Work Programme(IHO)</i> Programme de travail de renforcement des capacités
CNHC	Commission Nationale d'Hydrographie et Cartographie marines
DIGEMAR	Direction Générale de la Marine Marchande
EAtHC CHAtO	<i>Eastern Atlantic Hydrographic Commission</i> Commission Hydrographique de l'Atlantique oriental
ECDIS	<i>Electronic Charts Display Information System</i>
ENC	<i>Electronic Navigational Chart (sea)</i> Carte électronique de navigation
IENC	<i>Inland ENC (rivers)</i>
FFEM	Fonds français pour l'environnement mondial <i>French Facility for Global Environment</i>
GIE-SCEVN	Groupement d'Intérêt Économique – Service Commun d'Entretien des voies navigables Congo – RCA (République centrafricaine)
GMDSS SMDSM	<i>Global Maritime Distress and Safety System</i> Système Mondial de Détresse et de Sécurité en Mer
IALA AISM	<i>International Association of Marine Aids to Navigation and Lighthouse Authorities</i> Association Internationale de Signalisation Maritime
IGN	Institut Géographique International
IHO OHI	<i>International Hydrographic Organization</i> Organisation Hydrographique Internationale
IMO OMI	<i>International Maritime Organization</i> Organisation Maritime Internationale
IOC COI	<i>Intergovernmental Oceanographic Commission</i> Commission Océanographique Intergouvernementale
IRSN	Institut national de Recherche en sciences exactes et naturelle
MSI RSM	<i>Maritime Safety Information</i> Renseignement de Sécurité Maritime
MTACMM	Ministère des transports de l'aviation civile et de la marine marchande
MN	Marine Nationale
MOWCA OMAOC	<i>Maritime Organization of West and Central Africa</i> Organisation Maritime de l'Afrique de l'Ouest et Centrale
MSDI	<i>Maritime Spatial Data Infrastructure</i> Infrastructures de données spatiales maritimes
NC CM	<u><i>Nautical Charts</i></u> Carte marine
NHC CNH	<i>National Hydrographic Committee</i> Comité National Hydrographique

NtMs	<i>Notice to Mariners</i> Avis aux navigateurs
PAPN	Port autonome de Pointe-Noire <i>Autonomous Port of Pointe-Noire</i>
PCA	<i>Primary Charting Authority</i> Autorité cartographique principale
RHC CHR	<i>Regional Hydrographic Commission (EAtHC)</i> Commission Hydrographique Régionale (CHAto)
SEPCIM AEMEC	Secrétariat Permanent du Comité Interministériel de l'Action de l'État en mer et dans les Eaux Continentales <i>Permanent Secretary of the Interministerial Committee for State Action at Sea and Continental waters</i>
Shom	Service hydrographique et océanographique de la marine (France) <i>French Hydrographic and Oceanographic Service (French national hydrographic office)</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 <i>WACA National Coastal Resilience Investment Project in West Africa</i>

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



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 : Reference texts

Note: this list (in French) is not exhaustive and does not include the texts of DIGEMAR in particular.

Textes de référence de la République du Congo (SEPCIM AEMEC, MTACMM)

Objet	Référence officielle
Présidence (Secrétariat général du gouvernement)	
Action de l'État en mer (AEMEC)	Décret N° 2019-125 du 3 mai 2019 portant organisation et coordination de l'action de l'Etat en mer et dans les eaux continentales
Action de l'État en mer Sécurité maritime (Diffusion de l'information nécessaire à la navigation : balisage, information nautique)	Décret N° 2020-436 du 1 octobre 2020 portant création, attributions et organisation du centre des opérations maritimes (Pointe-Noire)
Action de l'Etat dans les eaux continentales (Diffusion de l'information nécessaire à la navigation : balisage, information nautique)	Décret N° 2020-437 du 1 octobre 2020 portant création, attributions et organisation du centre des opérations fluviales de Brazzaville
Attributions, organisation et fonctionnement du SEPCIM AEMEC	Décret N°2021-489 du 15 novembre 2021
MTACMM	
Attribution du ministre des transports, de l'aviation civile et de la marine marchande	Décret N° 2021-335 du 6 juillet 2021
Mise en place de la commission nationale d'hydrographie et cartographie marines	Note de service n°21/-0279 /MTACMM/CAB du 14 octobre 2021

Texte de référence de la France (Shom)

Objet	Référence officielle
Ministère défense	
Arrangement Administratif Coopération en matière d'hydrographie d'océanographie et cartographie marine	Arrangement administratif bilatéral du 30 décembre 2011 entre le ministre de la défense et des anciens combattants de la République française et le ministre délégué auprès du Ministre d'Etat, ministre des transports, de l'aviation civile et de la marine marchande, chargé de la marine marchande, de la République du Congo (Brazzaville).

