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for International Hydrographic Organization (IHO)

Proposal of Inland Water Project for African Countries & Recommendations on IHO Capacity Building Assessment

Zhiying Zhang

2nd year student in master course,
Graduate School of Public Policy,
The University of Tokyo

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ABSTRACT

The International Hydrographic Organization (IHO) is an intergovernmental organization that aims to ensure the oceans and navigable waters are properly surveyed and charted, coordinate the world's national hydrographic offices, and improve member states' hydrographic ability through capacity building programs.

This report introduces the results of two capacity building related research projects. The objective of each research project is to 1) propose a project concept for sustainable development of inland waterways in Africa and 2) recommend a better assessment procedure for the IHO capacity building programs. To achieve the first objective, the online research was carried out to investigate the current social issues and main challenges in sustainably managing inland water resources in Africa. For the second objective, the online research and face-to-face interviews were conducted to thoroughly study monitoring and evaluation methods for capacity building (CB) programs in the selected international organizations.

Project One: Proposal of Inland Water Project for African Countries

1 Introduction

Africa is facing severe challenges of various social issues, including rapid population growth, insufficient water supply, and inadequate water management system. These issues are included in the UN Sustainable Development Goals and aligned with the *2050 Africa's Integrated Maritime Strategy*. To solve these problems, the fundamental Spatial Data Infrastructure (SDI) needs to be developed. SDI refers to the technology, policies, standards, and human resources necessary to acquire, process, store, distribute, and improve utilization of geospatial data, services, and other digital resources (Hu & Li, 2017). Without the fundamental SDI, the member states' governments could hardly utilize the inland water resources. It is also difficult for the private sector to enter related industries.

To establish the fundamental SDI in the first place, a project concept requires to be developed for the sustainable use of inland waters in Africa that could be presented to donor agencies. This concept could then be developed into a formal project for funding. Therefore, the main objective of this study is to propose a formal concept of project for the sustainable development of inland waterways in Africa. Online research was conducted to investigate the current social issues and main challenges towards inland water resources in Africa.

This proposal was introduced at the UN-GGIM Working Group on Marine Geospatial Information (WGMGI2) meeting held in Rostock-Warnemünde, Germany, 26 (pm)-28 February 2020. (Detailed information about UN-GGIM use case proposal is in the appendix). And this proposal was selected during the meeting in February and will be eventually presented to the UN-GGIM meeting in New York in August 2020.

Results:

2 Social demands with inland water in Africa

In Africa, the volume and drainage area of inland water is massive. The total water volume is 30,572 km3 (≈ 2/5 Caspian Sea), total length is 31,452 km (≈ 3/4 earth's circumference), and total drainage area is 14,293,190 km^2 (≈ 1/2 Half of the entire size of Africa). Nevertheless, Africa is widely regarded as a place where people lack access to clean water resources due to inadequate water management and inland water transport is extremely inconvenient. Various social issues in Africa point to a need for better use of inland water resources. Here, four major social issues in Africa are addressed to discuss how they interlink one another and to show better inland water management can possibly solve these issues.

2.1 Rapid population growth and massive agricultural irrigation

About 12 million hectares of land becomes degraded each year in Africa. Droughts and floods are becoming more frequent and their scales are getting larger. Southern Africa has already lost 25% of its soil fertility. Furthermore, some countries on the continent have one of the highest population growth rates globally (The Conversation Report, 2018).

Good water management is among the most crucial factors for Africa to tackle the exsiting challenges. Water is essential for agriculture, which is the largest economic sector in Africa that accounts for 15% of total Gross Domestic Product (FAO, 2016). African countries must develop coherent and strategic policies around water, land, and agriculture.

This issue is aligned with the following UN Sustainable Development Goals:

Goal 1: No Poverty
Goal 2: Zero Hunger
Goal 3: Good Health and Well-being
Goal 6: Clean Water and Sanitation

2.2 Economic growth and increasing regional integration

Economic growth and increasing regional integration accelerate the use of logistics and transport services among African countries. However, container ports and hinterland transport networks in Africa are underdeveloped, and need to be supported with better infrastructure and services with improved performance to match international standards. The shipping connectivity, which significantly influences transport cost levels, is below the global average in Africa (UNCTAD, 2018). Inland water transport has the advantage of being energy-efficient, relatively safe, and environmentally friendly (UNESCO, 2009).

This issue is aligned with the following UN Sustainable Development Goals:

Goal 8: Decent Work and Economic Growth
Goal 9: Industry, Innovation, and Infrastructure
Goal 11: Sustainable Cities and Communities
Goal 13: Climate Action

2.3 Lack of clean water supply

Lack of access a clean water supply is one of the major challenge for both rural and urban communities in African. There are limited sources of water available to provide drinking

water to the entire population of Africa. Surface water sources are often highly polluted, and managing infrastructure to pipe water from fresh and clean water sources to arid areas is too costly.

Groundwater is the best source of clean water in the majority of areas in Africa. However, the high costs associated with drilling for water, and the technical challenges in finding sources that are large enough to serve the population in need present challenges that limit tapping the resource (The Water Project 2012).

This issue is aligned with the following UN Sustainable Development Goals:

Goal 3: Good Health and Well-being
Goal 6: Clean Water and Sanitation
Goal 11: Sustainable Cities and Communities
Goal 12: Responsible Consumption and Production
Goal 14: Life Below Water
Goal 15: Life on Land

2.4 Hydrological services in need of development for the tourism industry in Africa

As it is mentioned in the 2050 Africa's Integrated Maritime Strategy, tourism industry will be one of the most important engines of Africa's economic development (African Union, 2012). The goal of developing the tourism industry requires Africa's water resources to carry more populations. And a more convenient and safe inland transportation method remains to be developed, which raises the standard requirements for African oceanographic surveys and inland water transport. Sustainably managing hydrological services in the tourism industry and economy requires a water value chain approach, which means making full use of water resource cleanly, from sustainable water infrastructure design to water management practices in various tourism businesses. (Houdetm, Browne, Lewis, Canham, 2017).

