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(Of UNESCO)

Seventeenth Intergovernmental Session of the UNESCO-IOC Sub- commission for the Caribbean and Adjacent Regions (IOCARIBE)
(May 8 – 11, 2023)

Agenda Item: 4.6

IOCARIBE MEDIUM-TERM STRATEGIC SCIENCE PLAN (2023–2029)

The present IOCARIBE Medium-Term Strategic Science Plan (2023-2029) is an updated version of the IOCARIBE Medium-Term Strategic Science Plan (2017-2026) to be aligned with the recently adopted IOC Medium Term Strategy (2022-2029) and the UN Decade of Ocean Sciences for Sustainable Development (2021-2030), and in response to IOC Resolution XXVIII-2 "IOC Capacity Development Strategy 2015–2021" (IOC, 2015).

The Science Plan takes into consideration the IOCARIBE Medium-Term Strategic Science Plan 2005-2015 (IOCARIBE 2006), IOCARIBE Medium Term Strategic Science Plan (2017-2026) (IOCARIBE, 2016), IOC Medium-Term Strategy 2014-2021 (IOC, 2014), IOC Resolution XXVIII-2 "IOC Capacity Development Strategy 2015–2021" (IOC, 2015), and the IOC Capacity Development Strategy 2015- 2021 (IOC, 2015).

The objectives of the IOCARIBE Medium-Term Strategic Science Plan are to

- assist the continental coastal Latin-American and the Caribbean SIDS Member States to achieve sustainable use of the ocean and coastal resources;
- strengthen scientific basis supporting regional programmes;
- Support strategic planning of IOCARIBE Member States for the implementation of the IOC Global Programmes in the Region - IOCARIBE Regional Programmes;
- Facilitate a coherent management of regional programmes related to the marine-coastal environment and its resources.

IOCARIBE Sciences Plan is focused on five thematic programme areas following the IOC Medium-Term Strategy 2022-2029: i) Healthy ocean ecosystems and sustained ecosystem services; ii) Effective early warning systems and preparedness for tsunamis and other ocean-related hazards; iii) Increased resilience and adaptation to climate change and variability; iv) Scientifically-founded services for the development of the sustainable ocean economy; Enhanced knowledge of emerging ocean science issues.

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EXECUTIVE SUMMARY

The IOCARIBE Medium-Term Strategic Science Plan (SSP) (2023-2029) has been developed as a response to IOC Resolution XXVIII-2 "IOC Capacity Development Strategy 2015–2021" (UNESCO, 2016), the IOC Medium-Term Strategy, 2022-2029, adopted by Resolution A-31/2 of the IOC Assembly at its 31st Session, and UNESCO Medium-Term Strategy (41C/4) when adopted at the 41th session of the General Conference of UNESCO.

The IOC, established in 1960 as a body with functional autonomy within UNESCO, is the only competent organization for marine science within the UN system. In addition, IOC is recognized through the United Nations Convention on the Law of the Sea (UNCLOS) as the competent international organization in the fields of Marine Scientific Research (Part XIII) and Transfer of Marine Technology (Part XIV).

The IOC Medium-Term Strategy (MTS) 2022-2029 is derived from a vision guiding the high-level objectives, programmes, and also actions and activities to be detailed in each subsequent biennial programme and budget. The strategy including its objectives will also fulfil IOC's role in UNESCO and contribute to the relevant UNESCO Thematic areas of expected results, as reflected in the UNESCO Medium-Term Strategy (41C/4)

The Science Plan takes into consideration IOCARIBE Medium Term Strategic Science Plan 2005-2015, IOC Medium-Term Strategy 2014-2021 and 2022-2029 (IOCARIBE, 2016), the IOC Capacity Development Strategy 2015- 2021, the UN Decade of Ocean Science for Sustainable Development (2021-2030), and the regional science priorities identified during the WTA-Ocean Decade virtual meeting (April, 2020), the WTA Regional Workshops series (April-September 2021) and the TAC Regional Ocean Decade Kick-Off Conference (December 2021), the Capacity Development Survey (2020) and the findings of the Global Sciences Report 2017, and 2020.

IOCARIBE Sciences Plan is focused on five thematic programme areas following the IOC Medium-Term Strategy 2022-2029:

i) Healthy ocean ecosystems and sustained ecosystem services
ii) Effective early warning systems and preparedness for tsunamis and other ocean-related hazards
iii) Increased resilience and adaptation to climate change and variability
iv) Scientifically-founded services for the development of the sustainable ocean economy
v) Enhanced knowledge of emerging ocean science issues

The objectives of the IOCARIBE Medium-Term Strategic Science Plan are to:

- to assist the continental coastal Latin-American and the Caribbean SIDS Member States to achieve sustainable use of the ocean and coastal resources
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- Facilitate a coherent management of regional programmes related to the marine-coastal environment and its resources.

The IOCARIBE SSP is directed to the following users:

- IOCARIBE Secretariat.
- IOCARIBE Board of Officers.
- IOC Section, Programme and Project Leads
- Member States managers and decision makers working in ocean sciences and technology.
- The regional scientific community and regional organizations
- Donor organizations.
- Other United Nations agencies, Intergovernmental Organizations and Non-Governmental Organizations.

1.1 INTRODUCTION

The Strategic Science Plan (SSP) for IOCARIBE must become a system which permits the application of strategic planning to its daily work plan, creates policies, strengthen cooperation, identify needs, facilitates filling-in gaps and addresses national and regional needs related to the marine-coastal issues.

In 2017 the UN General Assembly adopted the UN Decade of Ocean Science for Sustainable Development (2021-2030) (The Decade) that represents a unique opportunity in a generation to reach the "Ocean We Need for the Future We Want." In 2021, IOCARIBE conducted a desk study to prepare Regional Ocean Decade actions. The work was consolidated in a report, which includes information on the Region's state of the art, helps to understand regional identified challenges, needs, gaps and priorities, and establishes the way forward. The desk study report also includes the Inventory of Regional Programme Activities, which consists of a consolidated list of regional activities led, endorsed, or supported by IOCARIBE during the inter-sessional period.

Overall, there is a need for strengthening the role of science within the region, overcoming geopolitical and economic diversity, promoting cooperation and networking, creating solutions to effectively share data and making ocean knowledge accessible for all. The research helped to understand the region's priorities, e.g., promote a sustainable region-wide network of ocean and coastal observation, and enhance and promote technology and data transfer, capacity development and ocean literacy.

The region is committed to leaving no one behind, encouraging the inclusion of early career professionals, women, local communities, end users and indigenous knowledge holders in ocean initiatives. The SSP is thus a relevant system to help address IOCARIBE Region priorities and overcome the identified challenges.

By following the SSP, IOCARIBE will assist Member States in achieving sustainable use of the ocean and coastal zone and its resources. It should facilitate the scientific community in reducing scientific uncertainties, including those due to climate change. At the same time, the SSP should effectively encourage the adoption of pertinent measures for reducing human and material losses associated with the increased frequency of extreme ocean and meteorological hazards.

The IOCARIBE SSP must consider specifically the real and/or functional insular condition of the majority of the countries of the region which demands that the strengthening of the ocean sciences be directed towards the improvement of its scientific basis.

Another relevant aspect to be considered in the SSP is the existing synergy between science and technology. Science being considered as the knowledge acquired through observations and experiments proved objectively, systematized and based on general principles; and technology, as the use of this knowledge for the production of goods and services with the

main purpose of satisfying the needs of society. The advance of current technology is supported in science. Science, on the other hand, benefits from the development of technology with its new experimental means and observational tools.

The development of any science branch requires two main elements, societal demands or needs for results of a particular type, and financial resources invested in this science by society for satisfying their needs.

The IOC Medium-Term strategy (IOC, 2022) stresses the "realization that building regional know how is essential for facilitating solving the economic and social problems" facing people living in the coastal zone depending on the oceans for their wellbeing and at risk to ocean-related disasters. IOC Capacity Development Strategy (IOC UNESCO, 2016) also stress the leadership of the regions. Thus, IOCARIBE as the IOC Subcommission for the Caribbean and Adjacent Regions will carry out this effort by implementing IOC Global programmes regionally and assisting Member States in achieving sustainable use of the coastal zone and its resources (United Nations Sustainable Development Goal 14) (United Nations, 2015). It will facilitate the scientific community in providing the scientific base for sound management and policy decisions and being a catalyst for reducing scientific uncertainties, including those due to climate change. At the same time IOCARIBE will effectively encourage the adoption of pertinent measures for reducing human and material losses associated with the increased frequency of extreme ocean and meteorological hazards. The proposed approach will prioritize a regional approach, fostering strong collaboration with other organizations and entities. This strategic plan outlines IOCARIBE's roadmap for its work during the period of 2023-2029.

1.2 IOC AND IOCARIBE ROLE

The Intergovernmental Oceanographic Commission (IOC) of UNESCO was established in December 1960. The purpose of the Commission is to promote international cooperation and to coordinate programmes in research, services and capacity development, in order to learn more about the nature and resources of the ocean and coastal areas and to apply that knowledge for the improvement of management, sustainable development, the protection of the marine environment, and the decision-making processes of its Member States; and IOC will collaborate with international organizations concerned with the work of the Commission, and especially with those organizations of the United Nations System which are willing and prepared to contribute to the purpose and functions of the Commission and/or to seek advice and cooperation in the field of ocean and coastal area scientific research, related services and capacity development (Article 2 of IOC Status)

The IOC of UNESCO is the only competent organization for marine science within the UN system. In addition, IOC is recognized through the United Nations Convention on the Law of the Sea (UNCLOS) as the competent international organization in the fields of Marine Scientific Research (Part XIII) and Transfer of Marine Technology (Part XIV).

The IOC Sub-Commission for the Caribbean and Adjacent Regions (IOCARIBE) is a regional subsidiary body of the Intergovernmental Oceanographic Commission (IOC) of UNESCO

established in 1982 and with 32 Member States and 15 Territories. As a Regional Sub-Commission of IOC of UNESCO, IOCARIBE is responsible for the science base, the gathering of knowledge, the implementation of scientifically based information, the quality control, the voice of scientific credibility, and for ensuring that knowledge and data can be shared and used by all. In establishing its programmes within the IOC Global Programmes framework, IOCARIBE takes into account the specific interests and needs of the Member States in the Region.

The IOC Terms of References for Regional Sub-commissions determine the basic functions of IOCARIBE:

Regional Sub-commissions are Intergovernmental Subsidiary Bodies of the Commission, responsible for the promotion, development and co-ordination of marine scientific research programmes, ocean services, and related activities, including capacity development in their respective regions. In establishing their programmes, it should take into account the specific interests and needs of the Member States in the region. In carrying out the above work, it is mandatory that the regional sub-commissions collaborate together with IOC's subsidiary bodies concerned with global activities, within their fields of competence.

The role of the ocean for climate, disaster risk reduction, future of island States is reflected in the Paris Agreement of UNFCCC, the Global Biodiversity Framework, the UN Sendai Framework for Disaster Risk Reduction, and the SIDS Accelerated Modalities of Action (SAMOA Pathway) and a number of regional, sub-regional and national action frameworks or development strategies. The success of all these frameworks depends on capacity of science to deliver needed solutions and on the ability and will of stakeholders to effectively use these solutions.