Annex D : List of main contacts - Telephones - Mails


Prénom NOM	Fonction	Tél (+242)	Mail
MTACMM Ministère des transports de l'aviation civile et de la marine marchande			
M Dieudonné TCHIKAYA	Directeur de Cabinet		mtacmmcabinet2021@gmail.com
Gaston MOMBO	Conseiller à la Marine Marchande		gmombo2017msa@gmail.com
Daniel NGANGA	Conseiller à l'Économie Portuaire du Ministre	06 510 79 00	daniel.nganga@yahoo.fr
Germain Aimervy Pierryl NGOUALA	Attaché Administratif et Juridique	06 994 88 42	germainngouala2014@gmail.com
Murcia Armel MAKAYA-KOKOLO	Attaché à la Marine Marchande Conseiller Adjoint de M MOMBO	06 514 15 15	armel_makk@hotmail.com
DIGEMAR Direction générale de la marine marchande			
Christian Armel NKOU	Directeur général de la marine marchande		armelnkou@gmail.com
Gérémy BOUGOUALE	Directeur de l'administration, des finances et des gens de mer	+242 05 557 12 92	geremybongouale@gmail.com
Médard NGOBO	Environnement		medardngobo@gmail.com
SEPCIM AEMEC Secrétariat Permanent du Comité Interministériel de l'AEMEC			
M Martin Parfait Aimé COUSSOUD-MAVOUNGOU	Secrétaire permanent du comité interministériel de l'action de l'État en mer et dans les eaux continentales		congosepcimaemec@gmail.com aimepcous@gmail.com
Jean-Claude GOUGONO	Directeur du cabinet		
GIE-SCEVN Service commun des voies navigables Congo - RCA			
Alexis DEKOÏSSET	Coordonnateur	+242055926218 / +242066740120	dekalex2002@yahoo.fr , dekalex2002@gmail.com
Levy AYISSOU	Chef de service hydrographique	(242) 05 536 21 59 (242) 06 993 51 39	levy_ayissou@yahoo.fr
PAPN Port Autonome de Pointe-Noire			
Séraphin BHALAT	Directeur général	+242 222940013	info@papn-cg.org
Bernard Serges César BOUYA	Directeur général adjoint	+242 05 554 47 47	elondzi@yahoo.fr
CV Wilfrid Brice NAHOUTOUMA SAMBA	Conseiller aux Opérations Maritimes (ancien Cdt du port)	+242 05 520 26 16 +242 06 663 56 35	nwilfrid@hotmail.com
Jean-Jacques MOMBO	Direction de l'Équipement et des infrastructures	+242 04 437 37 66	
Gaëtan MBAMA	Chef département Génie Maritime	+242 06 900 71 93	gaetanmbama@yahoo.fr