This issue is aligned with the following UN Sustainable Development Goals:

Goal 8: Decent Work and Economic Growth
Goal 9: Industry, Innovation, and Infrastructure

3 Discussion on key challenges towards inland water resources in Africa

The problems listed below have led to the main current challenges of governments to manage inland water resources and the limited participation of the private sector (based on the information provided by Anthony Parker).

a) Lack of marine aids to navigation (lighthouses, lightships, beacons, buoys)
b) Outdated hydrographic surveys and navigational charts
c) Limited regional cooperation in spatial data infrastructures
d) Limited geospatial information management skills
e) Lack of budget and interest from ministries or governmental

If private companies want to establish a waterway-related business, they need to bear the high research costs. However, there is a lack of incentives and skills to build the data infrastructures as public goods, keeping the private sector away from this field. The insufficient participation of the private companies is mainly manifested in inadequate cargo handling equipment and other port facilities, poor supply chain of marine equipment and spares, and lack of search and rescue (SAR) infrastructure and salvage equipment.

The governments of African countries lack not only the financial resources necessary for establishing marine aids to navigation but also capabilities to conduct hydrographic surveys and update navigational charts. As lack of budget and policy focus from ministries or governments, high barriers and low incentives still remain for academy side collect hydrographic data and conduct related research.

Furthermore, there has been little regional cooperation between African countries to establish effective spacial data infrastructures. For these reasons, there is no safety guaranteed on most of the inland waterways in Africa and the governments cannot promote inland water transportation. As a result, other expensive and inefficient transportation methods have to be chosen, leading to a bad cycle.

4 Proposal

4.1 Open inland water geospatial information system in Africa

This proposal on sustainable use of inland water resources in Africa was developed to address the current social demands discussed above and describe the support system for safety and efficiency of inland water navigation, water management, and increased use of hydrographic data for the benefit of the Africa society. One of the key aspects of this concept

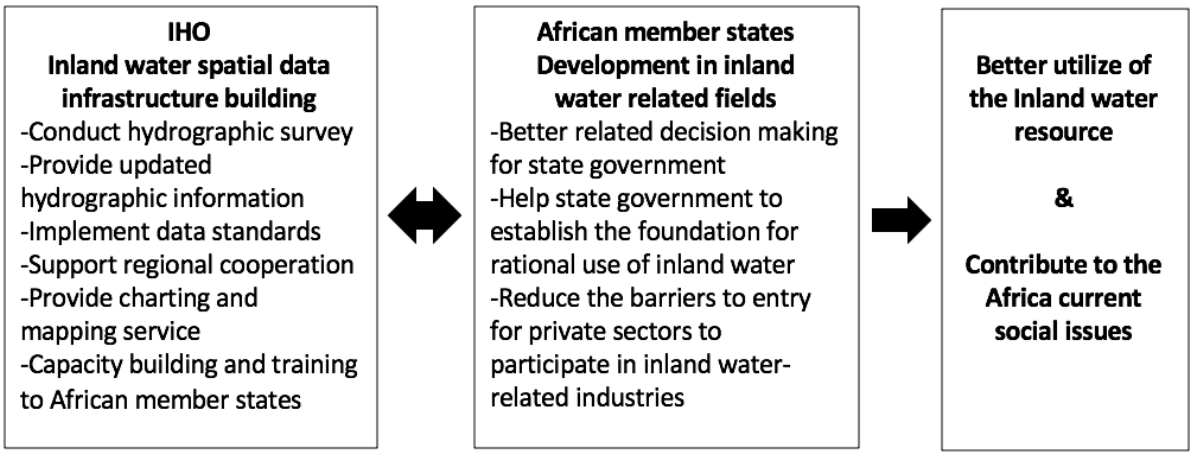
is to conduct modern hydrographic surveys in inland water to provide the updated infomation (including water depths, bathymetry data, and real time water level) for decision makers. Moreover, the important hydrographic elements such as capacity building, hydrographic surveys, charting, mapping, marine aids to navigation, environmental monitoring, and policy development are discussed in this proposal.

4.2 Operational Scenario

Figure 1 shows an operational scenario of inland water project in Africa. The detailed course of action by the IHO is as follows:

a) Implement a unified standard for hydrographic data, specifications, and guidlines in the areas of data assurance, including cyber security and data qulity assessment
b) Build a portal to support and promote regional cooperation in inland water spatial data infrastructures
c) Provide charting and mapping services, such as GIS map and MSDI (Maritime Spatial Data Infrastructure) map for African countries
d) Implement capacity building programs and trainings to develop the human resources (government regulatory or policy-making officers, port authority staff, and private sector operators) in African member states who can improve the use of inland water resources.

Figure. 1 The operational scenario of inland water project in Africa



First, the IHO is responsible for the development of a spatial data infrastructure for inland waterways in African regions by conducting hydrographic surveys, supporting regional

cooperation, implementing unified data standards, providing charting and mapping services, and carrying out capacity building programs and training courses.

Through this support system, inland water related fields could be developed in African member states, and various stakeholders could benefit from this data infrastructure. The state governments would be able to make proper decisions and establish the foundation for rational use of inland waters. The technical barriers for private companies to participate in inland water related industry could be reduced. By providing the fundamental hydrographic database and research materials for academia, more high-quality studies could be conducted in inland water related fields. Consequently, this project could promote better utilization of the inland water resource and thus contribute to the current social issues in Africa.

4.3 Monitoring & Evaluation Methods

Monitoring and impact evaluation should be formulated based on specific factors such as financial budget, human resources, and the number of participating African countries before the formal project is established.

Two possible evaluation methods are suggested for future reference. One is to conduct a quantitative impact analysis through data indicators, so that the macro social impacts of this inland water project can be observed and estimated. Another method is to conduct a qualitative assessment of the project through questionnaires to get practical feedbacks from the participating members.

