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2021 2030 United Nations Decade of Ocean Science for Sustainable Development

THE UN DECADE OF OCEAN SCIENCE FOR SUSTAINABLE DEVELOPMENT

2021-2030

WESTERN TROPICAL ATLANTIC

THE YEAR 2031, A CLEAN OCEAN – STEPS TO SUCCESS CO-DESIGN WORKSHOP

"A CLEAN OCEAN, WHERE SOURCES OF POLLUTION ARE IDENTIFIED, QUANTIFIED AND REDUCED, AND POLLUTANTS ARE REMOVED FROM THE OCEAN"

WTA - TECHNICAL WORKSHOPS SERIES

Report 2021 – 04

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WESTERN TROPICAL ATLANTIC REGION

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REPORT 2021 - 04

English only

This document presents the summary results of the technical workshop series convened in accordance with the Western Tropical Atlantic Action Plan for the UN Decade of Ocean Science for Sustainable Development 2021-2030 (The Ocean Decade), for the seven societal outcomes, held during the period of July-October 2021, in accordance with the Regional Western Tropical Atlantic Planning Group Action Plan. The results of this regional session will be consolidated as a discussion paper by the co-conveners of the regional session, which can contribute to the Western Tropical Atlantic Action Plan including the Eastern Tropical Pacific.

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Western Tropical Atlantic Technical Workshop Series Report 2021 – 04 as a contribution to the UN Decade of Ocean Science for Sustainable Development, Online meeting, 31 August, 2021

LIST OF CONTENT

THE UN DECADE OF OCEAN SCIENCE FOR SUSTAINABLE DEVELOPMENT 2021-2030 WESTERN TROPICAL ATLANTIC

The Year 2031, A Clean Ocean – Steps to Success, Co-Design Workshop

A Clean Ocean, where sources of pollution are identified, quantified and reduced, and pollutants are removed from the ocean.

WTA - TECHNICAL WORKSHOPS SERIES

Report 2021 – 04

Hosted by IOC of UNESCO Sub commission for the Caribbean and Adjacent Regions- IOCARIBE as regional coordinating body for The Ocean Decade.

Virtual Meeting, August 31, 2021

1. BACKGROUND

This document presents the summary results of the technical workshop series convened in accordance with the Western Tropical Atlantic Action Plan for the UN Decade of Ocean Science for Sustainable Development 2021-2030 (The Ocean Decade), for the seven societal outcomes, to be held during the period of July-September 2021, in accordance with the Regional Western Tropical Atlantic Planning Group Action Plan.

Workshop repository with presentations and documents:

http://iocaribe.ioc-unesco.org/webinarseries/cleanocean

A list of programs and initiatives that are relevant as per Annex 4. The full list of UN Endorsed Programmes (28) and Contributions (33) can be accessed at https://oceandecade.com/resource/166/Results-of-the-first-Call-for-Decade-Actio ns-No-012020).

2. INTRODUCTION AND CONTEXT

The UN Ocean Decade is to harness and stimulate innovative ocean research, from co- design to co delivery, to achieve a clean ocean, as well as to contribute to the achievement of the 2030 Agenda for Sustainable Development. A regional workshop on the Western Tropical Atlantic, was held virtually on April 2021. A regional planning group was established, and seven working groups, associated to the Ocean Decade societal outcomes, are actively contributing to define a Regional Action Plan.

Working Group I; a Clean Ocean, whereby sources of pollution are identified, quantified and reduced and pollutants removed from the ocean, involves the harmonizing of regional governance and overcoming geopolitical and economic diversity of the Western Tropical Atlantic Region to achieve a clean ocean.

This virtual session of the UN Decade Ocean Tropical Americas Workshops series, will result in a short regional discussion paper that will include recommendation on the availability of open access to data, information, and new affordable open-source technologies, to integrate earth system/social sciences, and cross sector participation to share resources, mobilize constituencies for national policy and community decision-making processes, and reduce the asymmetry between the countries in the region, including the island states. This could include the identification of priority issues and recommendations for the development of regional actions to develop and build capacity for an information access system for data sharing and interoperability, available to the public for specific products and services tailored to different stakeholder needs, and understandable for the general community.