Winther-Grenier TCHISSAMBOU AMBANA	Chef de la division hydrographie et topographie	00 242 06 622 97 39	ambanawinther@gmail.com
CV Alain KOUA- NGOULHOUD	Directeur des Opérations Maritimes, Commandant du Port.	00242 066307176	alainknag@gmail.com
Ntetefoua Sylvestre Ludovic NTETEFUA	Chef de division signalisation maritime		ntetefouasylvestre@gmail.com
TATI	Chef des pilotes		
MN Marine Nationale BZV			
CV René NGANONGO	Chef d'état-major de la marine nationale congolaise (CEMMAR),	(+242) 06 666 54 60	marinenationalebrazzaville@gmail.com
CF Gilles Aubry	Conseiller du chef d'état- major de la marine nationale (Congo)	00 242 06 890 9047	aemcongobrazza@gmail.com
MN Marine Nationale PNR			
CV Jean Bruno NGOUONO	Commandant du 31 ^{ème} groupement naval Centre des Opérations Marines (COM)	00242 069122862	Ningo1966@yahoo.fr
IRSEN BZV Institut de Recherche en Sciences Exactes et Naturelles			
Joseph GOMA- TCHIMBAKALA	DG		
Jean DINGA	Chef du service Hydrologie et Océanologie	06 872 33 32	bvs_dinga@yahoo.fr
Jean Armand PAKA	Chef de brigade de service hydrologie-océanographie Zone de Brazzaville	06 650 65 67 05 568 25 88	
IRSEN PNR Institut de Recherche en Sciences Exactes et Naturelles			
Guy Blanchard DALLOU	Directeur zone IRSEN Pointe-Noire	06 44 86 554	dg_blanc@yahoo.fr
Prudence Dorelle LOEMBA	Attachée de recherche (Océanographie et applications)	06 623 14 00 05 361 26 52	dlprudence@gmail.com
Rodeline MPEMB- LI-MUVUNGU	Attachée de recherche (Météorologie)	06 530 22 68 05 752 51 29	Rodelinempemb.li@gmail.com
IGN Institut Géographique National			
Etienne PAKA	Directeur Général	06 670 48 03	pakaetienne65@gmail.com
TotalEnergies			
Parfait KOUTA	Chef de la division logistique	05 202 79 27	parfait.kouta@totalenergies.com
Perenco			
Jery BOUNGOU	Directeur QHSE	05 072 44 43	jbougou@cg.perenco.com
Roland KOUNKOUD	PFSO	05 601 84 15	rkoukoud@cg.perenco.com

Ambassade de	France	Brazzaville	06 511 8800
Monsieur Lionel VIGNACQ	Conseiller de coopération SCAC (service de coopération et d'action culturelle)	06 511 88 01	lionel.vignacq@diplomatie.gouv.fr
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Shom (OHI)	France	(+33)	
Henri DOLOU	Expert	(0) 6 86 15 14 82	henri.dolou@shom.fr
Julien SMEECKAERT	Chef de la division des relations extérieures	(0) 2 56 31 97 81 / (0) 6 03 20 13 77	dmi-rex-d@shom.fr julien.smeekaert@shom.fr
Pierre-Yves DUPUY	Directeur des missions institutionnelles et des relations internationales	(0) 2 56 31 24 04 (0) 6 38 78 59 55	pierre-yves.dupuy@shom.fr
Ronan Le Roy	Chef de la division formation / directeur de l'enseignement	(0) 2 56 31 24 09	ronan.le.roy@shom.fr
Eric MAUGER	Expert nautique Bureau Afrique	02 56 31 24 39	eric.mauger@shom.fr na-om@shom.fr
Amandine LEFRANCOIS	NAVAREA II	02 56 31 26 09	amandine.lefrancois@shom.fr