4.3.1 Quantitative impact analysis using the indicators of SDGs

The macro social impacts of open inland water geospatial information system can be observed and estimated through a quantitative impact analysis using data indicators. The original intention of this project is to improve the urgent social issues in Africa, which are closely related to the UN Sustainable Development Goals. The positive social impact generated by implementing this project has helped to achieve some of the SDGs. As a result, the certain indicators of the SDGs can be utilized to measure the project performance. Goal 6 is a great example that can be used to measure the achievement of the project. (Reference of indicators: United Nations Economic and Social Council, Report of the Inter-Agency and Expert Group on Sustainable Development Goal Indicators, 2016)

Table 1: Quantitative impact analysis for inland water project in Africa using indicators for SDGs: Goal 6 Clean water and sanitation

African Country A	Before	Year 1	Year 2 ...	5 Years' improvement rate	
Goal 6. Clean Water and Sanitation					
Measurement Indicators					
6.1.1 Proportion of population using safely managed drinking water services					
6.2.1 Proportion of population using safely managed sanitation services, including a hand-washing facility with soap and water					
6.3.1 Proportion of wastewater safely treated					
6.3.2 Proportion of bodies of water with good ambient water quality					
6.4.1 Change in water-use efficiency over time					
6.4.2 Level of water stress: freshwater withdrawal as a proportion of available freshwater resources					
6.5.1 Degree of integrated water resources management implementation (0-100)					
6.5.2 Proportion of transboundary basin area with an operational arrangement for water cooperation					
6.6.1 Change in the extent of water-related ecosystems over time					
6.a.1 Amount of water- and sanitation-related official development assistance that is part of a government-coordinated spending plan					
6.b.1 Proportion of local administrative units with established and operational policies and procedures for participation of local communities in water and sanitation management					

These SDGs indicators will be measured, and the results will be submitted to the United Nations by the relevant government departments of member states every year. The IHO can use these submitted data without additional data collection.

4.3.2 Qualitative assessment using questionnaire

Although quantitative indicators are clear and convenient for overall assessment of the project, the overall social development is also affected by qualitative factors. It is difficult to grasp the actual situation and make an accurate conclusion on the project only with macro impact analysis. Therefore, the questionnaire survey for member countries and related industries is also crucial. By collecting qualitative data through this survey, the first-hand practical feedback and suggestions can be obtained, including the effects of the project on local communities and related industries, as well as the information on the satisfaction level and further demands toward the IHO’s information services.

5 Conclusion

By providing the fundamental hydrographic support through open inland water geospatial information system, the African governments can better establish the foundation for safe transportation and make proper decisions on the use of inland waterways. The technical barriers for private companies could also be reduced, providing opportunities for them to participate more in inland water related industry. Furthermore, this system can provide the fundamental hydrographic database and research materials for academia to conduct high-quality studies on inland water related fields. Through this project, the foundation of improving social demands related to inland water resource in Africa could be established.

Part Two: Recommendations on the IHO capacity building assessment

1 Introduction

The International Hydrographic Organization (IHO) assists member states in improving their ability to conduct hydrographic and cartographic activities and maintain maritime safety, by providing capacity building (CB) programs. The IHO offers various CB programs that meet diverse needs of its member states, including short- to long-term training courses, seminars, workshops, technical visits, and on-the-job and on-board trainings.

However, the IHO Capacity Building Program has some issues and challenges. Those include a lack of assessment implementation for CB programs, a lack of interest of member states in CB programs, and many other management issues. This report first summarizes the CB management system and general monitoring and evaluation (M&E) flow of other international organizations to identify key problems of the IHO capacity building assessment protocol. Finally, the recommendations for a better assessment procedure are proposed. The main research methods included face-to-face interviews with the IHO Capacity Building Sub-Committee (CBSC) staff and online research conducted on the websites of selected international organizations.

2 Results

2.1 Capacity building program and its monitoring and evaluation flow in other organizations

2.1.1 World Meteorological Organization

World Meteorological Organization (WMO) is a specialized agency of the United Nations whose main focus is on work of the National Meteorological and Hydrological Services (NMHSs). The Secretariat of WMO, headquartered in Geneva, has 301 Secretariat staff in total (as of 31 December 2017, according to the WMO official website).

In the *WMO Strategic Plan 2016–2019*, eight expected results are set for monitoring purpose, including "strengthened capacity development". This strategic plan also defines seven strategic priorities, and capacity development is one of them. WMO has a specialized team directly led by Secretariat General that is responsible for capacity development (WMO, 2016). For each expected result, key outcomes are set along with detailed key performance indicators (KPIs). The materials used to monitor and evaluate KPIs are based on data and information collected through annual questionnaires from the NMHSs of its member states (WMO, 2012).

2.1.2 International Maritime Organization

International Maritime Organization (IMO) is another United Nations specialized agency, which is responsible for managing the safety and security of shipping and preventing marine and atmospheric pollution. IMO is based in London with around 300 international staff (as of November 2017, according to the IMO official website).

IMO has established an Integrated Technical Cooperation Programme (ITCP) as the main body of its capacity building activities. ITCP aims to assist developing countries in building up their capacities for uniform and effective compliance with IMO's instruments. The monitoring and evaluation methods applied for ITCP include on-the-spot and ex-post evaluation, impact assessment exercise (IAE), and internal and external audit. On-the-spot evaluation collects first-hand event feedbacks by project leaders. Ex-post evaluation and internal audits are conducted by the Internal Oversight Section within IMO. Impact assessment exercise and external audits are conducted by external consultants and auditors. An IAE report is conducted every four years, providing an assessment of the impact on the beneficiaries of the assistance delivered through the ITCP and the Technical Cooperation Fund resources. Before each IAE, the core evaluation methodology and performance indicators are set and approved by the Technical Co-operation Division. The information used to measure those KPIs is collected through questionnaires and interviews (IMO, 2017).

2.1.3 Intergovernmental Oceanographic Commission of UNESCO

The Intergovernmental Oceanographic Commission of UNESCO (IOC-UNESCO) is a body with functional autonomy within UNESCO who specializes in ocean science and ocean and coastal management in the UN system. IOC Secretariat headquarters is located in Paris that comprises of 45 core staff, and other field staff are distributed on every continent (as of Match 2020, according to the IOC-UNESCO official website).

The IOC-UNESCO mainly provides short-term training courses and workshops. These capacity development programs aim to improve the scientific and technical capability of member states, to make the best use of marine technology and ocean research. The monitoring and assessment methods are interviews and online survey among the representatives of the selected IOC member states. The questions used in interviews and surveys are developed based on regional priorities that are identified by different IOC Sub-Commissions and relevant bodies.