These short regional discussions papers (in English and Spanish) will be prepared in close collaboration with the co-conveners of the regional session and contribute to the Western Tropical Atlantic Action Plan.

3. PARTICIPANTS

The workshop recorded attendance of 173 participants, coming from 40 countries, from local, national, regional, and global environmental specialists, ocean researchers, transdisciplinary researchers, civil society, policy makers, UN partners, government representatives, NGOs and other key stakeholders from the regions involved in national and regional ocean and marine related matters (Annex 1).

4. OUTCOMES AND FINDINGS

The aim of the workshop was to facilitate and contribute to identify opportunities, gaps, challenges, barriers and favourable conditions to support co-design, co-production and co-delivery actions to achieve a Clean Ocean.

This report highlights priority issues and recommendations identified in the meeting for the development of regional actions as well multi-stakeholder participation. These are:

- The need for multi-state or international strategies to more effectively reduce plastic pollution and a collaborative approach across sectors (communities, industry, and government).
- The development of new research, ensuring the data collected can be distributed and interpreted nationally, and broadening the scope of work so countries can discuss on a bilateral basis.
- The use of Nature-based solutions can help to produce a zero-footprint future. This includes Algal-base Solutions, with algae cultivation, or seaweed aquaculture to absorb carbon and nutrients, among other pollutants, helping develop an adaptation to ocean warming and acidification, and generating biomass and substrate and products for a regenerative and distributive economy.
- The education of the population and true transdisciplinary work from the continent where the problems are generated
- The adoption of alternatives to single-use plastics is fundamental to pursue and the establishment of recycling industries in coastal communities. People need to reduce consumption.
- In order to achieve a Clean Ocean, it was recommended (1) Building an inventory of contaminant sources (2) enhancing analytical capacity through institutional expertise across the region (3) the production of a regional database of the baseline, and current values, to interpret future changes and trends (4) forming a better understanding of the cumulative impact of climate change on pollutants.
- The need of Ocean Literacy as a transversal and systemic tool to engage people in good practices of interacting with the sea organisms and ecosystems
- Some islands are operating beyond carrying capacity. Thus, it is important to employ actions that will provide sustainable development.
- Management of Sargassum bloom is a golden opportunity to produce biomass and reduce eutrophication problems
- Circular economy by removing harmful substances and reusing material
- REMARCO and the Ocean Decade can be an alliance of excellence that takes advantage of the strength of this network and the regional capacities, as a vector of implementation of the Ocean Decade objectives

5. PROGRAMME HIGHLIGHTS AND WAY FORWARD

The agenda for the meeting as per Annex 2, two question polls were submitted to the consideration of the participants. The results in Annex 3.

❑ **Part 1. Welcome/Overview** to brief the participants on the technical administrative matters for the workshop, objectives, and **UN Ocean Decade Overview**

Dr Lorna Inniss (Jamaica) acknowledged the organizers for the opportunity to deliver the talk and celebrated the regional initiative to hold the series of workshops. She gave an overview of the Ocean Decade and reminded the audience how ocean cleanliness has deteriorated, and transformative actions from all are required to revert the cycle of diversity loss to achieve the sustainable development goals. She described the steps in the preparatory phase that led to implementing the Ocean Decade, emphasizing its mission and vision with transformative actions, equity, inclusion to strengthen knowledge and accelerate and ocean observation and data systems the delivery of outputs needed at the regional and national scales.. This workshop would provide an outcome, with clear action points on what we have decided to do next, what is expected for the next workshop, and what we want to achieve at the end of the decade (2031).

❑ **Part 2 -Flash Presentation on the State of Pollution in the Western Atlantic Region**. **Dr Darryl Banjoo**, gave a talk summarising contemporary ocean science and the current state of pollution in the Western Tropical Atlantic region.