Annex E : Agenda – Events

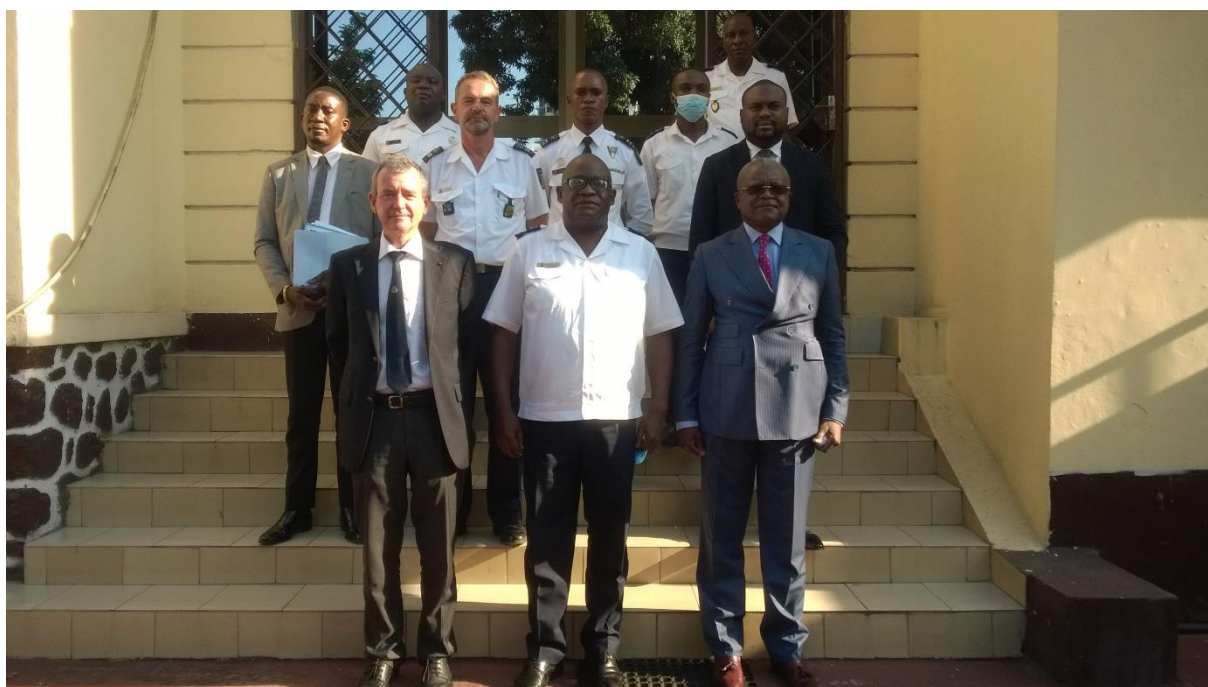
Object – Events	Observations
J1 : Sunday 14 November 2021 (Brazzaville)	
<ul style="list-style-type: none"> ➤ Arrival at Brazzaville airport of the IHO representative ➤ Welcome by MTACMM delegation 	Germain Aimervy Pierryl NGOUALA Murcia Armel MAKAYA-KOKOLO
J2 : Monday 15 November (Brazzaville)	
<ul style="list-style-type: none"> ➤ Reception by the Chief of Staff of the Minister of Transport, Civil Aviation and the Merchant Navy [MTACMM] ➤ Introduction by the Minister's Port Economy Advisor 	M Dieudonné TCHIKAYA Daniel NGANGA
<ul style="list-style-type: none"> ➤ Working session of the expert and members of the delegation by the Chief of Staff of the Navy [MN] 	CV René NGANONGO
J3 : Tuesday 16 November (Brazzaville)	
<ul style="list-style-type: none"> ➤ Interview with the Permanent Secretary of the Interministerial Committee for State Action at Sea and in Continental Waters [SEPCIM AEMEC] 	Monsieur le ministre délégué Martin Parfait Aimé COUSSOUD-MAVOUNGOU
<ul style="list-style-type: none"> ➤ Working session with the Economic Interest Group for the Congo-RCA Common Waterway Maintenance Service [GIE-SCEVN] 	Alexis DEKOÏSSET
J4 : Wednesday 17 November (Brazzaville)	
<ul style="list-style-type: none"> ➤ Working session with the Director General of the National Geographic Institute [IGN] 	Etienne PAKA
J5 : Thursday 18 November (Brazzaville and Pointe-Noire)	
<ul style="list-style-type: none"> ➤ Working session with the Director General of the National Institute for Research in Exact and Natural Sciences represented by Head of the Hydrology and Oceanology Department [IRSEN] 	Jean DINGA
<ul style="list-style-type: none"> ➤ Arrival in Pointe-Noire of the expert and the delegation 	
J6 : Friday 19 November (Pointe-Noire)	
<ul style="list-style-type: none"> ➤ Working session with the General Directorate of the Merchant Navy Welcome by the Director of Administration, Finance and Seafarers [DIGEMAR] 	Gérémy BOUGOUALE
<ul style="list-style-type: none"> ➤ Working session with the commanding officer of naval group N ° 31 - Operational Maritime Center of the Navy [MN] [COM] 	Jean Bruno NGOUONO
<ul style="list-style-type: none"> ➤ Reception by the Deputy Director General of Autonomous Port of Pointe-Noire [PAPN] 	Bernard Serges César BOUYA
Saturday 20 November (Pointe-Noire)	
<ul style="list-style-type: none"> ➤ Progress meeting 	Delegation
Sunday 21 November (Pointe-Noire)	
J7 : Monday 22 November (Pointe-Noire)	