On September 25th, 2015 the United Nations adopted the 2030 Agenda and a set of Sustainable Development Goals (SDGs),1 including a goal dedicated to the ocean, SDG 14, which calls to "conserve and sustainably use the oceans, seas and marine resources for sustainable development". The Intergovernmental Oceanographic Commission (IOC) of UNESCO was identified as the custodian agency for the SDG Target 14.3: "Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels", and the associated SDG Indicator 14.3.1 ("Average marine acidity (pH) measured at agreed suite of representative sampling stations"), and marine scientific research (Target 14.a)

There is a need to mainstream ocean science for managing the ocean, The emergence of an international legally-binding instrument on conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction (BBNJ) under the UN Convention of the Law of the Sea (UNCLOS) means that legally-binding obligations of nations are becoming increasingly ocean science-dependent. Successful execution of the IOC programme during the period of Medium- Term Strategy 2014–2021 and the IOC-led planning and coordination of the UN Decade of Ocean Science for Sustainable Development (2021–2030) brought IOC to

[1] Ref: (www.un.org/sustainabledevelopment/sustainable-development-goals/development).

the leading position in the work on systematic provision of ocean-related solutions to the global challenges of our time.

During the period of the IOC Medium-Term Strategy 2014–2021, the IOC Capacity Development Strategy (2015-2021) was adopted, by which the following outputs were proposed as targets to be addressed:

- Human resources developed.
- Access to physical infrastructure established or improved.
- Global, regional and sub-regional mechanisms strengthened.
- Development of ocean research policies in support of sustainable development objectives promoted.
- Visibility and awareness increased.
- Sustained (long-term) resource mobilization reinforcement.

According to the IOC Capacity Development Strategy (2015-2021), by promoting such outputs, IOC expected "Member States to learn more about the nature and resources of the ocean and coastal areas and to apply that knowledge for the improvement of management, sustainable development, the protection of the marine environment, and decision-making processes."

As per the report of the third session of the IOC Group of Experts on Capacity Development, at the global level (December 2021), the IOC Capacity Development Strategy (2015-2021) has been implemented through the following programmes and projects:

- The Ocean Teacher Global Academy (OTGA)
- The Global Ocean Observing System (GOOS)
- The IOC Ocean Sciences Programme
- The Global Tsunami Warning System
- The IOC Marine Policy and Regional Coordination Section

In 2021, the IOC Assembly adopted the Medium-Term Strategy (2022-2029). The document highlighted the main goal of the Decade of Ocean Science to offer effective solutions and to motivate society and elevate its readiness to implement them, presenting the Decade as a powerful stimulus for IOC to contribute to implementing collectively agreed global and regional priorities.

1.3 IOC HIGH-LEVEL OBJECTIVES AND PRIORITIES

Through international cooperation, IOC aspires to build and apply scientific knowledge to achieve the following High-Level Objectives (HLOs), with particular attention to ensuring that all Member States have the capacity to meet them:

1. Healthy ocean and sustained ocean ecosystem services;
2. Effective warning systems and preparedness for tsunamis and other ocean-related hazards;
3. Resilience to climate change and contribution to its mitigation;

4. Scientifically-founded services for the sustainable ocean economy; and
5. Foresight on emerging ocean science issues.

When working towards the high-level objectives, IOC will focus on the broad areas of:

- strengthening scientific knowledge of the ocean and human impact on it,
- applying that knowledge for societal benefit, and
- building institutional capacities for sound management and governance

The strategy is organized in a conceptual framework of six functions required to advance towards the IOC Vision statement to bring together governments and the science community in achieving the "Ocean We Need for the Future We Want."

A. Foster ocean research to strengthen knowledge of ocean and coastal processes and human impacts upon them [Ocean research]

B. Maintain, strengthen, and integrate global ocean observing, data and information systems [Observing system / data management]

C. Develop early warning systems and preparedness to mitigate the risks of tsunamis and ocean-related hazards [Early warning and services]

D. Support assessment and information to improve the science-policy interface [Assessment and Information for policy]

E. Enhance ocean governance through a shared knowledge base and improved regional cooperation [Sustainable management and governance]

F. Develop the institutional capacity in all of the functions above, as a cross-cutting function [Capacity Development]

The IOC Mid-Term Strategy's vision identifies capacity development as the primary catalyst through which IOC will achieve its four High-Level Objectives (HLOs) in 2022-2029. IOCARIBE will provide the leadership for this effort to empower capacity in the IOCARIBE Region.

In 2014, the UN General Assembly adopted the Oceans and the Law of the Sea Resolution (A/RES/69/245) which reiterated the essential need for cooperation, including through capacity development and transfer of marine technology, "to ensure that States, especially developing countries, in particular the least developed countries and small island developing States, as well as coastal African States, are able both to implement the Convention and to benefit from the sustainable development of the oceans and seas, as well as to participate fully in global and regional forums and processes dealing with oceans and law of the sea issues".

IOCARIBE has been actively promoting IOC's Capacity Development Strategy (2015-2021) through partnerships, networking, and cooperation. According to the report of the third session of the IOC Group of Experts on Capacity Development, IOCARIBE has identified a high demand for capacity development related to deep sea management, and aiming to address such an issue, IOCARIBE organized webinars on deep-sea management with the International Seabed Authority. In addition, IOCARIBE has been cooperating with The Meso-American

Caribbean Sea Hydrographic Commission (MACHC) of the International Hydrographic Organization (IHO) to map the bathymetry for the entire region and established a joint strategy for obtaining data and filling the gaps in the region, which was also identified as a contribution to the SEABED 2030 programme. For this purpose, IOCARIBE and MACHC designed and implemented a capacity development strategy and carried out a series of training courses and seminars to strengthen countries' capacity to process bathymetry data and produce digital mapping of the MACHC- IOCARIBE Region.

1.4 IOCARIBE AND THE UN DECADE OF OCEAN SCIENCE FOR SUSTAINABLE DEVELOPMENT (2021-2030)

In 2017, UN General Assembly adopted the Ocean and Law of the Sea Resolution (A/RES/72/73) which established the UN Decade of Ocean Science for Sustainable Development (2021-2030) (The Decade), under the coordination of the IOC. Overall, as stated on IOC's website, "[t]he Ocean Decade is a convening framework for diverse stakeholders to co-design and co-deliver solution-oriented research needed for a well-functioning ocean in support of the 2030 Agenda. Capacity development, ocean literacy and the removal of barriers to full gender, generational, and geographic diversity are essential elements of the Decade."

The Ocean Decade Action Framework will guide the design and implementation of the initiatives carried out during the Ocean Decade. The Ocean Decade Challenges form the highest level of this framework and represent the most immediate and pressing priorities for the Ocean Decade. They aim to unite Decade partners in collective action at the global, regional, national and local scales and will contribute to the achievement of the Ocean Decade outcomes, thus shaping the overall contribution of the Decade to the 2030 Agenda and other policy frameworks. They may evolve throughout the Ocean Decade to respond to emerging issues.

Challenge 1
Understand and beat marine pollution

Understand and map land and sea-based sources of pollutants and contaminants and their potential impacts on human health and ocean ecosystems and develop solutions to remove or mitigate them.

Challenge 2
Protect and restore ecosystems and biodiversity

Understand the effects of multiple stressors on ocean ecosystems, and develop solutions to monitor, protect, manage and restore ecosystems and their biodiversity under changing environmental, social and climate conditions.

Challenge 3
Sustainably feed the global population

Generate knowledge, support innovation, and develop solutions to optimise the role of the ocean in sustainably feeding the world's population under changing environmental, social and climate conditions.

Challenge 4
Develop a sustainable and equitable ocean economy

Generate knowledge, support innovation, and develop solutions for equitable and sustainable development of the ocean economy under changing environmental, social and climate conditions.

Challenge 5
Unlock ocean-based solutions to climate change

Enhance understanding of the ocean-climate nexus and generate knowledge and solutions to mitigate, adapt and build resilience to the effects of climate change across all geographies and at all scales, and to improve services including predictions for the ocean, climate and weather.

Challenge 6
Increase community resilience to ocean hazards

Enhance multi-hazard early warning services for all geophysical, ecological, biological, weather, climate and anthropogenic related ocean and coastal hazards, and mainstream community preparedness and resilience.

Challenge 7
Expand the Global Ocean Observing System

Ensure a sustainable ocean observing system across all ocean basins that delivers accessible, timely, and actionable data and information to all users.

Challenge 8
Create a digital representation of the ocean

Through multi-stakeholder collaboration, develop a comprehensive digital representation of the ocean, including a dynamic ocean map, which provides free and open access for exploring, discovering, and visualizing past, current, and future ocean conditions in a manner relevant to diverse stakeholders.

Challenge 9
Skills, knowledge and technology for all

Ensure comprehensive capacity development and equitable access to data, information, knowledge and technology across all aspects of ocean science and for all stakeholders.

Challenge 10
Change humanity's relationship with the ocean

Ensure that the multiple values and services of the ocean for human wellbeing, culture, and sustainable development are widely understood, and identify and overcome barriers to behaviour change required for a step change in humanity's relationship with the ocean.

As a result of the Ocean Decade planning process and under the coordination of IOCARIBE, a Regional Planning Group (WTA RPG) for the UN Ocean Decade was established in 2020 to advance and coordinate strategic partnerships and actions for engagement in the Ocean Decade

of the Western Tropical Atlantic and the Eastern Tropical Pacific -The Tropical Americas and Caribbean Region (TAC)-. The WTA RPG established seven Working Groups to promote multi-disciplinary, inclusive co-design and implementation partnerships to achieve each of the six initial the Societal Outcomes and one specific for Capacity Development, recognizing the efforts of the Working Groups and strategy for advancing the Ocean Decade in the Tropical Americas and the Caribbean Region. The seventh societal outcome, an Inspiring and Engaging Ocean, has been addressed as a cross cutting theme.

Seven online workshops were organized around the corresponding WTA Working Groups (conducted July – October 2021). The workshops aimed to review knowledge gaps, barriers, identify priority areas and needs in capacity development, and catalyse a co-design process to find transformative ocean science solutions and develop potential Regional Ocean Decade Actions (programmes / projects / activities / contributions) as part of the global collective effort under the Ocean Decade.

In 2021, IOC adopted the Ocean Decade Implementation Plan, which aims to help society to change from "the ocean we have" to "the ocean we want."

In December 2021, IOCARIBE convened jointly with UN Agencies and Partners under the auspices of the governments of Barbados and Colombia, the Regional Kick-off Conference that marked the launch of the UN Ocean Decade in the Tropical Americas and The Caribbean.

The Regional Kick-off Conference represented the beginning of the region-wide efforts in a substantive development and implementation of Decade Actions. It aimed to catalyse partnerships among various ocean stakeholder communities in the region, and catalyse co-design of transformative ocean science solutions to the Ocean Decade Challenges to achieve the Ocean Decade Outcomes and Sustainable Development Goals.