2.1.4 International Association of Marine Aids to Navigation and Lighthouse Authorities

The International Association of Marine Aids to Navigation and Lighthouse Authorities (IALA) is a nonprofit international technical association. IALA brings together representatives of the aids to navigation services for technical coordination, information sharing, and coordination of improvements to aids to navigation throughout the world.

The IALA World-Wide Academy (WWA) is the training and capacity building tool that helps coastal states develop and reinforce their national and institutional capacity to deliver marine aids to navigation services to international standards. The Academy is governed by a board members, including 4 IALA staff. IALA WWA does not have a post-project assessment process, but it has the targeting process in advance. The Academy assesses the current state of all coastal states to determine which countries are in the greatest need of WWA support, and identify "Coastal States in Need". The material of target states analysis is based on whether this state is accepted by being a signatory to the SOLAS (Safety of Life at Sea) Convention[1]. In this way, IALA WWA can determine how the Academy's resources can best be allocated for reducing the number of Coastal States in Need over the next 5 years (IALA, 2016).

Although IALA is a rather small organization (around 23 core staff) compared to the other UN organizations, it actively coordinates and conducts joint capacity building projects with other organizations and supports United Nations Sustainable Development Goals.

2.2 General capacity building monitoring and evaluation flow in selected international organizations

The online research on the capacity building activities conducted by the other ocean related international organizations suggested that the general capacity building monitoring and evaluation flow can be divided into three main steps (Table 2).

Step one is to target priority regions and member states in advance, screen their capacity building activities, and adjust the activities plan. In step two, monitoring activities on CB programs are conducted, including gathering first-hand feedback and adjusting in real time. Finally, post evaluation is carried out in step three. For this step, necessary data and information are collected mainly through the questionnaires sent out to the member states in

[1] SOLAS Convention is an international maritime treaty which sets minimum safety standards in the construction, equipment, and operation of merchant ships.

order to conduct the assessment. Also, good practices and lessons learned are collected during this last step.

Table 2. General capacity building monitoring and evaluation flow in other international organizations.

General Capacity Building Monitoring& Evaluation Flow	
Steps	Detailed Actions
Step One **Targeting in advance**	- Target region and member states - Programs and activities screening - CB activities plan adjustment
Step Two **Monitoring in process**	- First-hand feedback - Real time adjustment - Data gathering
Step Three **Post Evaluation**	-Key Performance Indicators defination -Data and information gathering -Evalution and assessment -Good practices and lessons collection

3 Discussion on the key problems of the IHO CB assessment

3.1 Lack of assessment materials for post evaluation

The comparison of the CB monitoring and evaluation flow between the other selected organizations (Table 2) suggests that the post evaluation process in the IHO CB assessment is still underdeveloped. One of the main reasons is due to incomplete data collection for assessment. Although KPIs are formulated for the post evaluation of different projects, the final report submission by the project leader often gets delayed, and the quality of reports differ among the regions. The report submission rate for CB activities in 2019 is currently only 41.6% as of today (Among 12 CB activities implemented in 2019, 5 final reports were submitted), and most of them submitted by the Eastern Atlantic Hydrographic Commission (EAtHC). In addition, the reports are often written solely by the project leaders, so the quality and contents of the reports largely depends on the level of responsibility of the project leader.

3.2 Shortage of operational staff in IHO secretariat

The IHO is facing a shortage of operational staff who is in charge of capacity building management. The size of the organization in terms of the number of employees is very small,

and the number of staff responsible for CB program is even smaller (only 2 staff in charge as of today). Therefore implementing the capacity building program to all member states like the other large organizations do requires enormous efforts. It is almost impossible to add additional monitoring and evaluation tasks to the current responsible staff, since they already have too much workload towards CB program. Table 3 shows the comparison on the scale of organizations between the IHO and other ocean-related international organizations.

Table 3. Summary of the size of organization and responsible departments for capacity building programs for the IHO and other international organizations.

Organization	Number of staff members	Scale of organization*	Responsible department for CB programs
IHO	22	1	IHO Capacity Building Sub-Committee
IALA	23	1	IALA World-Wide Academy Board
IOC	45	2	Each program coordinator within IOC Secretariat
IMO	300	13.6	Internal Oversight Section & External Consultants
WMO	301	13.6	Specialized team led by Secretariat General

* Scale of organization is shown as a relative value when the number of the IHO staff members is considered as 1.

First, the size of the IHO is much smaller than WMO and IMO. It is not feasible for the IHO to set up a specialized team of more than 10 people for the capacity building program or hire external consultants for the follow-up assessment. Although the IOC is only twice as large as the IHO, they have UNESCO's support on the administrative operation for external auditing (IOC-UNESCO, 2016). IALA can be the best reference for IHO in terms of the scale of organization. However, the post evaluation process for IALA is also underdeveloped. In addition, it should be noted that the IALA WWA Board has 4 staff in charge which is twice as much as the IHO. Currently, the IHO CBSC has only two staff working (Assistant Directors Mr. Alberto COSTA NEVES and Ms. Sandrine BRUNEL) for the operations of Capacity Building program. Since Mr. Costa Neves is also responsible for many other works at the same time, the staff who is fully responsible for all the CB operation is only Ms. Brunel.

3.3 Insufficient awareness towards ocean and hydrography in member states

Through interviews with the IHO CB's responsible staff, Mr. Costa Neves and Ms. Brunel, the biggest problem in the current implementation of the CB program is lack of awareness towards ocean and hydrography in member states. Many states who are in the IHO CB

targeting list do not prioritize the development of their hydrographic ability. They tend to maintain the current status or rely on the hydrographic services provided by other nations with high hydrographic ability. However, the establishment of more dynamic and real-time GIS maps in the world's oceans as public goods requires all coastal states to have at least basic hydrographic capabilities. This will also promote better management of the ocean and the use of marine resources in member states.

Due to insufficient awareness, many of the IHO target states believe that they do not need to spend a lot of resources and budgets to develop hydrographic ability, thus preventing them from participating in the CB program and submitting questionnaires to the IHO. Under such a circumstance, it is hard to properly allocate the resources of the CB program to the most needed states. It also affects the subsequent CB evaluation and impact assessment.