<ul style="list-style-type: none"> ➤ Expert interview with the head of the Maritime Engineering Department representing the Director of Equipment and Infrastructures (Jean-Jacques MOMBO) [PAPN] 	Gaëtan MBAMA
<ul style="list-style-type: none"> ➤ Working session with the head of the hydrography and topography division [PAPN] 	Winther-Grenier TCHISSAMBOU AMBANA
<ul style="list-style-type: none"> ➤ Working session with the Head of Department of the National Institute for Research in Exact and Natural Sciences [IRSEN Pointe-Noire] 	Guy Blanchard DALLOU
J8 : Tuesday 23 November (Pointe-Noire)	
<ul style="list-style-type: none"> ➤ Reception of the expert by the Director General of PAPN [PAPN] 	Séraphin BHALAT
<ul style="list-style-type: none"> ➤ Interview of the expert with the head of piloting and the head of aids to navigation division [PAPN] 	Commandant TATI M Sylvestre NTETEFUA
<ul style="list-style-type: none"> ➤ Sea trip on <i>Tsieme</i> to the landing buoy  <p style="text-align: center;">[PAPN]</p>	
J9 : Wednesday 24 November (Pointe-Noire)	
<ul style="list-style-type: none"> ➤ Working session with TotalEnergies and PERENCO companies 	
<ul style="list-style-type: none"> ➤ Restitution de la mission de l'expert à la Direction Générale PAPN (conclusion et recommandation) suivi d'un apéritif ➤ Return of the expert's mission (conclusion and recommendation) followed by an aperitif <ul style="list-style-type: none"> ○ MTACMM delegation ○ DIGEMAR ○ Director of the Cabinet of SEPCIM AEMEC ○ National Navy ○ IRSEN ○ PAPN (Headmaster, Maritime Operations Advisor, Head of the Maritime Engineering Department, Head of the Hydrography Division, Head of the Maritime aids tonavigation Division) ○ Oil companies (TotalEnergies, Perenco) <p>[PAPN]</p>	Daniel NGANGA Germain Aimervy Pierryl NGOUALA Murcia Armel MAKAYA-KOKOLO Gérémy BOUGOUALE Jean-Claude GOUGONO Capitaine de frégate Prudence Dorelle LOEMBA Rodeline MPEMB-LI-MUVUNGU Alain KOUA-NGOULHOUD CV Wilfrid Brice NAHOUTOUMA SAMBA Gaëtan MBAMA Winther-Grenier TCHISSAMBOU AMBANA Ntetefoua Sylvestre Ludovic NTETEFUA Parfait KOUTA, Jery BOUNGOU
<ul style="list-style-type: none"> ➤ Departure from Pointe-Noire of the IHO representative 	

Annex F : Photos



**Le Ministère des transports, de l'aviation civile et de la marine marchande (MTACMM)
La délégation avec M Dieudonné TCHIKAYA Directeur de Cabinet du ministre
De gauche à droite : Germain Aimervy Pierryl NGOUALA, Murcia Armel MAKAYA-KOKOLO, Henri
DOLOU, Dieudonné TCHIKAYA, Daniel NGANGA**



**La Marine Nationale à Brazzaville
La délégation avec Chef d'état-major de la marine nationale congolaise (CEMMAR) le CV René
NGANONGO (premier rang au milieu)**



Secrétariat permanent du comité interministériel de l'action de l'État en mer et dans les eaux continentales (SEPCIM AEMEC)

La délégation avec M Le directeur de cabinet Jean-Claude GOUGONO (1^{er} à partir de la droite) et M le Ministre M Martin Parfait Aimé COUSSOUD-MAVOUNGOU (2^{ème} à partir de la droite)



Groupe d'Intérêt Économique - Service Commun d'Entretien des Voies navigables (GIE SCEVN)

La délégation avec le coordonnateur M Alexis DEKOÏSSET, (2^{ème} à partir de la gauche), le coordonnateur adjoint Georges ESSANGA (3^{ème} à partir de la droite) les hydro-cartographes Kévin OKAGNANGA (1^{er} à partir de la droite) et Grace BISSEMO (2^{ème} à partir de la droite)



Institut Géographique National IGN
La délégation avec M le Directeur Général M Etienne PAKA (3^{ème} à partir de la droite)



Institut de Recherche en Sciences Exactes et Naturelles sur Brazzaville (IRSEN)
La délégation avec le chef du service Hydrologie et Océanologie Jean DINGA (1^{er} à partir de la gauche)



**Direction Générale de la Marine Marchande (DIGEMAR)
La délégation avec M Directeur de l'administration, des finances et des gens de mer Gérémy
BOUGOUALE (4^{ème} à partir de la gauche)**