Partners and stakeholders reviewed the proposed transformative ocean science solutions and assessed the value, feasibility, and priority of the potential Regional Ocean Decade Actions.

As well, the Kickoff Conference highlighted emerging regional engagement in co-designing partnerships for Regional Ocean Decade Actions and mobilized contributions and expressions of interest by UN and regional agencies, governments, industry and private sectors, and other stakeholder groups. In the Kickoff Conference Regional Call of Action Member States, partners and stakeholders called for engaging and inspiring stakeholders to develop and enhance partnerships for co-design and co-delivery of transformative solutions for the critical decadal sustainable development challenges, leaving no one behind in the design, implementation and access to benefits, and to strengthen the governance and coordination in the Region the Conference called to support the creation of National Committees for the Ocean Decade to mobilize local and national collaboration for co-designing and coordinating local, national and regional actions.

In 2022 following the TAC Regional Ocean Decade Kick-Off Conference (December 2021), IOCARIBE drafted Regional Ocean Decade Actions aiming to address TAC region priorities and help the region to overcome the identified challenges, including strengthening marine scientific cooperation and enhancing ocean capacity development. The following actions were endorsed by the Ocean Decade Coordination Office and will be implemented alongside the IOCARIBE SSP:

1. Project No. 133.2 – Gain knowledge to respond to multiple stressors
2. Project No. 134.2 - TAC Pollutants Observatory
3. Project No. 135.2 - TAC Ocean Observing and Forecasting System
4. Project No 136.2. Enhancing capacity development in the TAC Region
5. Project No. 137.2 Ocean Literacy in the TAC Region
6. Project No 138.2. Integrating Coastal Hazard Warning Systems for TAC
7. Project No 140.2. MACHC-IOCARIBE Seabed 2030 Project

The Decade corresponds with the IOCARIBE SSP timeline and provides a mechanism for supporting and promoting IOCARIBE activities. Presently, several projects contributing IOCARIBE have been endorsed by the Decade, and these should be incorporated into the SSP and supported by IOCARIBE and member states in order to leverage ongoing Decade activities to their benefit. In addition, these programs can provide formal structures and resources for project and activity execution.

One such project is the Tropical Americas and Caribbean Ocean Observing System, TAC-OOS. TAC-OOS supports the development and operation of a sustained integrated ocean observation and forecasting System for the Tropical Americas and Caribbean providing essential information for the sustainable development, prosperity and safety of the region's oceans, responsive to the needs of the regional community. The System provides critical ocean information needed to generate reliable environmental forecasts, protect ocean health, mitigate and adapt to climate change and support sustainable growth; promotes efficient data and information sharing, data quality, ease of data sharing, and standard knowledge and training; and regional engagement and participation, data and information sharing, and collaboration with the global ocean community.

Another is the Integrating Coastal Hazards Warning Systems for the Tropical Americas and Caribbean project, which also supports cross-cutting science activities as discussed in the SSP. While the Coastal Hazards Warning System has a well-established place within IOCARIBE through the Tsunami and Sea-Level program, the TAC-OOS is the logical extension of the presently dormant IOCARIBE-GOOS, and needs to be established immediately using the endorsed proposal to support the SSP.

The TAC Pollutants Observatory is also one of the endorsed projects by Ocean Decade and is part of the ML2030 program. This project, and others, play central roles in supporting the Ocean Decade mission to catalyze transformative ocean science solutions for sustainable development, and connecting people and the ocean. This project is based in the need to develop an inventory of contaminant sources along with a regional baseline database and current values, to better understand and interpret the impact of the pollutants and climate change on marine

life along with future changes and trends. This work will focus on addressing key gaps in knowledge related to understanding the fate of pollutants in the region.

Increasing knowledge to respond to multiple stressors in a changing environment is another Ocean Decade project endorsed under ML2030. With a large number of organizations, agencies, and institutions engaged regionally, it is necessary to establish a mechanism for the effective engagement of all stakeholders. Taking advantage of the diverse network of national and regional stakeholders of IOCARIBE and Gulf Caribbean Fisheries Institute (GCFI), this project will fill priority knowledge gaps of ecosystems, and their reactions to multiple stressors and develop tools to implement management frameworks. GCFI's annual meeting provides a means of enhancing communication and participation among stakeholders throughout the year. Additionally, it will provide a mechanism for an annual review and update of the activities undertaken by the partners in the region.

Finally, within the framework of the UN Decade of Ocean Science for Sustainable Development (2021-2030), IOC has been working on promoting ecosystem-based management through Marine Spatial Planning (MSP). Since 2017, IOC and the European Commission have been working in a joint action called MSP Roadmap, which lead to the establishment of the MSP Global Initiative and the International MSP Forum. In 2022, Regional MSPforums were created, resulting in the launch of the Regional MSPforum for Latin America and The Caribbean in December 2022. In a nutshell, the first edition of the online Regional MSPforum marked the beginning of a regional dialogue process on MSP. The high-level discussions included the presentation of ongoing regional initiatives, projects to enhance capacity development within the region and raise awareness on MSP, marine protection and restoration, and the next steps towards building a regional network and platform for MSP practitioners.

STRATEGIC VISION, PRINCIPLES, OBJECTIVES AND USERS OF THE STRATEGIC SCIENCE PLAN

The vision of the IOCARIBE SSP - Strong scientific understanding and systematic observations of the changing world ocean climate and ecosystems shall underpin sustainable development and global governance for a healthy ocean, and global, regional, and national management of risks and opportunities from the ocean.

The strategic objectives of the IOCARIBE SSP, based on IOC`s HLOs are:

i) Increase scientific knowledge and a better understanding of coastal and oceanic regional processes to help Member States in the formulation and application of ocean and coastal zone sustainable policy for contributing to global strategies and regional IOC programmes; and

ii) support the permanent enhancement of capacity development and empowering in ocean sciences and ocean observations of developing Member States, for enabling management of resources and coastal ecosystems to their own exclusive economic zones and in the region.

The IOCARIBE SSP incorporates the following principles:

- Prioritize regional social, scientific, and economic impacts in project formulation.
- Reflect adequately on the planned projects and programmes executed by IOCARIBE within the framework of IOC Medium Term strategy and by other UN Agencies.
- Coordinate jointly with UN Agencies priorities of specific action plans in the Region.
- Bear in mind synergic relationship existing between science and technology becoming a unique entity.
- Strengthen cooperation among countries and organizations of the region.
- Reinforce institutional strengthening of the Sub-commission and national coordinating networks.
- Perform periodic evaluations of the SSP progress and its priorities every two years.

The IOCARIBE SSP is directed to a wide group of users, among them the following users:

- IOCARIBE Secretariat.
- IOCARIBE Board of Officers.
- IOC Section, Programme and Project Leads
- Member States managers and decision makers working in ocean sciences and technology.
- The regional scientific community and regional organizations
- Donor organizations.
- Other United Nations agencies, Intergovernmental Organizations and Non-Governmental Organizations.

REGIONAL CONTEXT

2.1 BACKGROUND

The IOCARIBE region (Caribbean Sea, Gulf of Mexico and Adjacent Areas) consists of 32 independent states and 15 dependent territories. The territories and dependent departments are represented by 4 independent states, three of which have their capital located outside the region in Europe (France, The Netherlands, UK and USA).

All thirty-two (32) states of the region are members of IOCARIBE. Taking into account geographical characteristics, size, language and socioeconomic development, member states have been grouped by IOCARIBE as follows:

1. Small Island Developing States (SIDS) Antilles: includes 14 independent states. Mayor participation of the smaller Antilles. Belize, Guyana and Suriname are included because of size and language likeness.
2. Small Isthmus Developing States (SIDS) of Central America: includes 6 independent states of Central America and the Dominican Republic, which is also included because of language and size similitude.
3. Medium Size: includes five independent States considered among the most active countries in IOCARIBE.
4. Europe and USA: includes most of the 15 territories and departments represented by France, The Netherlands, United Kingdom, and the USA and its two territories in the Region.

The IOCARIBE region is regarded as one of the most geopolitically diverse and complex regions in the world. The culturally diverse countries and territories that border this maritime area range from among the largest (e.g. Brazil, USA) to among the smallest (e.g. Barbados, St. Kitts and Nevis) and from the most developed to the least developed in the world. There are great differences in size, wealth, ethnic make-up, language and political situation among countries in the region, but there are also many common issues such as the cultural background, its geographical location, its natural resources and their associated environmental problems.

Continental Coastal Latin-American countries and the Caribbean SIDS are two distinct regions from the ocean sciences capacity and economic development point of view. Nevertheless, both are greatly dependent on the ocean and coastal resources.

Caribbean Island countries are classified as middle-income countries, and most are Small Island Developing States (SIDS). This situation is indeed unique and brings a different set of dimensions and challenges in terms of ocean sciences. The principal features of these countries are smallness in geographical size and population; insularity; low resilience and high vulnerability to natural and human-made disasters and the impact of global climate change– as seen in the annual passages of hurricanes, and sea level rise; and high dependence on tourism.

Although tourism is important for all IOCARIBE countries, it is most critical in the Caribbean where tourism income is equivalent to 16.6% of its GDP. In February 2016 the Tourism Organization for the Caribbean published that for the first time in history the growth of tourism in the Caribbean in 2015 surpassed all the major tourism regions in the world, reaching 28.7 million visits and contributing approximately USD 30 billion to the Caribbean economies. Due to COVID-19 restrictions on tourism, SIDS economies have been significantly impacted. Especially, countries like Bahamas, Barbados and Jamaica where 34-48% of their GDP comes from tourism (IDB, 2020)

Maritime transport is a key component of world trade and is considered one of the major sources of pollution in this region. The presence of the recently expanded Panama Canal plays a major role in world maritime transport, since it serves more than 144 sea routes, connecting 160 countries and reaching some 1,700 ports in the world. In 2015 more than 340.8 million

tons of cargo passed through the Canal and the tolls generated amounted to 1.9 billion dollars. The Ocean Economy of the Caribbean in 2012 is dominated by shipping, tourism, and oil and gas industries, where shipping reaches 76% of the total estimated of USD 407 billion (Park and Kildow, 2015)

The IOCARIBE Medium-Term Strategic Science Plan 2005-2015 (IOCARIBE, 2006) detailed regional environmental concerns. Since then both the Caribbean and Gulf of Mexico Global Environmental Facility (GEF) Large Marine Ecosystem (LME) Projects have produced major documents identifying marine and coastal environmental concerns in the Gulf of Mexico, Caribbean Sea and North Brazil Shelf LMEs (Heileman, 2001). In addition, both the Caribbean Environmental Programme (CEP) of the UN Environmental Programme (UNEP) (UNEP, 2017) and the Western Central Atlantic Fisheries Commission (WECAFC) (WECAFC, 2017) of the UN Food and Agricultural Organization (FAO) have produced numerous reports on environmental issues, especially land-based sources of pollution (the former) and fisheries resource status (the latter). IOC has had the UN lead for Tsunami warning system coordination (IOC, 2017) and the Wider Caribbean Region was included from the start as a result of the efforts of IOCARIBE (CARIBE-EWS – Tsunami and Other Coastal Hazards Early Warning System for the Caribbean and Adjacent Regions).