4 Recommendations

4.1 Providing standard report format to project leaders

Regarding the low submission rate of final reports and the huge gap in the quality and contents of reports among regions, providing a standard final report format to project leaders could be a solution. First, a standard format that clearly shows what necessary information are required needs to be developed for each category of CB activities (including long course, short course, seminar, technical workshop, and on-the-job and onboard training). The use of a standard format can help project leaders quickly find the report and understand necessary information that needs to be filled in, thus making it easy for them to write and submit. A report template with a uniform format and content can greatly reduce the quality and content gap between project leaders. It can also help the IHO operational staff to manage the projects in a uniform way and easily classify the activities, thus reducing their workload.

This standard format mainly includes measurable performance indicators (quantitative) and project reflections (qualitative). The effective collection of both quantitative and qualitative data and information can greatly facilitate the development of the future evaluation and assessment. Also, good practices and lessons can also be collected and thus benefit the future CB activities.

In addition, a submission deadline should be set. For overdue submissions, a corresponding punishment mechanism can be set up, which could somehow relate to the financial reimbursement or the evaluation of application for next CB training project. Delayed submissions and low submission rate can be partially improved by doing so.

Tables 4 shows an example of a standard final report format for short courses (Standard final report format for all kinds of CB activities is available in Appendix).

Table 4. An example of a standard final report format for short courses.

Part 1: Basic Information	
1.	Project Number
2.	Project Name
3.	Project Leader
4.	Date of Start
5.	Date of Finish
6.	Instructors
7.	Instructional Support
8.	Opening Address
9.	Nationality of Participants(Countries)
10.	Language
11.	Cost

Part 2: Description	
1.	Introduction
2.	Objectives
3.	Project Content
4.	Financial issue
5.	Instruction
6.	Training Evaluation

Part 3: Assessment			
Each of the performance indicators indicated in the table is rated according to the scale provided: 0 = 0-20% 1 = 20-40% 2 = 40-60% 3 = 60-80% 4 = 80-90% 5 = 90-100%	**Performance indicator**	**Mark**	**Comments**
	-Arrangements		
	Organization of the project		
	-Involvement (contribution) of		
	National partners		
	Regional partners		
	RHC		
	IHO		
	-Efficiency of the project		
	Goals achieved		
	Planned timing		
	-Future perspectives		
	Need of similar projects (locally, regionally)		
	Impact on future development		
	-Procedure of CBSC		
	Application from		
	Support received		
	Follow up and reporting		

Part 4: Results	
1.	Results achieved (output, product,etc.)
2.	Comparison with the achievements and benefits awaited
3.	Problems and challenges experienced
4.	Suggestion for improvement for similar projects
5.	Suggestion for follow-up projects

Part 5: Annex files	
1.	List of participants and instructors
2.	Syllabus of programme
3.	Students Feedbacks
4.	Project finance report (Invoice, air-tickets, etc.)
5.	Photos
6.	Copy of Certificates
7.	Others

4.2 Simplification of existing procedures and implementation of digital CB management system

The current IHO Capacity Building Procedures include 12 steps in total (Table 5). Briefly, the project leader from member state government needs to submit the request of training support to the CBSC at first. Then the regional hydrographic commission and CBSC Secretary need to screen the request based on the draft management plan. And the performance assessment towards possible result of the project need to be conducted by CBSC. After approval by CBSC, the CB activity will be operated by project leader. The evaluation of CB activities and assessment of CB Phase Stage of Coastal States are assumed to be done after activities ending.

Several problems are considered to exist in current CB management process. First of all, it is clear that the CB Procedures have many steps that are hard to understand and operate. It is often difficult for both project leaders and the CBSC to accurately communicate based on these complex procedures, particularly they contact each other via emails. Also, the function of several procedures is repetitive to some extent (e.g. Procedure 2 and 4).

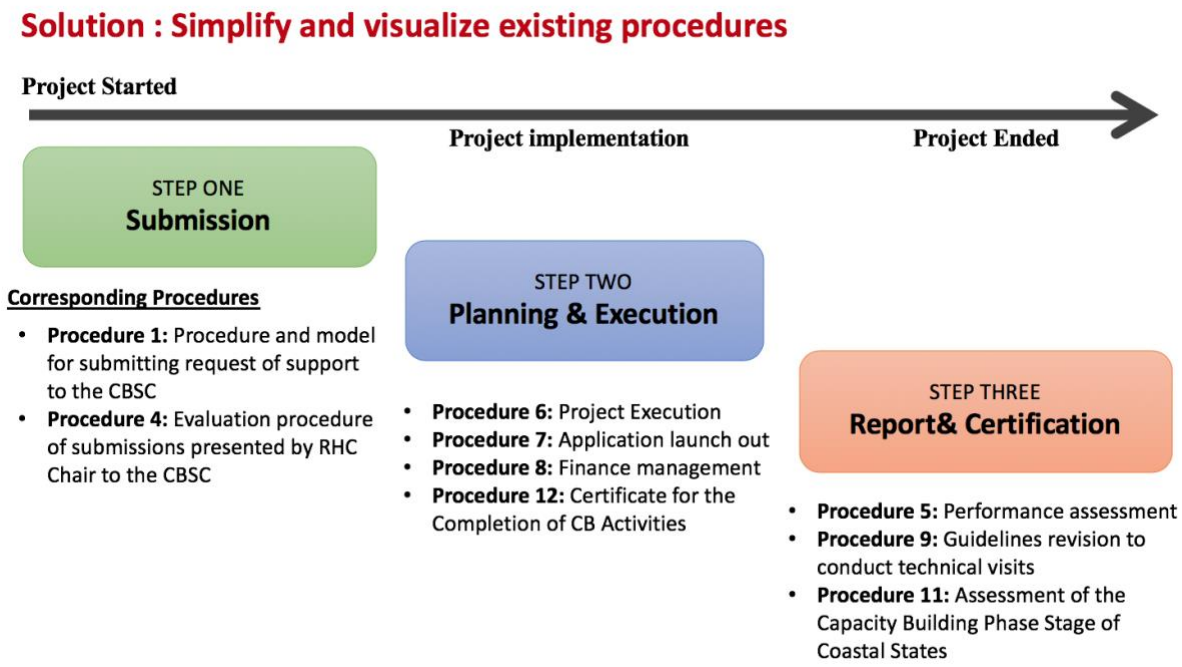
Table 5. The IHO's CB Procedures and management process (IHO website, CB procedures page)