**La Marine Nationale à Pointe-Noire
La délégation avec le Commandant du 31^{ème} groupement naval CV Jean Bruno NGOUONO
(premier rang, 1^{er} à partir de la gauche)**



Port Autonome de Pointe-Noire (PAPN) Direction Générale
La délégation avec M Le Directeur Général Séraphin BHALAT (4^{ème} à partir de la gauche) et le
Conseiller aux Opérations Maritimes CV Wilfrid Brice NAHOUTOUMA SAMBA (2^{ème} à partir de
droite)



Port Autonome de Pointe-Noire (PAPN) Pilotage et Signalisation maritime
La délégation avec M TATI chef des pilotes (3^{ème} à partir de la gauche) et M Ntete foua Sylvestre
Ludovic NTETEFOUA chef de la signalisation maritime (1^{er} à partir de la gauche)



**Au PAPAN avec TotalEnergies et Perenco
M Parfait KOUTA, M Jery BOUNGOU, Roland KOUNKOU**



Au PAPAN Réunion de synthèse avec :
MTACMM (délégation), SEPCIM AEMEC (Directeur de cabinet, Jean-Claude GOUGONO)
DIGEMAR, IRSEN (Prudence Dorelle LOEMBA, Rodeline MPEMB-LI-MUVUNGU)
PAPAN : nombreux services, présence du chef de département Génie maritime Gaëtan MBAMA,
du Conseiller aux Opérations Maritimes CV Wilfrid Brice NAHOUTOUMA SAMBA et du
Commandant du port CV Alain KOUA-NGOULHOU
TotalEnergies et Perenco

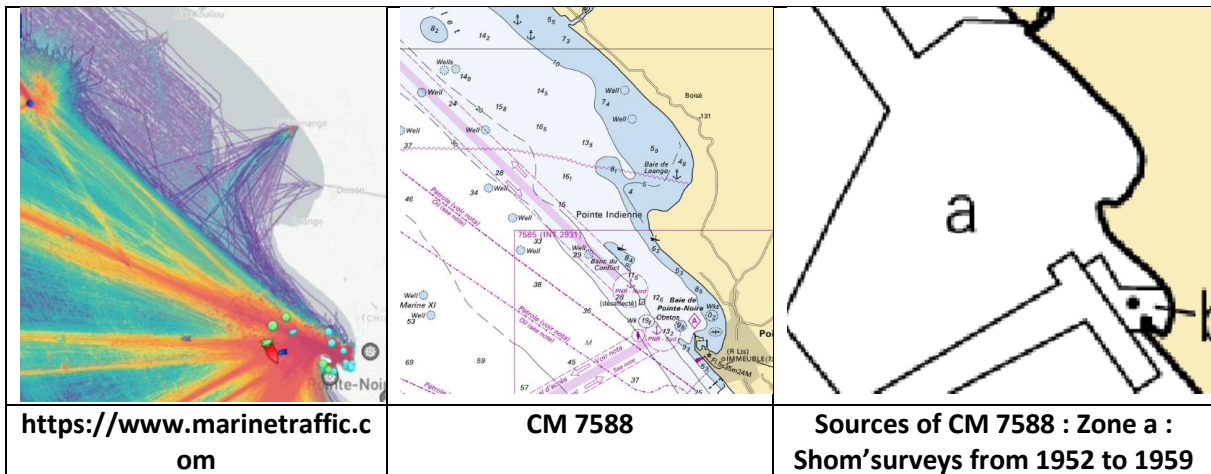
Annex G : Possible interdisciplinary projects

This appendix does not constitute a program of activities. It only offers suggestions of action to be consolidated and then led by the stakeholders of the CNHC.

1. Bathymetry: risk assessment in terms of cabotage

The first step would be to make sailors aware of the quality of the charts with regard to the routes followed. The superimposition of followed routes (AIS on Marinetrtraffic) on nautical charts (Shom, CM 7588), the quality of which can be assessed with the use of sources, would allow a first analysis.

Example in the north of Pointe-Noire (Baie Loango):



It would then be possible to specify and then carry out the hydrographic surveys necessary to update knowledge of the area (updating the nautical chart) by associating not only the sailors but also those responsible for the marine environment (in the example the Marine Protected Area).