There are numerous major stressors that can be drawn from these studies and the deliberations of IOCARIBE. Priority transboundary problems that affect the CLME: unsustainable exploitation and non-optimal harvesting of fish and other living resources, habitat degradation and pollution both point and non-point, land and ocean-based. Each one of these can be broken down into specific examples such as the degradation of the extensive coral reef habitat and the major oil spills that have occurred including Deepwater Horizon, where by the time the well was capped on July 15, 2010 (87 days later), an estimated 3.19 million barrels of oil had leaked into the Gulf of Mexico, as evident in the references mentioned above.

While the above stressors are primarily human-driven, in the last twenty years the population increased from 386 million to 554 million (PRB, 2017), (Commerce, 2017), the region is also vulnerable to natural disasters that are intimately tied to the ocean, these are hurricanes and tsunamis.

The 2017 Atlantic hurricane season was a highly destructive and exceptionally active season, ranking as the costliest on record with a total estimated damage of at least USD 294.92 billion. This season was marked by the occurrence of 17 storms, 10 hurricanes, and 6 major hurricanes. The devastating impact of hurricanes Harvey, Irma, and Maria resulted in the majority of the season's damage. Additionally, Hurricane Nate was a notable disaster, causing unprecedented devastation in Costa Rican history

Finally, all of this is taking place under the overall condition of rapid human-magnified climate change. The warming temperatures themselves have an impact such as increasing coral bleaching. The rising temperatures resulting in increased deoxygenation and sea level rise are extremely critical for low-lying areas especially those on small island states. Ocean acidification over time is a direct threat to shell-forming organisms and thus an ecosystem

changer. In addition, the weather patterns will change and there is some indication that stronger storms may occur.

The IOCARIBE Region with its island States and significant and important coastal areas in the continental states is a region very dependent on the ocean for their well-being from food security to energy and from being a major ocean shipping region to one of the world's great tourism areas. Its position in an area of extreme events like hurricanes and tsunamis and being ground zero for climate change impacts requires the strongest science possible to form the basis upon which societal decisions relevant to the coasts and oceans are made.

2.2 CAPACITY DEVELOPMENT NEEDS AND GAPS

The IOCARIBE SSP strives to develop a strategy that effectively addresses the unique challenges faced by the IOCARIBE region, in alignment with the six core functions outlined in the IOC Medium-Term Strategy for 2022-2029.

In 2020, IOC released the 2nd Capacity Development Survey results (IOC UNESCO Capacity Development Survey 2020). IOC recognized that due to the low respondent numbers, it was difficult to draw general findings from the results. Still, the following capacity development challenges were identified at the global level[2]:

- Funding and investment.
- Access to communities of practice.
- Increase awareness, ocean literacy and public outreach.
- Access to ocean observation equipment.
- Access to remotely sensed satellite data.

As per the report of the desk study conducted by IOCARIBE in 2021, the following capacity development challenges were identified as a priority for the Tropical Americas and the Caribbean (TAC) Region:

- Funding and investment.
- Access to equipment, research vessel, and trained researchers.
- Increase ocean knowledge.
- Identify an efficient method to engage with or approach and exchange knowledge with local communities and indigenous knowledge holders.
- Enhance opportunities in the TAC Region aiming to prevent or minimize the exodus of talents.
- Include more students and early career professionals in the Decade-related activities.

In 2020, IOC published the Global Ocean Science Report 2020 – "Charting Capacity for Ocean Sustainability." Among GOSR 2020 main findings the following are important guidelines for the capacity development plans in IOCARIBE Region:

[2] https://surveys.ioc-cd.org/index.php/2020-survey/regional-analysis/

- Competitive ocean science is driven by international partnerships. International collaboration results in a higher quality of work.
- There is increasing recognition of the ocean's role in regulating the climate and the negative impact of anthropogenic change on ocean health. Ocean science discoveries feed into nearly all sectors of the economy.
- Access to technical infrastructure required for ocean science remains unequally distributed.
- Countries in the southern hemisphere only have limited access to ocean science technologies and infrastructure.
- Access to the open ocean is not a given. More than a third of this global research fleet is maintained by the USA. Based on information obtained for 920 research vessels, local and coastal research is the primary purpose of 24% of these research vessels in 35 countries: 8% of the vessels operate at regional, 5% at international and 11% at global scale.
- There are large differences in countries budget and investments in ocean research.
- On average, only 1.7% of national research budgets are allocated for ocean science, with percentages ranging from around 0.03% to 11.8%. With a few exceptions, LAC countries are in the lower part of the spectrum. This is a small proportion compared to the modestly estimated US$1.5 trillion contribution of the ocean to the global economy in 2010.
- Of the 37 countries that responded to the related GOSR2020 question, over 70% have strategies and a roadmap to achieve the goals of the 2030 Agenda. However, only 21% reported that they have a specific strategy focusing on the ocean and SDG 14.
- Unequal distribution of technical capacity of ocean science, accentuated by short-term or ad hoc funding for ocean science.

Small Island Developing States (SIDS) are particularly vulnerable and at high risk concerning climate change and natural hazards. Often they are the first to feel the effects of global environmental problems, due to their often small size, isolated locations. On average they lose 2.1 % of their GDP annually due to disasters (UNCTAD, 2020).

The SIDS Accelerated Modalities of Action (SAMOA) Pathway of 2014 The SAMOA Pathway emphasizes the need for capacity development in:

a) climate change adaptation and mitigation strategies, including improving understanding of the science of climate change;
b) marine biodiversity conservation, including the establishment and management of marine protected areas, sustainable fisheries management, and marine pollution control;
c) ocean governance and the implementation of the United Nations Convention on the Law of the Sea (UNCLOS);
d) disaster risk reduction and resilience, including early warning systems, disaster preparedness, response, and recovery, and building resilient coastal communities and infrastructure;

e) blue economy include sustainable resource management, value-added processing, marketing and trade, and sustainable tourism practices;
f) The SAMOA Pathway highlights the need for technology transfer and capacity development in SIDS to enable them to effectively utilize and benefit from modern technologies related to ocean sciences, including ocean observation systems, remote sensing, and other tools for monitoring and managing marine environments. This includes strengthening technical skills, building institutional capacity, and enhancing access to relevant technologies and expertise through partnerships and international cooperation.

The SAMOA Pathway strongly supports action to "enhance local, national, regional and global cooperation to address the causes of ocean acidification and to further study and minimize its impacts, including through information-sharing, regional workshops, the integration of scientists from small island developing States into international research teams, steps to make marine ecosystems more resilient to the impacts of ocean acidification and the possible development of a strategy for all small island developing States on ocean acidification." (Article 58, n)

It is clear that most SIDS countries are keenly aware of the importance of the marine environment and its resources to their sustainable development and economic stability. SIDS countries, however, are sometimes constrained by weak institutions and administrative processes and need enhanced human, technical, and financial resources to develop and implement cross-cutting approaches to the planning and management of oceans and coasts.

The IOCARIBE Member States are implementing some 60 legal instruments related to ocean and coastal issues management as national policies, strategies, laws, plans, decrees, resolutions and diagnostic analyses and assessments for the management and sustainable development of the ocean, addressing coastal management, risk management and climate change (C. Toro *et al.*, 2017). There are few regional and subregional policy instruments developed for the ocean and in force in the region with the Cartagena Convention as one of the most comprehensive instruments available. The Organization of the Eastern Caribbean States, developed Eastern Caribbean Regional Ocean Policy, an example of a sub-regional policy. CARICOM fisheries have worked with the regional fisheries management organization for Central America (OSPESCA) on management actions. The CLME+ developed some regional management linkages and as a result of the CLME+ Strategic Action Plan, Member States created a Coordination Mechanism in 2021.

The development and operation of the CARIBE-EWS Tsunami and Other Coastal Hazards Early Warning System for the Caribbean and Adjacent Regions and of the GEF Caribbean Large Marine Ecosystem Project clearly demonstrates the power of a regional approach (CLME, 2016). Thus, this science plan will have a regional focus within the IOC Medium Term Strategy framework and will address strengthening regional science efforts and strengthening countries' participation. The needs of both coastal states and small island states need to be addressed.

IMPLEMENTING IOCARIBE STRATEGIC SCIENCE PLAN

IOCARIBE will continue to be a strong regional contributor to the work of all IOC programmes and will align its activities with the strategic framework of the Decade. The main objective will be to assist the continental coastal Latin-American and the Caribbean SIDS Member States to achieve sustainable use of the ocean and coastal resources. In doing so, IOCARIBE will capitalize on the advantages of its region, which is rich in biodiversity and resources and is a key world's tourism destination. Ocean science will be central for addressing major regional challenges of IOCARIBE, where manifestations of climate change, such as hurricanes, severe storms, coastal inundation, coastal erosion, and sargassum beaching, occur on the background of generally low resilience of island States.

The main avenue will be strengthening Member States' science capacity for managing the ocean, in national and transboundary context, through an ecosystem-based management approach, continuing to implement the CLME+ (The Caribbean and North Brazil Shelf region) Strategic Action Programme (SAP) and supporting the creation and operation of a Coordination Mechanism and sustainable financing plan for ocean governance. The Sub-commission will also assist Member States in formulating national and regional policies and plans to develop ocean science and technology.

Recognizing Member States asymmetry in Capacity Development and technology, IOCARIBE will undertake projects to enhance transfer of marine technology and strengthen ocean sciences institutional and scientific networks to increase access to infrastructure and knowledge.

IOCARIBE will work to achieve the high- level objectives of the IOC Medium Term Strategy (2022-2029) within its region by implementing the following efforts:

- Foster the generation of knowledge, sharing of information, expertise and experiences on the IOCARIBE Region and its coastlines.
- Assist Member States to develop their capacity to formulate national and regional policies and plans to meet their needs in marine science and technology.
- Reinforce and broaden scientific cooperation, regionally and internationally through networking and institutional arrangements with organizations operating within and without the region, for example, UN bodies, IGOs, NGOs and the scientific community.
- Provide the regional input to global ocean sciences and observation programmes.
- Promote and facilitate the implementation of IOC global science programmes and ocean services at the regional level.

IOCARIBE will establish an expert group led by one of the IOCARIBE Officers that will work in close collaboration with IOC Capacity Development Section to develop corresponding Work plans.