IHO's CB Procedures and management processes

CB Procedures
Procedure 1: Procedure and model for submitting request of support to the CBSC
Procedure 2: Procedure to be followed by RHCs before submitting requests of support to the CBSC
Procedure 3: Reviewing process to be followed by the CBSC Secretary prior to include requuest in the draft management plan (In English only)
Procedure 4: Evaluation procedure of submissions presented by RHC Chair to the CBSC (In English only)
Procedure 5: Performance assessment (In English only)
Procedure 6: Project Execution (In English only)
Procedure 7: Application procedure (In English only) (Rev. 1)
Procedure 8: Finance management (In English only) (Rev. 2)
Procedure 9: Guidelines to conduct technical visits (In English only)
Procedure 10: CB Management Plan (In English only)
Procedure 11: Assessment of the Capacity Building Phase Stage of Coastal States (In English only)
Procedure 12: Certificate for the Completion of CB Activities (In English only)

Through the interviews with the IHO CB Assistant Ms. Sandrine Brunel, the current CB procedures could be simplified into three steps with detailed procedures within each step.

Figure 2. Simplified IHO CB procedures (created based on the interview with IHO CB Assistant Ms. Sandrine Brunel and the M&E methods in the other international organizations)



*Procedures 2, 3, and 10 may not be necessary for the project leaders.

Figure 2 shows three simplified steps that include submission, planning and execution, and report and certification. All steps clearly show what project managers need to do. First, they need to submit a request and draft management plan. Within this step, their submitted plan gets screened and evaluated by Regional Hydrographic Commission (RHC) and CBSC. The second step is to plan the activity more in details and execute it, which is fully responsible by the project leader. In the final step, the project leader is required to submit the final report that is filled with necessary information and data, whereas the CBSC staff need to conduct the project performance evaluation and assessment of the CB Phase Stage of Coastal States. [2]

Furthermore, the simplified and visualized procedures could be integrated with the digital CB management system that is currently under development. The followings are possible functions of the digital CB management system that are expected to achieve:

[2] Capacity Building Stage of Coastal States is a capacity building assessment model including three Phases of Development of Hydrographic Surveying and Nautical Charting Capability. The three phases are as follows: Phase 1 Collection and circulation of nautical information, Phase 2 Creation of a surveying capability to conduct including coastal and offshore projects, Phase 3 Produce paper charts, ENC and publications independently.

a) Simple and clear procedures for project leaders
b) Real-time status checking function for each step
c) Online questionnaire and report submission function
d) Effective background data collection and management system
e) Data analysis function with calculation formulas and models

The above suggestions aim to reduce the current workload of the IHO CBSC staff and improve the efficiency of timely communication among project leaders, member states and the IHO CBSC.

4.3 Development of collaborated programs with other organizations and expansion of IHO's CB resource

The coordination and cooperation among the Joint IHO-IMO-WMO-IOC-IALA-IAEA-FIG-IMPA Capacity Building Group need to be strengthened in the following decade. Strong networks among the organizations not only help to achieve the UN "Delivering As One" initiative for reducing the administration cost and workload for member states, but also implement joint projects with a focus on the UN Sustainable Development. In this way, the resources from the other organizations could be utilized on human, technical, and even funding resources of the IHO CB programs.

As a good example, the cooperation project between the IALA World-Wide Academy and IMO has a great reference value for the IHO capacity building programs. As part of the IMO's ongoing and increasing efforts to support UN Sustainable Development Goal 5 (Gender Quality), IMO's gender program has greatly supported the participation of women in IALA courses. This sponsorship is granted on a case to case basis where IMO covers the cost of return airfare, accommodation, and a daily expenditure (IALA, 2016).

In addition, through the projects closely linked with the UN strategy and SDGs, it is bound to increase the awareness of member states towards the importance in cultivating of talents and technical capabilities in the ocean and hydrographic fields. This is mainly because of the efforts and practical results made against the development goals proposed by UN, is a measure of national comprehensive governance indicators for each member country, especially for those developing countries that need international assistance. Those indicators play an important role in determining the amount and direction of aid in the next phase. Through the establishment of more joint CB projects, increased awareness of member states can be effectively achieved.

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APPENDIX

1. Requirements of use case proposal on open marine geospatial information at the UN-GGIM meeting

The United Nations Committee of Experts on Global Geospatial Information Management (UN-GGIM) is an initiative of the United Nations to foster the global development geospatial information.

Use Case on Open Marine Geospatial Information

Overview

The Working Group would like to produce a use case showing the benefits of open (readily available and accessible) marine geospatial information, including minimum standards needed for data. The use case will serve to identify trends, strengths, challenges, issues and possible solutions, providing a reference for Member States on the benefits of providing easy access to marine geospatial data and on the recommended data types to make available. The exercise below will gather information from participants on the practices, challenges and issues when providing open marine geospatial information. The findings from this exercise will help the Working Group to understand what challenges and issues to address and provide real-world examples of the benefits of and need for open marine geospatial information.

Use Case Exercise

Exercise Instructions

Below is a hypothetical scenario followed by five questions which are aimed at understanding the practices and challenges a jurisdiction faces when providing open marine geospatial information. As you answer the questions, assume you are the lead hydrographer or person responsible for hydrographic surveying of Country A. Also assume the legal and policy framework of Country A is identical to that of your jurisdiction. If in your jurisdiction you are not responsible for the decisions below, answer to the best of your knowledge within your jurisdiction's laws and policies. The scenario below is meant to provide a framework for thinking about the questions posed; however, the questions can be answered without the scenario.