2. Hydro-oceanographic survey of the Marine Protected Area (AMP) of Loango

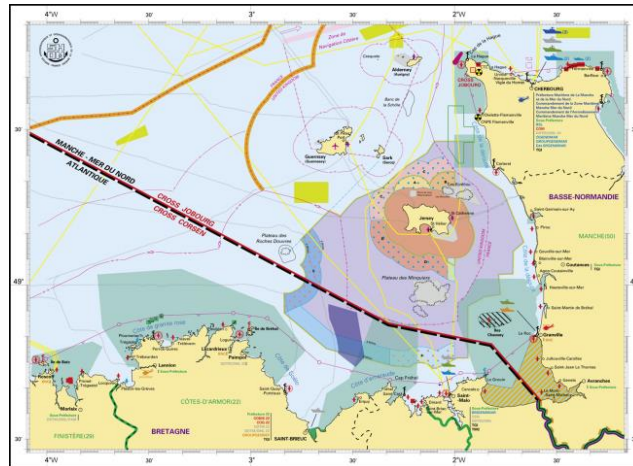
The example given above could go beyond a simple bathymetric survey to build a unifying multi-agency project around the Loango's AMP. It would then be a question of supplementing the bathymetry by a more complete georeferenced initial physical description without which it will not be possible to follow up and possible surveillance of the AMP's ecosystem: currents, physicochemical description of the water column, coastline / erosion. Nothing more promising (IRSEN very concerned) to "force" to acquire, qualify, manage data in shared databases and operate GIS (Geographic Information Systems).



Marine Protected Area of Loango

3. National Map of State Action at Sea

Continuing on from the previous project, the need for cartography arises. This cartography must be digital with georeferenced data (WGS84) usable by open source GIS (Geographic Information Systems) such as QGIS. These maps can target specific areas like the Loango's AMP. However, the country also needs a general "AEM" (Action Etat en Mer) map of its waters where all the sovereignty (eg EEZ) and regulatory limits can be drawn. SEPCIM AEMEC, the national border commission and the Navy need it.



Example of a French AEM map in the English Channel

4. Tide gauge

This is a major topic:

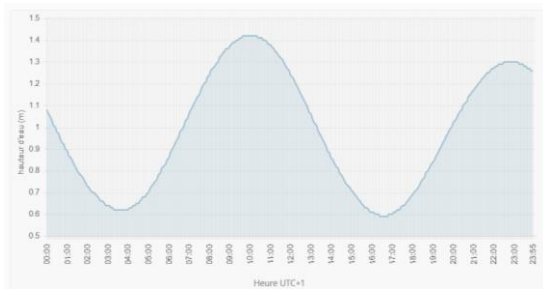
- because "IHO" standards applicable to hydrographic surveys in channels, recommended channels and port cannot be respected without observation of the tide.
- to financially optimize dredging.
- to prepare for future huge container ship the draft of which will approach the actual depths of the channel. Safety then also depends on the water levels observed in real time.
- for hydrodynamic studies (tidal currents) including those necessary for sediment transport or even marine pollution.
- for studies on climate change, in particular the rise in mean sea level

The acquisition of a new tide gauge at PAPN will help address this concern. It is recommended :

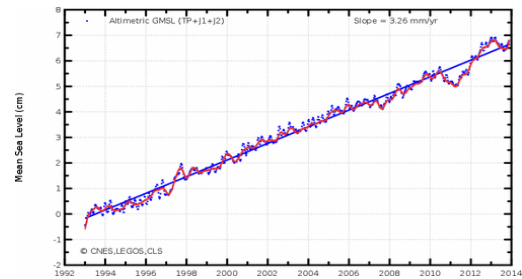
- to properly list the "functions / services" expected from users: hydrographers (accuracy), pilots (real time for port watch and PPU), oceanographers (databases)
- to involve from the design stage not only the users but also IGN, which will be able to provide its expertise (including linking the hydrographic zero to the general leveling) in terms of leveling and geodesy

Note: the acquisition of a new tide gauge must be accompanied by an inventory, recovery and then digital archiving of all the measurements that have already been carried out in Pointe-Noire. If these are old paper records their digitization should be considered. As a result, this is very structuring for the country, the constitution of the Congo tide gauge database on which many studies will depend not only on the rise in sea level but also all those relating to extreme weather-oceanographic events. (surges) that the country may suffer.

For the inventory, think not only of PAPN but also of IOC (Intergovernmental Oceanographic Commission).