In alignment with IOC High Level Objectives, and the global expected results of IOC, IOCARIBE will focus on achieving the following results:

IOC Global Expected Result 1: Scientific understanding of ocean and coastal processes strengthened through coordinated actions in research, observations, assessments, design and implementation of management tools and CD.			Decade IOC and TAC Regional Ocean Actions Contributing to achieve this Expected Result
Improving scientific understanding of ocean ecosystems, identifying robust indicators of their health, and understanding ecosystem vulnerability, e.g., to multi-stressors, are vital for monitoring and predicting the ecosystem health and resilience and developing ecosystem-based management, underpinning sustainable ocean economy and improved ocean governance. Current ecosystem research and management require stronger coordination and cooperation between key stakeholders.			**Gain knowledge to respond to multiple stressors in TAC Region** Fill priority knowledge gaps of ecosystems, their responses to multiple stressors, develop tools to implement management frameworks that build resilience, recognize thresholds and avoid ecological tipping points. There is a need to unify programs efforts whilst enhancing technical capacities (lack of data, information & research) through institutional expertise across the region to develop integrated solutions. There is a pressing need to develop solutions to monitor, protect, manage and restore ecosystems, their biodiversity under changing environmental, social and climate conditions whilst addressing the lack of baseline scientific information on oceans and their biological diversity as well as the low investment in ocean science. With main objectives: i) Develop solutions to monitor and protect ecosystems and their biodiversity under changing conditions while addressing the lack of baseline scientific information; b) Promote drafting of sustainable ocean plans to respond to multiple stressors, as it provides a credible basis for safeguarding long-term ocean health and resilience, attracting investment and creating jobs for the benefit of communities and national economies; c) Promote ocean literacy and science-policy dialogue by expanding use of citizen and user-oriented data collection and local/traditional knowledge practices.

IOCARIBE Expected Result 1.1 IOCARIBE-GOOS Redesigned, updated and enhanced	A predicted ocean whereby society has the capacity to understand current and future ocean conditions, and the ability to forecast their change and impact on human wellbeing and livelihoods. Re-invigorating IOCARIBE-GOOS aims to sustained long-term high-quality observations of marine and coastal environments, including human interactions, creation and operation of models based on stakeholder needs, and delivery of forecast and decision-support tools that help fulfill the multiple sustainable development goals. Observations, forecasts and products that address essential ocean variables as determined by regional needs, including biological and ecological variables useful for ecosystem management and the generation of ocean health indicators.		**TAC Ocean Observing and Forecasting System (TACOOS)** The Region expressed the need for the co-design and operation of a sustained integrated ocean observation and forecasting system that will provide essential information for the sustainable development, well-being, prosperity and safety of the region's ocean. The system will be in alignment with the GOOS 2030 Strategy, using a value chain approach, connecting observations through data management for use in analyses and models to create applications. It will have a governance and management structure that ensures sustainability, enables and supports broad regional engagement and participation, promotes data and information sharing, and advocate for regional collaboration with the global ocean commu.nity. It will promote the development of regional national observing systems and collaborate with global Ocean Decade Programmes, and utilize both for capacity development and education.
IOCARIBE Expected Result 1.2 Strengthened Member States capacity to monitor, investigate, mitigate, and adapt to ocean acidification and its impacts	Enhance the monitoring OA network, develop needed human and institutional capacity and promote use of GOA-ON methodology to measure the impacts of ocean acidification on marine life.		**Ocean Acidification Research for Sustainability (OARS)** is providing society with observational and scientific evidence needed to sustainably identify, monitor, mitigate and adapt to ocean acidification; from local to global scales. It will foster the development of ocean acidification science including impacts on marine life and sustainability of marine ecosystems in estuarine-coastal-open ocean environments. OARS will build on the great work of the Global Ocean Acidification Observing Network (GOA- ON). The aim is to achieve SDG target 14.3 'Minimize and address the impacts of Ocean Acidification, including through enhanced scientific cooperation at all levels'. Key components include: 1) Enhancing regional collaborative efforts, 2) Coordination of capacity building in science, 3) Co-design and implement observation and research to address the threat of ocean acidification, and 4) Communication and delivery of the outputs to policy makers and communities.

IOCARIBE Expected Result 1.3 Enhanced institutional capacity to undertake and mainstream valuation of ecosystem goods and services in decision making and policy development	Within the framework of CLME+ SAP adopt and develop standards and methods for valuation of ecosystem goods and services valuation with Marine Spatial Planning support.		
IOCARIBE Expected Result 1.4 Strengthened Member States ecosystem-based management capacity	Marine spatial and coastal area management plans developed and implemented. Continuing CLME+ SAP implementation through PROCARIBE+ Project and as part of IOC and DGMare "Updated Joint Roadmap to accelerate Marine/Maritime Spatial Planning processes worldwide" - MSProadmap (2022- 2027) implementation.		
IOCARIBE Expected Result 1.5 Baseline data on biodiversity and ecosystem habitats in the IOCARIBE Region, mangroves, seagrasses, and coral reefs developed	Establish collaborative efforts with IOC OBIS regional nodes Caribbean OBIS, OBIS Colombia, and OBIS-USA, the CLME+ SAP, and IOCARIBE-GOOS and other international, regional, and national organisations and initiatives for developing products and tools for monitoring and managing marine environments and in assessing the impacts of both natural and human-induced disasters on these fragile ecosystems.		**OBIS 2030 - The biodiversity data hub for the Ocean Decade Actions** Through the OBIS Clearing-House Mechanism, OBIS 2030 will provide standardised, quality controlled and managed data to create information tailored for decision makers to help them protect and restore marine ecosystems and protect life in the ocean.
IOCARIBE Expected Result 1.6 A region-wide information system for oil spills developed and Member States oil spills monitoring capacity enhanced	Strengthening and enhancing the partnership for the information system for oil spills development and continuing capacity development and training on oil spill satellite monitoring granting access to up to date technology and methods.		Refer to **TAC Ocean Observing and Forecasting System (TACOOS)** above

IOCARIBE Expected Result 1.7 Western Tropical Atlantic inventory of contaminant sources along with a regional baseline database and current values developed.	Tropical Americas & Caribbean Pollutants Observatory		**Tropical Americas & Caribbean Pollutants Observatory**During the co-design process for TAC Regional Ocean Actions key oceans-related research priorities were identified for a regional programme in the TAC Region. These included a need for developing an inventory of contaminant sources along with a regional baseline database and current values, to better understand and interpret the impact of the combination and synergy between pollutants and climate change on marine life along with future changes and trends. Furthermore there is a need to unify programmes and efforts whilst enhancing technical capacities through institutional expertise across the region to develop integrated solutions. Thus the development and implementation of a transboundary, multidisciplinary, and cross-sectoral approach such as a regional pollution observatory was warranted. This will help to coordinate, analyse and regularly publish information on marine pollution and produce data that will be curated, credible and open access – to better guide and inform key stakeholders and decision makers.
Global Expected Result 2 Capacities in early warning, services and assessment to reduce risks and impacts of ocean related hazards			
With accelerating coastal development and changing environment, society becomes increasingly vulnerable to coastal hazards such as harmful algal blooms, coastal flooding, tsunamis and tropical cyclones. Nations should be aware of the hazards and have access to the necessary information for coastal planning, hazard mitigation, adaptation to climate change, and for safe operations at sea. This calls for continued implementation of ocean and coastal observing systems, improvements in the ocean, meteorological and climate models, and the development of a suite of local decision-support tools, including early warning systems.			Refer to **TAC Ocean Observing and Forecasting System (TACOOS**) above

IOCARIBE Expected Result 2.1 Integrated coastal hazards warning systems and Increased technical capacity for monitoring and early warning for coastal and ocean hazards	Coastal Hazard Warning Systems for TAC Region integrated. Co-Design, Co-Production and Co-Delivery of Integrated Multiple Coastal Hazard Early Warning System and Services for the Tropical Americas and Caribbean (TAC). The project will prioritize the integration of existing and new coastal hazards early warning systems and services considering four components: Monitoring and Warning, Risk Knowledge, Warning Dissemination and Communication, and Response Capabilities, supported by capacity development.		**Integrating Coastal Hazard Warning Systems for TAC Region.** Co-Design, Co-Production and Co-Delivery of Integrated Multiple Coastal Hazard Early Warning System and Services for the Tropical Americas and Caribbean (TAC). The project will prioritize the integration of existing and new coastal hazards early warning systems and services considering four components: Monitoring and Warning, Risk Knowledge, Warning Dissemination and Communication, and Response Capabilities, supported by capacity development. Linkages to regional and international efforts and national and local priorities would be maximized and strengthened.
IOCARIBE Expected Result 2.2 Improved Coastal Inundation Observing Forecasting Capacities and preparedness	In coordination with CARIBE-EWS, IOCARIBE-GOOS and partners implement the Coastal Inundation Forecasting Initiative as a core input for MSP and ICAM Plans and DRR		Refer to **TAC Ocean Observing and Forecasting System (TACOOS)** and **Integrating Coastal Hazard Warning Systems for TAC Region** above
IOCARIBE Expected Result 2.3 A region-wide information and forecasting system for sargassum developed	In collaboration with IOCAFRICA, Cartagena and Abidjan Convention Secretariats and partners further develop: (i) the Sargassum Information Hub as a centralized location for information sharing related to sargassum; (ii) regular and sustained Atlantic-wide monitoring products and inundation reports; (iii) comprehensive guides on best management practices for sargassum management; and (iv) a trans-Atlantic collaboration between IOCARIBE of IOC, IOCARIBE GOOS, and partners to create a sargassum community of practice.		**OceanTeacher Global Academy**: Building Capacity and Accelerated Technology Transfer for the Ocean Decade

IOCARIBE Expected Result 2.4 Complete baseline seabed map of the IOCARIBE Region that informs the sustainable, multi-purpose use of our regional ocean developed by 2030.	By implementing the Joint IOCARIBE MACHC Strategy create an accurate, observation-based bathymetric map of the IOCARIBE region through multi-sector partnerships and collaboration. This map is essential for the sustainable use of critical ocean resources and to inform and improve forecast capabilities, disaster risk reduction and response, environmental management and scientific investigation activities. Further strenghten the data providers and partners capacity to deliver their bathymetric data and information.		**MACHC-IOCARIBE Seabed 2030 Project** The priority Project outcome is to create an accurate, observation-based bathymetric map of the Tropical Americas and Caribbean Region through multi-sector partnerships and collaboration. **The Nippon Foundation-GEBCO Seabed 2030 Project (Seabed 2030)**
IOCARIBE Expected Result 2.5 A region-wide information system for oil spills developed and Member States oil spills monitoring capacity enhanced	Strengthening and enhancing the partnership for the information system for oil spills development and continuing capacity development and training on oil spill satellite monitoring granting access to up to date technology and methods.		
Global Expected Result 3: Improved capacity to understand and predict climate change, increase resilience and contribute to its mitigation			
Climate change and variability encompass temperature changes, altered patterns and intensities of tropical cyclones, storms, rainfall and droughts, sea-level rise, etc. Carbon emissions lead also to ocean acidification. Combined effects manifest themselves in ocean deoxygenation, coastal erosion, etc. Many human development goals, such as food security and health, access to water resources, and preparedness for disasters, are threatened by climate change. Ocean is a key regulator of climate. Coordinated global and regional efforts, including through the assistance of the WMO-IOC Joint Collaborative Board, are needed therefore to comprehensively include the ocean dimension in our improved capacity to understand and predict climate change, its impacts on the ocean, guiding the development and accelerated implementation of effective adaptation and mitigation strategies.			