Scenario

Country A is demolishing a large chemical storage facility on its coast. Country A needs to design protective measures if, during the demolition, toxic chemicals are leaked into Country A's coastal waters. The hydrographic office of Country A has been asked to provide geospatial data on those coastal and nearby inland waters, so that Country A can predict if the chemicals will reach and contaminate the inland water supply. There is also a possibility that chemicals released from the storage facility will reach inland waters of neighboring Country B. Currently, Country A has no agreement on sharing geospatial information with Country B.

Questions

1. How does your country organize and manage marine geospatial information (e.g., spatial data infrastructure)?

2. How are data added to or integrated with existing geospatial data, including land-based data?

3. How can or do you share and integrate your data with other national agencies?

4. Do you have any international, cross-agency, or non-governmental partnerships that facilitate the collection, sharing, and maintenance of data?

5. What legal and logistical barriers do you know of or foresee in using a multilateral approach to managing and sharing data (i.e., marine spatial data infrastructure)?

Responses

We thank you in advance for your contribution and please email your response to the questions above to:

Mr. John Nyberg
E-mail: john.nyberg@noaa.gov
Ms. Sasha Doss
E-mail: sdoss@lynkertech.com

2. Project proposal submitted and presented during UN-GGIM

UN-GGIM | United Nations Committee of Experts on Global Geospatial Information Management | Working Group on Marine Geospatial Information

Inland Water Project for African Countries

Summary:

Africa is facing severe challenge of various social issues, including rapid population growth, insufficient water supply, immature water management method… which are also related to the UN Sustainable Development Goals and align with the *2050 Africa's Integrated Maritime Strategy*. To solve those problems, the fundamental spatial data infrastructure is required, without it the member states government could hardly utilize the inland water resource, and it is also difficult for the private sector to enter related industries.

Social Issues in Africa

1. Population Growth and Massive agricultural irrigation needs

- About 12 million hectares of land becomes degraded each year. Droughts and floods are becoming more frequent and larger. Southern Africa has already lost 25% of its soil fertility. And some countries on the continent have some of the highest population growth rates globally[1].

- Good water management is among the most crucial factors for Africa to facethe exsiting challenges. if Africa is to navigate an uncertain future. Water is essential for agriculture. African countries must, as a matter of urgency, develop coherent and strategic policies around water, land and agriculture.

2.Marine Transportation and Social Development

- Demographic growth and regional integration of ports and hinterland access are required to expand maritime tool
- Africa's container ports and hinterland transport networks need to support these efforts by upgrading infrastructure and services, and improving performance, to match international standards.
- Shipping connectivity, which significantly influences transport cost levels, is below the global average in Africa.[2]
- Inland water transport has the advantage of being energy efficient, relatively safe, and environmentally friendly.

3. Rural and Urban water supply in Africa

- Africa faces huge challenges with multiple issues that adversely affect public health. One major challenge is the ability for both rural and urban Africans to access a clean water supply.

- There are limited sources of water available to provide drinking water to the entire population of Africa. Surface water sources are often highly polluted, and infrastructure to pipe water from fresh, clean sources to arid areas is too costly.

-Groundwater is the best resource to tap to provide clean water to the majority of areas in Africa. However, the high costs associated with drilling for water, and the technical challenges in finding

[1] The Conversation Report, *How Africa can up its game on water management for agriculture*, Aug 2018
[2] UNCTAD/PRESS/IN/2018/006, *Maritime trade and Africa,* 2018

sources that are large enough to serve the population in need, present challenges that limit tapping the resource[3].

4. Reservoirs& Dams Development and Management

-More than 60 large dams are under construction or planned in Africa, including at least 39 in West Africa[4].

-Knowledge and Good practices for the management of major water infrastructures in West Africa required. And it is necessary to collaborate between multi-counties and share the benefits of large dams in West Africa.

5. The inland water related tourism industry

-Sustainably managing hydrological services in the tourism industry and economy requires a water value chain approach:

i.e. water source area stewardship, sustainable water infrastructure design and management, sustainable water use / management practices in various tourism businesses and water ecological infrastructure stewardship at tourism assets / destinations. [5]

***Scale of the inland water in Africa: Large volume and Drainage area**

Total water volume: 30,572 km3 (≈ 2/5 Caspian Sea)

Total length: 31,452 km (≈ 3/4 earth's circumference)

Total drainage area: 14,293,190 km2 (≈ 1/2 Half of the entire size of Africa)

Current Challenges

- Lack of Aids to Navigation (lighthouses, lightships, beacons, buoys)
- Outdated hydrographic surveys and navigational charts
- Limited regional cooperation in special data infrastructures
- Limited geospatial information management skills

The above problems have led to the current inability of governments in managing inland water resource, and the limited participation of private sector.

If **private companies** want to establish a waterway-related business, they need to bear high research costs. And they are lack of incentives and professional abilities to build the data infrastructures as

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[3] The Water Project, *Rural and urban water issues in Africa*, 2012

[4] International Institute for Environment and Development (UK), *Sharing the benefits of large dams in West Africa,* 2009

[5] Houbet, J.,Browne,M.,Lewis, F. *The Inland Water Related Tourism in South Africa by 2030 in the light of global change. Report to the Water Research Commission,* 2017

public goods, which making the private sector stay away from this field. The insufficient participation of private companies is mainly manifested as: inadequate cargo handling and other facilities at ports; poor supply chain of marine equipment and spares; lack of search and rescue (SAR) and salvage equipment;

The governments of African countries lack the financial resources of Aids to Navigation, and the lack of regulating and research capabilities to update hydrographic survey and navigation charts implement, and there is no practical regional cooperation between countries to establish effective spacial data infrastructures. For these reasons, there is no safety guarantee on most of the inland water shipping routes, so the government cannot promote inland water transportation. As a result, other more expensive and inefficient transportation methods have to be chosen. It's a bad cycle.