The presentation first summarised the major economic activities and major concerns of the region, highlighting that there are over 100 million who live near the coast, and tourism is part of the region's main sources of income., therefore, leads to the environmental concern of pollution, and possible dead zones in our oceans, harmful algal blooms, pathogens affecting human health, the threat of invasive alien species, underwater noise pollution, all exacerbated with the threats of climate change. Furthermore, the presentation touched on the Cartagena Convention, which is the only legal, binding regional agreement for the protection and development of the Wider Caribbean region, and therefore highlights the importance of governance mechanisms.

An overview was then provided of the landmark documents in Pollution Assessment of the Wider Caribbean Region. This included the 33rd Caribbean Environment Programme Technical report (1994, USEPA) on Land-Based Sources of pollution, which labelled sewage, oil hydrocarbons, sediments, nutrients, pesticides, litter and marine debris and toxic wastes to be the greatest threats. The first state of convention report (2019), provided a quantitative baseline for monitoring and assessment in the region. The assessment of untreated Domestic wastewater/ sewage and nutrients loads showcased the fact that they are among the major anthropogenic pressures from land-based sources and activities. In 2021, the regional nutrients pollution reduction strategy and action plan were completed and now requires implementation.

One of the main concerns are the high loading of nutrients, which included dissolved inorganic nitrogen and dissolved inorganic phosphates. There are sites in the North Brazilian Shelf, which were determined to have high loading of nutrients, there is cause for concern in terms of eutrophicated waters. On the other hand, there has been limited data in terms of the amount of data from ship-based activities. Similarly, Oil Hydrocarbons has also raised much concern in the region recently, as there was a recent oil spill in 2019, on the Brazilian Coast and more recently in Trinidad and Tobago. It is therefore important for the region to have an early detection system so hat oils spills can be mitigated, as prevention is better than cure.

Concerning persistent organic pollutants such as pesticides, there is generally limited regional assessment for the coastal and marine environments. The persistent toxic substance, mercury has been another major concern, although there has been limited data on mercury in the marine environment. Furthermore, another cause for concern is organotin compounds, which are used in anti-fouling agents in marine paints and boatyards, and need to be appropriately managed. Lastly, there is a growing concern about emerging contaminants such as pharmaceuticals.

❑ **Part 2.1 -Flash Presentation on Plastic Pollution in the Caribbean Large Marine Ecosystem**. **Dr La Daana Kanhai,** directed a key talk on plastic pollution in the Caribbean Large Marine Ecosystem **(CLME),** which captured work conducted on marine debris and microplastics between 1980 - 2020 in the region; *what we know, existing knowledge gaps, where do we go from here*.

The study utilised 13 databases to retrieve peer-reviewed published studies that reported on marine debris and microplastics in the CLME between 1980 - 2020. This was important, as it allowed for the identification of existing knowledge gaps and priority areas required for future research. Overall, within the CLME more attention was focused on marine debris than microplastics, and the environmental compartment that received the most attention, were beaches. However, considerably less attention was focused on coastal waters, mangroves, seagrasses, coral reefs and the deep sea. This is understandable as more resources are needed to facilitate the sampling of these environmental compartments. There was also a disparity among countries in terms of data availability, with some countries like Colombia having data on marine debris and microplastics in multiple environmental compartments, compared to others having data in a single environmental compartment. Moreover, the studies that reported on marine debris across the Caribbean have indicated that plastics are often the dominant material that is recorded.

It was shown that where resources are limited, it truly emphasised the power of citizen-science initiatives. Additionally, the majority of plastic debris reaching the marine environment originated from land-based activities. This indicates that inappropriately managed waste is leaking into the marine environment. Nonetheless, oceanic currents are also transporting plastic debris into, within and out of the CLME. Also, beaches are not the ultimate sink for plastic debris and microplastics, as these contaminants are ending up in mangrove swamps, seagrass beds, coral reefs and even the deep sea. Therefore, the fact that plastic pollution is a transboundary issue emphasizes that regional and international action is important.