IOCARIBE Expected Result 3.1 Improved Member States Hurricane and Coastal Inundation Observing Forecasting Capacity	Initiatives to Improve Member States Hurricane and Coastal Inundation Observing Forecasting Capacities		Refer to **TAC Ocean Observing and Forecasting System (TACOOS)** above
IOCARIBE Expected Result 3.2 Increased understanding of ocean acidification among key stakeholders, targeted audiences, and local communities.	Identify and convene ocean acidification activities relevant to the region, such as webinars, conferences, workshops, and lab trainings. Work with Ocean Literacy for designing and implementing activities to raise awareness among coastal communities.		**OceanTeacher Global Academy**: Building Capacity and Accelerated Technology Transfer for the Ocean Decade . **Ocean Literacy in the TAC Region**The unequal distribution of information across generations and genders was identified as a relevant barrier to achieve an inspiring and engaging ocean by 2030.Unequal access to knowledge is a challenge to the sustainable development of the ocean and that it is crucial to adopt an efficient method to engage with, or approach and exchange knowledge with local communities and traditional knowledge holders. There is a lack of visibility to local efforts, that understanding ocean literacy is a gap for decision-makers. The project thus intends to address the regional need to promote ocean literacy as a tool to transform ocean knowledge into actions that lead to ocean sustainability. **Ocean Literacy With All (OLWA)** OLWA advances Ocean Literacy (OL) through international partnerships and networks by designing and implementing transformative locally and globally relevant research-based activities and projects by and for diverse stakeholdersThis programme builds capacity and behaviour change to achieve an ocean literate society to help ensure sustainable development of the global ocean.
IOCARIBE Expected Result 3.3 Increased Member States capacity to adapt and mitigate coastal erosion impacts.	Developing and implementing Integrated Coastal Area Management (ICAM) plans. IOCARIBE-GOOS Best practices		Refer to **TAC Ocean Observing and Forecasting System (TACOOS)** **MACHC-IOCARIBE Seabed 2030 Project** above
Global Expected Result 4: Scientifically-founded services for the sustainable ocean economy			

Sustainability of ocean economy relates to the long-term capacity of ocean ecosystems to support human activities. Maintaining this equilibrium requires ocean observations, fit-for purpose data products and services, scientific assessments, and monitoring and forecasting of ocean ecosystem health. Knowledge-based ocean management tools such as marine spatial planning, coastal zone management, marine protected areas, and management of Large Marine Ecosystems (LMEs) can help ocean stakeholders to set environmental and socio-economic objectives, develop operational plans, define safe boundaries and guidelines for operations, as well as reduce conflicts among multiple uses of ocean space.			Refer to **TAC Ocean Observing and Forecasting System (TACOOS)** and **Tropical Americas & Caribbean Pollutants Observatory** above
IOCARIBE Expected Result 4.1 Sustainable resource management and governance in the IOCARIBE Region strengthened	CLME+ Coordination Mechanism fully operational by 2029 CLME+SAP implementation advanced		
IOCARIBE Expected Result 4.2 Sustainable tourism practices promoted	Marine Spatial Plans for a sustainable tourism developed		Refer to TAC Ocean Observing and Forecasting System (TACOOS) and **Tropical Americas & Caribbean Pollutants Observatory** above
IOCARIBE Expected Result 4.3 At least 65 per cent of key biodiversity areas (KBAs) conserved in the Region by 2027	Marine protected areas are vital to the sustainable development of oceans . Protected area networks must continue to expand to increase their coverage of key biodiversity areas (KBAs). The global mean percentage of each marine KBA covered by protected areas in LAC increased from 35.9 per cent in 2010 to 41.5 per cent in 2019. While this represents substantial progress, many KBAs have only partial or no protected area coverage. Least developed countries and small island developing States continue to lag behind at 25.4 per cent and 23.7 per cent, respectively. (SDG 14 Target 14.5)		
IOCARIBE Expected Result 4.4 Sustainable long-term capacity of ocean ecosystems to support human activities.	IOCARIBE will i) deliver fit-for-purpose data and information products and services through the Ocean Data and Information System and LAC Ocean InfoHub; ii) continuing supporting the CLME+ SAP implementation; iii) coordinate scientific assessments required to define ecosystem thresholds for safe operations and to identify sustainable pathways.		

Global Expected Result 5: Strengthened and enhanced Institutional and scientists capacity to anticipate emerging ocean science issues, inform policy-making, including in the context of relevant regional and global conventions, and advance timely solutions involving relevant stakeholders.			
The Earth's ocean remains one of the least explored environmental domains, with much of its depths still shrouded in mystery. Despite advancements in ocean research, there is still much to be discovered in this vast and dynamic ecosystem. Continual emergence of new issues in the ocean, such as the presence of contaminants and pressures from emerging activities or industries, have the potential to impact the health of ocean ecosystems and human wellbeing. These new stressors can interact with known stressors, such as ocean acidification, altered patterns of the ocean carbon cycle, de-oxygenation, and climate change, to create complex impacts on ecosystems. Therefore, there is a pressing need for ongoing research to better understand the complexities of the ocean and the potential impacts of human activities on this crucial ecosystem.			Refer to **Gain knowledge to respond to multiple stressors in TAC Region** and **Tropical Americas & Caribbean Pollutants Observatory** above
IOCARIBE Expected Result 5.1 Improved collective understanding of emerging ocean environmental issues and work towards sustainable solutions for the future by fostering international collaboration and promoting open sharing of data, and new observing and monitoring technology.	IOCARIBE in close coordination with IOC Global Programmes and initiatives will i) enhance and strengthen regional coordination of scientific research on the marine ecosystem impacts by new contaminants and multiple new stressors resulting from changing climate and anthropogenic influence; ii) promote an ocean observing system, which incorporates the latest in autonomous instrument technology and global data/information processing and management systems that are adaptable to new needs; iii) contribute with scientific syntheses and assessments that provide actionable information about new threats or opportunities.		
Global Expected Result 6: An IOC Ocean Data and Information System, “digital ecosystem” built around already existing and operational national, regional, and international systems which will be the system of choice for all ocean activities			

The expected outcome of the IOC Strategic Plan for Data and Information Management is to achieve significant enhancement of infrastructure, common approaches in ocean data and information management that enable interoperable data sharing and stewardship, and enhanced collaboration between data providers and users. It will implement a "digital ocean ecosystem" as a dynamic and continuous process, incorporating established approaches and technologies as well as those that are only just emerging. In close cooperation with the UN Decade of Ocean Science for Sustainable Development it will aim at representing the socio-ecological dimensions of the ocean through digital means.			The IOC Strategic Plan for Ocean Data and Information Management will guide IOC programmes to effectively share and manage their data and information in a coordinated way and based on widely agreed practices so as to assist in fulfilling not only IOC's objectives but also those of the Ocean Decade.
IOCARIBE Expected Result 6.1 A regional component of the IOC Ocean Data and Information System, "digital ecosystem" built around already existing and operational national, regional, and linked to international systems which will be the system of choice for all ocean activities, particularly those of research programmes.	This regional component and the implementation plans will be developed and implemented following functional and interoperable data and information management practices and frameworks as described and recommended in the IOC Strategic Plan for Data and Information Management (2023-2029).		

4.1 TECHNOLOGY TRANSFER

IOC has been involved in technology transfer since its beginning, but its role was officially defined at the XXII Session of the Assembly of the Intergovernmental Oceanographic Commission (2003) that adopted the "IOC Criteria and Guidelines on Transfer of Marine Technology" (CGTMT) drawn up by the Advisory Body of Experts on the Law of the Sea following the mandate established in Article 271 of UNCLOS.

The guiding principle of the CGTMT is that the Transfer of Marine Technology must always be conducted on fair and reasonable terms and conditions and should enable all parties concerned to benefit on an equitable basis from developments in ocean science-related activities, particularly those aiming at stimulating the social and economic contexts in developing countries.

In 2015 IOC described its plans and goals for the transfer of technology in:

Transfer of Marine Technology – Knowledge Sharing and Capacity Development for Sustainable Ocean and Coastal Management. 2015; IOC Brochure 2014-3 (IOC/BRO/2014/3). This document emphasizes the importance of the IOC Regional bodies in this transfer process.

In addition, the need to promote transfer of marine technology within the IOCARIBE Region was expressly stressed in the IOC Medium-Term Strategy 2022-2029, according to which IOCARIBE ought to undertake projects to enhance transfer of marine technology due to Member States asymmetry in capacity development and technology.

In this context, IOCARIBE will prioritize and advocate for regional needs within the IOC programme and involves itself in the efforts to ensure that transfer results in the ability to sustain technology transferred and thus truly empowering the region. The promotion and implementation of the Ocean Decade endorsed Ocean Regional Actions will be of relevance to this end. The activities performed by the Ocean InfoHub in the LAC Region are also important to enhance transfer of marine technology in the region, particularly the LAC Clearing-House Mechanism.

4.2 EDUCATION AND OUTREACH

The countries in the IOCARIBE region recognize that the sustainable management of the marine environment and effective disaster mitigation efforts require an informed and engaged public. This includes not only young people, direct users, the civil sector, both profit and non-profit organizations, but also the general citizenry. Without active participation from all stakeholders, efforts to address these challenges may fall short of their potential or even

fail. To address this, IOCARIBE will prioritize integrating education and outreach initiatives into its activities and encourage relevant organisations to do the same, promoting cooperative efforts wherever possible.

Ocean literacy refers to the understanding of the ocean's influence on you and your influence on the ocean. It involves the knowledge of the ocean's physical, chemical, biological, and geological processes, as well as its importance to human life, the economy, and the environment. The role of ocean literacy in education and raising awareness is significant, as it helps people understand the importance of the ocean, the challenges it faces, and the actions they can take to protect it.

One of the main benefits of ocean literacy is that it promotes environmental stewardship. By understanding the interconnectivity between the ocean and the planet, people become more aware of the impact of their actions on the ocean and are more likely to take steps to reduce their ecological footprint. Moreover, ocean literacy can promote sustainable practices, such as reducing plastic waste and supporting sustainable fishing practices.

Another benefit of ocean literacy is that it can inspire careers in marine science and conservation. By educating young people about the importance of the ocean, we can inspire the next generation of scientists, engineers, and policymakers to address the many challenges facing the ocean, such as ocean acidification, overfishing, and plastic pollution.

In summary, ocean literacy plays a critical role in education and raising awareness about the ocean. By fostering understanding and appreciation of the ocean's importance, we can promote environmental stewardship, inspire careers in marine science and conservation, and work towards a sustainable future for the planet.

4.3 DEVELOPING AND SUSTAINING CAPACITY

IOC has adopted an IOC Capacity Development Strategy 2015-2021 (IOC, 2015). This Strategy is a major step beyond previous efforts and sets the IOC regional bodies as the major focal point for moving forward in this area. Although the financial outlook for all of UNESCO is challenging, the prioritizing of capacity development and the recognition of the IOC regional bodies which contain the areas where capacity development is a central issue should be supported as drivers in the process (Figure. 1) IOC MTS (2015). Capacity development plan demonstrates the centrality of capacity development in the efforts of IOC and its subsidiary bodies. The areas identified as a priority by IOC following UNESCO priorities are Africa, small island states and gender. Furthermore, its ultimate goal was stated as “Sustained (long-term) resource mobilization reinforced” that is capacity needs not just to

be “built” but empowered to be able to impact sustained use of the oceans in all regions and the mitigation of ocean-related disasters.