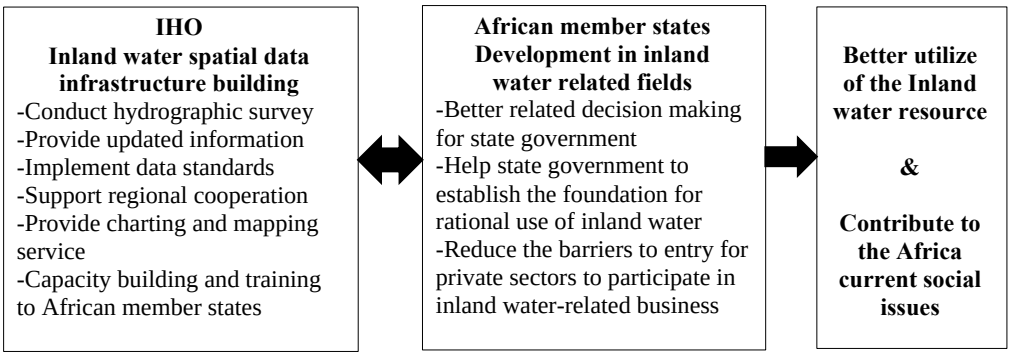
Solution: Open inland water geospatial information in Africa

The **mission** of this concept paper is to address hydrographic support for safety and efficiency of inland water navigation, water management, and increasing the use of hydrographic data for the benefit of Africa society. Focus on capacity building; surveys; charting; mapping; aids to navigation; environmental monitoring; policy development, and the detailed actions could be as follows:

- One of the key aspects of this concept paper is to conduct modern hydrographic survey of inland water areas to provide the updated infomation (including water depths, bathymetry data, real time water level) for decision makers;

- Implement standards for hydrographic data, specifications and guidlines in the areas of data assurance, including cyber security and data qulity assessment
- Build a portal to support and promote regional cooperation in inland water spatial data infrastructures aligned to the UN-GGIM/IFGI
- Provide charting and mapping service
- Use capacity building and training to develop and increase the ability of African member states to improve the capacity of government regulatory/policy-making officers, port authority staff, and private sector operators ...

Scenario:



Providing these fundemental hyfrographic support through the inland water project **helps governments to establish the foundation** for safe transportation and rational use of inland waters, and also **reduces the barriers to entry for private sectors** to participate in inland water-related business. Thereby the inland water resources could be better utilized, and society demands mentioned above could be better achieved.

3. Standard final report format for all kinds of course

CB Standard Report for Long Course

Basic Information

1 Title of the course:
2 Host Country:
3 Venue and dates:
4 Organized by:
5 Supported by:
6 Participants:

Summary Report

Disbursement of funds

Participants:

1 Information of candidates prior to attending course
2 Information of candidates after attending course

Feedback from participants(example questions):

1 How have you made a difference in improving hydrography and nautical charting in your country? Has the course influenced said imp
2 Do you perceive that the course will help your career?
3 What changes would you make to the programme?
4 How can the faculty team assist you in improving hydrography in your country?

Assessment

Each of the performance indicators indicated in the table is rated according to the scale provided:
0 = 0-20%
1 = 20-40%
2 = 40-60%
3 = 60-80%
4 = 80-90%
5 = 90-100%

Performance indicator	Mark	Comments
-Arrangements		
Organization of the project		
-Involvement (contribution) of		
National partners		
Regional partners		
RHC		
IHO		
-Efficiency of the project		
Goals achieved		
Planned timing		
-Future perspectives		
Need of similar projects (locally, regionally)		
Impact on future development		
-Procedure of CBSC		
Application from		
Support received		
Follow up and reporting		

Results:

1 Results achieved (output, product,etc.)
2 Comparison with the achievements and benefits awaited
3 Problems and challenges experienced
4 Suggestion for improvement for similar courses
5 Suggestion for follow-up projects

Annex:

including:
List of participants and instructors
Syllabus of programme
Students Feedbacks
Project finance report (Invoice, air-tickets, etc.)
Photos
Others

CB Standard Report for Short Course

Basic Infomation

1 Project Number
2 Project Name
3 Project Leader
4 Date of Start
5 Date of Finish
6 Instructors
7 Instructional Support
8 Opening Address
9 Nationality of Participants(Countries)
10 Langeuage
11 Cost

Description

1 Introduction
2 Objectives
3 Project Content
4 Financial issue
5 Instruction
6 Training Evaluation

Assessment

Each of the performance indicators indicated in the table is rated according to the scale provided:
0 = 0-20%
1 = 20-40%
2 = 40-60%
3 = 60-80%
4 = 80-90%
5 = 90-100%

Performance indicator	Mark	Comments
-Arrangements		
Organization of the project		
-Involvement (contribution) of		
National partners		
Regional partners		
RHC		
IHO		
-Efficiency of the project		
Goals achieved		
Planned timing		
-Future perspectives		
Need of similar projects (locally, regionally)		
Impact on future development		
-Procedure of CBSC		
Application from		
Support received		
Follow up and reporting		

Results

1 Results achieved (output, product,etc.)
2 Comparison with the achievements and benefits awaited
3 Problems and challenges experienced
4 Suggestion for improvement for similar projects
5 Suggestion for follow-up projects

Annex files

including:
List of participants and instructors
Syllabus of programme
Students Feedbacks
Project finance report (Invoice, air-tickets, etc.)
Photos
Copy of Certificates
Others

CB Standard Report for Seminar

Basic Information

1. Seminar Title
2. Project Leader
3. Date
4. Location

Description

1. Outline
2. Objectives
3. Session Information(lecturers, main content, activities,time length...)

Results

1. Principal conclusions and outcomes
2. Comparison with outcomes awaited
3. Problems and challenges experienced
4. Suggestion for improvement for similar events
5. Suggestion for follow-up steps

Annex

including:

- Seminar detailed schedule
- List of participants
- List of observers
- List of Lecturers
- Photos
- Seminar finance report
- Others

CB Standard Report for Technical Workshop

Basic Information

1. Course
2. Venue and dates
3. Address
4. Instructor
5. Instructional support
6. Administrative support
7. Participants

Summary

Objectives

Workshop Content

Feedback

Annex

including:

- Workshop detailed schedule
- List of participants
- Photos
- Workshop finance report
- Others

CB Standard Report for On-the-job Training& On-board Training

Basic Information

1 Reference
2 Venues and dates
3 Additional Information

Summary

Objectives

Brief Content

Feedback

Results

Annex

including:
- Detailed schedule
- Finance report
- Photos
- Others