There was also evidence that indicates that plastic debris can induce negative effects on biodiversity, with a few studies indicating that sea turtles, seabirds and fish are ingesting plastics. Plastic debris can accordingly function as a carrier of pollutants and this has consequences for the organisms that ingest them, and apart from the effects on biodiversity, the fact that plastic debris can impact sectors that are important to humans i.e., tourism and fisheries also needs to be considered.

Plastic in the CLME is a complex issue, and within the next decade, we need to focus on the causes of the problem and invest in multi-pronged interventions.

Poll 2; Where should capacity be focused in the WTA region? (Annex 3)

Presentation of the answers to the registration question: "*In a single word, can you comment on what area you think should be prioritised during the decade*." (Annex 3)

❑ **Part 3 – Panel discussion on different thematic areas, necessary for identifying knowledge gaps and priority areas**.

❑ **Identification of sources and quantification of pollution by agricultural fertilizers and the network REMARCO**. **Dr Carolina Ruiz.**

Scientific work carried out in Latin America and the Caribbean allows us to recognize the magnitude and impact of eutrophication. Based on estimates and models, it has been concluded that the contribution of agriculture and the contamination of aquifers is the main cause of eutrophication in the Caribbean. However, studies at the local level in other regions suggest the prevalence of other sources such as urban waste or the transport of nutrients through ocean currents from highly populated areas. Although it is important to assess the problems on a regional scale, it is also essential to improve monitoring programs individually in each zone, which is essential to be able to validate models and predictions of the impacts of eutrophication. Through the use of isotopic and nuclear techniques, it has been possible to obtain information that could not have been obtained by other methods, such as the historical reconstruction of excess nutrients in coastal areas of Mexico

REMARCO is a science and communication cooperation network that connects scientists and communities from 18 Latin American and Caribbean countries under a South-South collaboration framework, it was created under the support of the International Atomic Energy Agency (IAEA) and its mission is to generate scientific information on the state of the coastal marine environment through the safe and peaceful use of nuclear and isotopic techniques and of achieving the effective transfer of scientific information to support the different public policies towards an integrated and sustainable management of the coastal marine environment.

The recent regional project. RLA-7025, deals with chemical pollution (heavy metals, nutrients), microplastics, harmful algal blooms, and ocean acidification. With this project, it is intended that at least 16 countries in the region present reports to meet the goals of the Sustainable Development Goals (SDG), in particular SDG 14. At REMARCO the aim is to provide information on the SDG

indicators 14.1.1 and SDG 14.3.1, through the SDG focal points in each of the member countries, to prepare manuals with a harmonized methodology according to the reality and the limitations of the region, to train specialists in sampling and analysis of samples and in the reports of the SDG indicators through workshops and technical meetings that for now are held virtually due to the pandemic. Monitoring work has been also carry out using harmonized methods in areas of interest, defined according to the priorities of each country, scientific publications and dissemination products are generated in magazines of regional prestige, it also contributes to international databases for harmful algal blooms, for ocean acidification at the IOC and also for the Microplastics database in our own repository.

At REMARCO we are convinced that regional problems are solved with regional collaboration. It can contribute to achieving a Clean Ocean through the study of the sources, distribution, transport, final destination and effects of pollutants in the coastal marine areas of Latin America and the Caribbean through nuclear and conventional techniques. Also through the transfer of knowledge and capacity building through the development of manuals and practical training with harmonized methods consistent with the needs of our region. In the same way, it can contribute to the dissemination of results that provide useful information to the population and interested parties, as well as to the strengthening of relevant databases for decision-making.

REMARCO and the Ocean Decade can be an alliance of excellence that takes advantage of the strength of this network and the regional capacities, as a vector of implementation of the Ocean Decade objectives.