The 2015-2021 CD Strategy established six outputs to be achieved: (i) human resources developed; (ii) access to physical infrastructure; (iii) global, regional and sub-regional mechanisms strengthened; (iv) development of ocean research policies in support of sustainable development objectives promoted; (v) visibility and awareness increased; and (vi) sustained (long-term) resource mobilization reinforced.

On the fourth session of the IOC Group of Experts on Capacity Development (November 2022), the IOC GE-CD approved the final draft of the IOC Capacity Development Strategy 2023-2030 for submission and adoption by the 32nd Assembly in June 2023 (IOC-UNESCO, 2023). While retaining the six outputs as target outcomes, the current draft expanded the Strategy to include additional actions and activities to address identified needs and gaps as well as issues on capacity development and further intensify IOC efforts through its global and regional programmes. The Group also highlighted the development of Ocean CD-Hub as a tool to promote accessible and equitable participation in capacity development. As a central online database bringing providers and users together with access to information on resources and existing capacity development opportunities in the region, the Ocean CD-Hub can contribute to identifying synergies and potential partnerships between organizations and catalyzing the development of an effective regional approach on developing and sustaining capacity across the IOCARIBE region.

The IOC Medium-term Strategy aims to ensure that all Member States have the capacity to achieve the High-Level Objectives of:

- Healthy ocean and sustained ocean ecosystem services;
- Effective warning systems and preparedness for tsunamis and other ocean-related hazards;
- Resilience to climate change and contribution to its mitigation;
- Scientifically-founded services for the sustainable ocean economy; and
- Foresight on emerging ocean science issues.

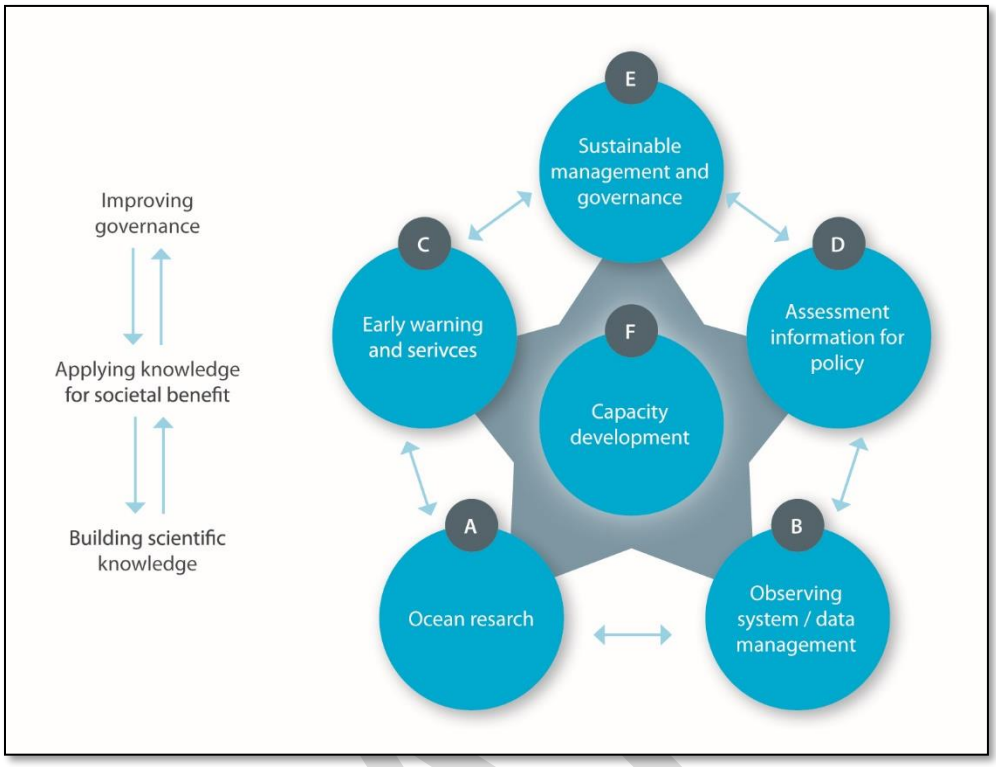

Figure 1. Conceptual framework of IOC Functions

Its Capacity Vision is: "Through international cooperation, IOC assists its Member States collectively achieve the IOC'S high-level objectives (HLOs) with particular attention to ensuring that all Member States have the capacity to meet them. "

IOCARIBE ought also to assist Member States in sharing knowledge and expertise, facilitating access to infrastructure, promoting networking, cooperation and facilitating communication at the regional level, raising awareness on ocean related issues, and developing national marine science management procedures and policies. IOCARIBE will also seek to promote ocean literacy, gender balance and fund raising.

Furthermore, IOCARIBE will work closely with the IOC OceanTeacher Global Academy (OTGA) with its network of regional and specialized Training Centres, Regional Training and Research Centres. OTGA offers online and in-person courses, workshops, and other learning opportunities on various topics, including marine data management, ocean observing systems, oceanography, marine spatial planning, and marine biodiversity, among others. The OTGA also promotes the use of international standards and best practices in marine data management and information exchange.. The available courses cover a range of topics related to the IOC Programmes and contribute to the implementation of the IOC CD Strategy. OTGA's Regional Training (RTCs) and Specialised Centres (RSCs) aim to deliver customized training for ocean experts and professionals to increase national and regional

capacity in coastal and marine science, services and management. In the LAC Region OTGA established five Centres at Escuela de Ciencias del Mar (Argentina); University of Santa Catarina (UFSC) (Brazil); University of Uruguay (UdelaR) (Uruguay); INVEMAR (Colombia), and Escuela Superior Politecnica del Litoral (ESPOL) (Ecuador). More specifically, IOCARIBE will continuing coordinating with and using the facilities provided by the OTGA RTCs and RSCs to carry out training and specialized courses activities as part of its capacity development programme.

The IOC plan stresses the opportunities for collaboration between IOC Regional Subsidiary Bodies. The IOCARIBE Secretariat will continue cooperation with IOC Subcommissions IOCAFRICA and WESTPAC.

The IOCARIBE region has been increasing its capabilities in the ocean sciences in recent years when looked at as a region. Governmental structures have also strengthened. Looking at its Member States, the IOCARIBE Secretariat identified 147 academic higher education institutions that offer 796 Ocean Sciences programmes including 313 B.Sc. 298 M.Sc. 185 Ph.D. programmes. From that in the United States are 30 institutions with 69 Ph.D., 65 M.Sc. and 63 B.Sc. As well, students and scientists have other opportunities in Canada that has 14 Ph.D., 19 M.Sc. and 18 B.Sc.; Argentina with 13 Ph.D., 11 M.Sc. and 17 B.Sc.; Chile with 10 Ph.D., 20 M.Sc. and 24 B.Sc.; Peru with 2 Ph.D., 8 M.Sc. and 5 B.Sc. (C. Toro et al., 2017). However, 66% of that capacity is concentrated in only five Latin American countries and the USA. The study concluded that the major challenge in the ocean sciences was the asymmetrical development and capacity of member states.

To follow and analyze different variables and generate marine and meteorological forecasts, tsunami waves, trajectory and oil dispersion at sea, among other events, the IOCARIBE Member States use about 48 numerical models most of them operationally. Also, for the development of marine research in the region there are 35 oceanographic vessels in Latin America, and 44 oceanographic vessels in the USA including 16 of the National Oceanic and Atmospheric Administration – NOAA; 14 of the University National System of Oceanographic Laboratories – UNOLS; and 14 belonging to the US Navy (6 managed by UNOLS).

IOCARIBE is committed to promoting gender balance in ocean science within the Region and aims to take leadership in its initiatives in this area. Additionally, IOCARIBE will play a crucial role as a conduit for developing and implementing capacity development efforts by the IOC to assist member states in establishing ocean science management procedures and national policies.

IOCARIBE will proactively explore the potential of the UNESCO University Chairs Programme in Ocean Sciences in the LAC Region, with the goal of identifying effective

capacity development opportunities. The Sub-commission will work with UNESCO Offices in the Region. In particular, with the UNESCO Cluster Office for the Caribbean and UNESCO Office, Montevideo - Regional Bureau for Sciences in Latin America and the Caribbean.

Furthermore, IOCARIBE will actively engage with regional (including subregional) organisations and projects, such as UN bodies, University consortia, intergovernmental organizations, and LME projects in order to catalyze the development of a regional approach that empowers capacity development efforts to be effective across the Wider Caribbean Region.

IOCARIBE acknowledges the importance of marine technology transfer and assistance, as well as the increasing significance of utilizing cutting-edge technology to monitor and understand the marine environment. In light of this, IOCARIBE will prioritize the need for ocean engineering capacity in the region.

4.4 OCEAN DATA AND INFORMATION MANAGEMENT

To effectively integrate the vast array of complex marine environmental measurements and observations across multiple disciplines, institutions, and temporal and spatial scales, it is imperative that we adopt a comprehensive ocean data and information management communication strategy. This will allow us to develop a more cohesive approach towards managing ocean data and information, which will ultimately lead to better decision-making and resource management.

The IOC Strategic Plan for Ocean Data and Information Management (2023-2029) (IOC, 2022) describes the implementation of functional and interoperable data and information management practices and frameworks to ensure data and information availability.

It guides IOC Programmes to effectively share and manage their data and information in a coordinated way and based on widely agreed practices so as to assist in fulfilling not only IOC's objectives but also those of the Ocean Decade. The scope of the IOC Strategic Plan for Ocean Data and Information Management is therefore intended to be comprehensive and cover all disciplines within the mandate of IOC.

All types of data and all time scales for data delivery (e.g. real-time versus delayed mode) as well as synthesis products and model output are included. Different strategies might be employed to satisfy global, regional and local requirements, and to meet timeliness needs.

The aim is to ensure the establishment of a comprehensive and integrated ocean data and information ecosystem for all ocean activities. It is essential that the existing and operational national, regional, and international systems can connect to the integrated global system.

The objectives of the Strategic Plan are to deliver: (i) interoperable, quality-controlled data on a diverse range of variables: (i) generated according to scientifically and operationally sound methods; and (ii) persistently archived in well-documented, globally applicable standards and formats; (ii) timely dissemination of data on a diverse range of variables (generated from observations and model outputs) both in real-time and delayed modes depending on the needs of user groups and their technical capabilities ("on demand" as well as automatically scheduled); and (iii) easy discovery and access to data and information about a diverse range of variables and derived products (including forecasts, alerts and warnings) in a way that is user friendly for a wide variety of users.

IOCARIBE urged Member States (IOCARIBE XV 2019; IOCARIBE XVI 2021) to establish National Oceanographic Data Centres (NODCs), Associate Data Units (ADUs) and/or Associate Information Units (AIUs), in order to enable the active participation in IODE global and regional activities; to implement national needs assessments related to ocean data and information management capacity; and to ensure the development of data and information management plans in existing and new national ocean science, observation and related programmes and activities, and to involve national and regional experts, NODCs, ADUs and AIUs in the development and implementation of these plans.