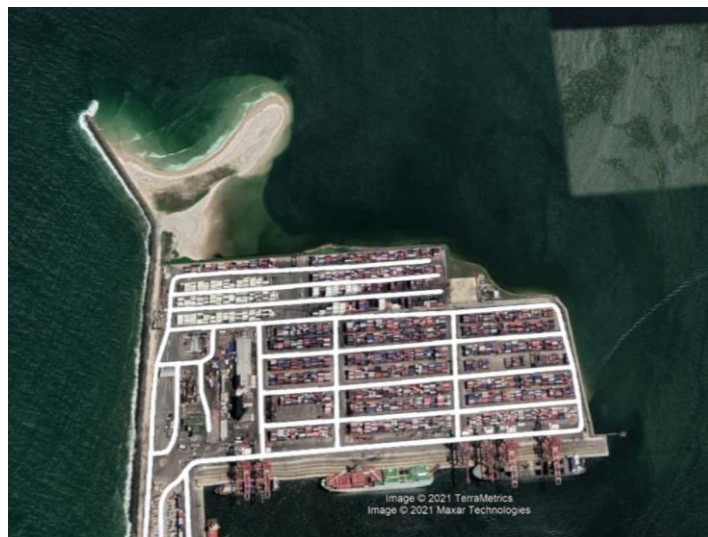
Tides in Pointe-Noire



General sea level rise

5. Modeling of sediment currents and transport in the vicinity of Pointe-Noire

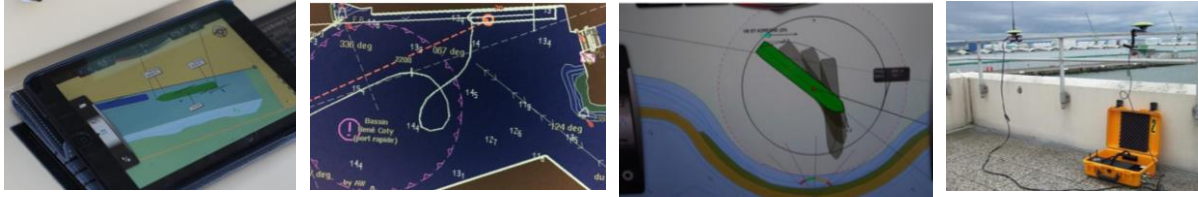
This is physical oceanography including the tide. The applications would be for PAPN which must control the depths of its channel and in general the operators needing to simulate the movements of water masses (eg in the event of pollution). It is certain that such models could explain the phenomena of accretions and erosions in the region.



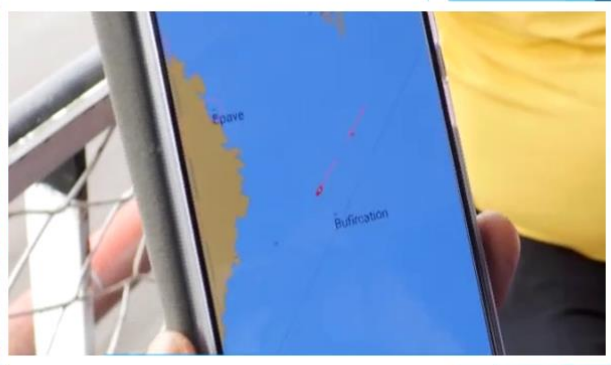
Sand trap - PAPN

6. Digital cartographies and visualization systems at sea and rivers

Controlled navigation now involves electronic navigation charts ENC (Electronic Navigational Chart) at sea and IENC (Inland ENC) in rivers. Coupled with a GPS, they must be able to be displayed on systems such as ECDIS (Electronic Charts Display Information System) at sea and Inland ECDIS on rivers. Shom produces the ENCs. The GIE-SCEVN has started to produce IENCs. Maritime pilots in Pointe-Noire will soon need specific very high definition digital cartography for the PAPN. Their display system will be a PPU (Portable Pilot Unit). These specific charts will have to be produced. It seems natural to bring together the PAPN (maritime) and the GIE-SCEVN (river).



PPU Source : <https://piloteslehavre.fr/materiel/positionnement-dgps/>



La réalisation des IENC par le Service hydrographique est une grande première au niveau de la sous-région. Plusieurs cours d'eau sont concernées comme c'est le cas des rivières Oubangui, Kasai et la Sangha.

Production of Inland electronic navigational charts (IENC) at GIE SCEVN