The expected outcome of the IOC Strategic Plan for Data and Information Management is to achieve significant enhancement of infrastructure, common approaches in ocean data and information management that enable interoperable data sharing and stewardship, and enhanced collaboration between data providers and users. It will implement a "digital ocean ecosystem" as a dynamic and continuous process, incorporating established approaches and technologies as well as those that are only just emerging. In close cooperation with the UN Decade of Ocean Science for Sustainable Development it will aim at representing the socio-ecological dimensions of the ocean through digital means.

In the context of IOCARIBE the main Expected Output will be the regional component of the IOC Ocean Data and Information System, "digital ecosystem" built around already existing and operational national, regional, and linked to international systems which will be the system of choice for all ocean activities, particularly those of research programmes.

It is worth mentioning the importance of ongoing regional projects and activities that will be of relevance to address the development of the regional component of the IOC Ocean Data and Information System, and help overcome the identified challenges, deliver the expected results and to promote capacity development in the IOCARIBE Region, such as (i) the Ocean Decade endorsed actions, which will be coordinated by IOCARIBE; (ii) Ocean InfoHub and

its LAC node, which is coordinated by IOCARIBE and supports member states in improved access to information and data; (iii) the pilot portal for the CHM_TMT developed by INVEMAR (Colombia) and later expanded to be a node of the Ocean InfoHub, with additional LAC partners; (iv) and the Ocean Biodiversity Information System (OBIS) activities in the IOCARIBE Region. Finally, the IOC Ocean CD-Hub ought to be stressed as a relevant tool for making capacity development opportunities accessible and equitable in the region.

The IOC OBIS and its regional nodes, such as Caribbean OBIS, OBIS Colombia, and OBIS-USA, have the potential to greatly contribute to the development of baseline data on biodiversity and ecosystem habitats, such as mangroves, seagrasses, and coral reefs. Additionally, they can play a crucial role in assessing the impacts of both natural and human-induced disasters on these fragile ecosystems. Collaborative efforts with OBIS could lead to the creation of comprehensive maps and indicators that can serve as valuable tools for monitoring and managing marine environments.

The IOCARIBE regional component and the implementation plans will be developed and implemented following functional and interoperable data and information management practices and frameworks as described and recommended in the IOC Strategic Plan for Data and Information Management (2023-2029).

4.5 REGIONAL GOVERNANCE AND RELATED FRAMEWORK DEVELOPMENT

One of the major challenges identified in the Region is the need to implement a comprehensive regional governance mechanism. As a result of a 5-year negotiations Member States, UN, international and regional organisations and partners of the GEF CLME+ Project agreed in October 2021 to create a Coordination Mechanism to improve interactive and cooperative ocean governance, inter alia through integrated management of the shared living marine resources of the CLME+ region. The main goal is to facilitate the realization of the long-term vision of “healthy marine ecosystems that are adequately valued and protected through robust, integrative and inclusive governance arrangements at regional, sub-regional, national and local levels, effectively enabling adaptive management which maximizes, in a sustainable manner, the provision of goods and services in support of enhanced livelihoods and human well-being” in the CLME+ region, within a horizon of 15 to 20 years. This is a major step forward in strengthening governance in the Region and a great example of partnership that will contribute to the sustainable management of transboundary marine resources. IOC of UNESCO (IOCARIBE) has designed and developed the first phases of the

CLME project and is one of the leading partners and has been contributing by contributing the ocean science needed to the Strategic Action Programme (SAP).

As defined by IOC[3], "Marine Spatial Planning (MSP) is a public process of analyzing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic and social objectives that have been specified through a political process."

In short, it is a tool for helping States to foster sustainable use of the sea while addressing emerging needs and challenges. It aligns with UN Sustainable Development Goals 2030 and Paris Agreement, as it contributes to design coordinate strategies to combat climate change and adapt to its effects.

Deploying regional marine spatial planning aims to strengthen regional cooperation for States to design and implement maritime spatial plans while at the same time significantly reducing conflicts between the sea uses and boosting the development of sustainable activities in the region. It can be thus a relevant regional tool for increasing resilience to climate change effects, as it will contribute to a sustainable blue economy, promote joint actions to support the implementation of MSP and development of a knowledge base, as well as improve regional policy coherence.

Since the region is particularly complex in terms of governance, including maritime disputes over marine areas and resources, overlaying of legal frameworks and policies with different objectives and measures, and unequal social and economic development challenges, it is crucial to make sure that there is a solid mapping and analysis of the current regional governance framework, including the identification of strengths and weaknesses, in order to provide security, certainty and clarity to the design of a regional marine spatial planning which will be unique to the region. Such security, certainty and clarity would be indeed essential to support and encourage investors to finance sustainable ocean activities in the region.

Such mapping and analysis would also significantly assist the various coastal States in discussing and agreeing on the foundations of this regional planning, including the identification of potential objectives and priorities. It would also help coastal States to develop Marine Spatial Plans coherent with regional needs, taking land-sea interactions into account, involving all relevant stakeholders, and understanding the available data. It could therefore support the design of an ambitious regional cooperation framework, fit to deal with present and future ocean challenges.

This mapping and analysis could include, but would not be limited to, the following topics: ocean observation and ocean data, management and use of biodiversity, including the impact

[3] See in this regard https://ioc.unesco.org/our-work/marine-spatial-planning

of the future BBNJ Agreement in the region, traditional knowledge and stakeholder involvement, the current state of implementation of the various international and regional instruments in the region as well as related synergies and opportunities for cooperation and collaboration among the various governance actors.

5. MANAGEMENT AND USE OF KNOWLEDGE

The scientific base for enhancing national and regional oeean science and applied ocean science becomes valuable when it is used by managers and policymakers in their decision processes to provide sustainable benefits for society.

IOCARIBE has a prominent and visible role to promote, coordinate, sponsor, support and encourage the creation and dissemination of knowledge for an adequate decision-making process. The creditability of IOCARIBE through its utilization of regional scientific networks will enable it to be a significant factor in increasing science-based decision-making relying on the regional endogenous capacity for coastal and ocean sciences and their knowledge of the local conditions of member states. Capacity development efforts will focus on this component.

The knowledge progression is from data to information to operational products to manuals, proceedings, inventories and methodological guides and finally teaching materials. All levels are valuable when disseminated to appropriately targeted audiences.

The various targeted users include: scientific institutions and regional experts, national agencies and donor countries, governments of Member States, regional organizations (governmental and non-governmental), private industry and the general public (schools, mass media, social media, communities, etc.).

Fundamental ways for disseminating knowledge are: reports and publications on the ocean and coastal sciences, symposia, workshops, websites, social media, and newsletters both printed and on the website. In addition to the scientific, management, and policy audiences there needs to be extensive teaching programs aimed at public awareness.

As important as individual country efforts are particularly in reaching the public the greatest impact on science-based decision-making will be at the regional level Regional Capacity Development Centers (Regional Resources Centers / Excellency Centers / Science and Communication Centers), at different levels of Science and Ocean sciences are needed and can utilize the experience of the Scientific and Communication Centres of Harmful Algal Blooms of the IOC and the Ocean Teacher Global Academy Centers

Fundamental uses of knowledge are a critical input for the strategic planning of national and regional policies. To provide the basis for decision-making (models and methods for facilitating the analysis of economic and environmental policy) are needed.

IOCARIBE will strive to be a catalyst for stimulating the production of products that meet the satisfaction of regional and national needs. It will do this by promoting the enhancement of national and regional marine science and technology capacity development to strengthen the science base needed for decision making.

6. FUNDING

Funding is critical to progress in this science plan. Even though the UNESCO funding situation is not encouraging the increased level of priority for its regional bodies well for the progress of IOCARIBE. However, it will be necessary for IOCARIBE to re-double its efforts for creative extra-budgetary funding. These should include member countries, the private for profit and non-profit sectors and other entities with an interest in the IOCARBE region, especially for capacity development efforts and those with business concerns. Cooperative efforts with other UN Agencies, intergovernmental bodies and regional projects e.g. LMEs will be pursued.

Recognizing society's demands, it is necessary to establish a priority order to be addressed by the Sub-commission's regional programmes and projects under generally limited funding resources.

The identification of priorities and requirements for the projects will be based on two main elements: on one side the policies that are the main lines of action, objectives and strategies contained in this SSP developed within the IOC Strategy Framework, and on the other side the needs which should be understood as main national problems associated with marine-coastal issues identified by IOCARIBE Member States.

A third criteria for the establishment of priorities could be given by the possibility, which include the availability of human, technical and material resources needed for executing projects aimed to address the priority issues mentioned above.

The sustainability of the SSP depends on that the results of the projects reach the required visibility and satisfy the needs of different users groups, which would guarantee funding, and that an adequate enhancement of the capacity development strategy is implemented including human, material and institutional resources from the region and from IOCARIBE Member States.

The competition for funding requires contacting donors in a coordinated manner. Therefore, it is convenient to involve, since the formulation stage of any particular initiative, representatives from UN Agencies (UNEP, FAO, and other), NGOs and private industry

through appropriate legal frameworks. Using this method is possible to reduce efforts duplication, maximize the use of resources and contribute to the financial support of the plan.

The IOCARIBE Secretariat will establish an ad hoc group of experts for developing a sustainable business plan. The Group would be responsible for elaborating proposals to be submitted to potential funding sources.

7. PARTNERSHIPS

IOCARIBE will reinforce and broaden scientific cooperation, regionally and internationally, through regional networking and institutional arrangements between organizations of the UN system, IGOs, NGOs, and the scientific community.

As well, IOCARIBE should capitalize on the IOC efforts to strengthen the role of ocean science as a critical foundation for achieving the mandates of various UN agencies. This will be pursued through exploring new forms of collaboration and potentially forging closer formal ties between the IOC and other UN bodies. In the Region IOCARIBE will continue forging those partnerships for effectively implementing the Ocean Decade, establishing partnerships also with the private sector and industry.

8. Communication and Visibility

Communication is fundamental to raise awareness on the importance of ocean sciences for maintaining life on the Planet. For people to recognize the value of IOCARIBE work it is necessary to communicate tangible results that demonstrate the value of reducing the risk, saving lives, generating jobs and sustainably producing food. There are a series of strategies that IOCARIBE can use for increasing its visibility:

1. Increasing public outreach: organize public events to engage with local communities and raise awareness about ocean-related issues.
2. Enhancing its online presence: use its interactive website to communicate its messages in an engaging way.
3. Partnering with other organizations: collaborate with other organizations to amplify its message and increase its visibility, and reach new audiences and build credibility.
4. Engaging with policymakers: continuing engaging with policymakers at the local, national, and regional levels to influence ocean-related policy decisions.
5. Leveraging social media: use social media platforms, such as Twitter, Facebook, Instagram and LinkedIn, to share updates on its activities and research findings. Social media can also be used to engage with followers and build a community around ocean-related issues.
6. Highlighting success stories: share success stories and case studies of its initiatives and research findings. By showcasing tangible results, IOCARIBE can demonstrate its impact and attract media attention.
7. Building a network of ambassadors: IOCARIBE can work with influential figures in the media, entertainment, and sports industries to raise awareness about ocean-

related issues. These ambassadors can help IOCARIBE reach new audiences and build momentum around its initiatives.

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