❑ **Plastic Pollution concerning the recent paper *"Source, sea and sink—A holistic approach to understanding plastic pollution in the Southern Caribbean."*. Dr Winnie Courtene Jones.**

The study integrated marine plastic pollution research with ocean modelling approaches, terrestrial litter assessment and regional policy to inform on the sources, flows and quantities of plastic in the Southern Caribbean, and specifically in Antigua, Aruba, Bonaire, Panama, and at sea sampling only off the coast of Colombia. The results indicates that plastics arise from numerous sources and thus solutions also need to be diverse. Furthermore, marine plastics are considered to be a major threat to the sustainable use of marine and coastal resources of the Caribbean, on which the region relies heavily on tourism and fishing. The research also identifies the maritime and tourist industries as contributing towards both terrestrial litter and the microplastics identified in marine samples. This, therefore, represents the complex challenge of managing plastic pollution since both are major contributors to the economies of the Caribbean region. Overall, holistic research, such as this study, can help to identify where interventions may be interlinked, resulting in the most significant impact to reduce plastic pollution

The importance of understanding the transboundary movement of marine litter in the Caribbean was also raised, due to the prevailing ocean currents, as such movement can undermine local or national legislation aimed at reducing plastic pollution - action taken in one location does not necessarily translate to less litter on their shorelines. Therefore, there is the need for multi-state or international

strategies to more effectively reduce plastic pollution and a collaborative approach across sectors – communities, industry, and government – to bring this about.

❑ **The complicated relationship Macro-Algae Sargassum has with Ocean Pollution, Dr Franziska Elmer.**

The presentation discussed how the bloom is made up of pelagic *Sargassum*, The natural habitat of pelagic *Sargassum* is the Sargasso sea, where the bubbles on the algae are air bladders (vesicles) that keep the algae afloat. When the algae get older and start to disintegrate from the sun, these air bladders break and eventually the algae sinks to the bottom.

A recently published paper shows that the percentage of nitrogen in *Sargassum* has increased today, compared to the 1980s. Additionally, it is particularly high in places with land-based runoff. Similarly, energy production, biomass burning and synthetic nitrogen fertilisers are increasing the nitrogen loads in the ocean, where pelagic *Sargassum* takes advantage by increasing its growth rate. Moreover, pelagic *Sargassum* is an important offshore habitat, however, when it reaches the coasts and beaches, it becomes a polluter itself. For example, the Caribbean has known *Sargassum* for a long time, as some would escape the Sargasso Sea and travel there but the quantities are unprecedented. *Sargassum* removal also requires the wearing of scarves due to the different toxic gasses being released like the foul-smelling hydrogen sulfide gas. This can lead to adverse health effects, including irritation of the nose and throat, nausea and vomiting, headache, dizziness as well as decreased lung function. Long term health effects are still being researched. These dangerous gases can travel tens of kilometres and still impact people. Therefore, to avoid decomposition and health impacts, *Sargassum* needs to be removed within 48 hours. Nearshore ecosystems are also impacted by these mass inundations, including brown coloured ocean water or sargassum brown tide, and anoxic nearshore waters that impact animals, mangroves and coral reef ecosystems and lead seagrass beds to die off completely.

The presentation ended with how pelagic *Sargassum* can also help to clean up our ocean, as it doesn't only take up excess nutrients that are otherwise released into the ocean and brings them back to land, by acting like a sponge removes other pollutants from the marine ecosystem. This includes the accumulation of arsenic, heavy metals and Chlordecone, and therefore gives us a second chance of depositing them properly. (www.marinefrontiers.org/Sargassum)

❑ **Monitoring and Assessment of Pollutants, Dr Linroy Christian.**

The presentation touched on the State of Convention Area Report (SOCAR) 2019, which provided a basis for how we should move forward with the assessment of the convention area. The Open-Ended Working Group on monitoring and assessment provided the technical insight on the implementation of the LBS Protocol, and as such provided much of the input that went into the SOCAR report. The challenges associated with the assessment of the SOCAR includes strengthening the role of science, the importance of causality (ensuring that implementation is in the best interest of the countries), a paucity of quantitative data, data gaps.

Concerning the more minute details, there are budgetary constraints at the national level, and human resources deficiencies. There is also very little coordination within the region, as it relates to laboratory work and data comparability. Similarly, concerns relate to the classification of waters (I or II), due to the legislation in various countries, and discharge vs receiving water guidelines is still under discussion. Lastly, issues concern the right parameters for monitoring, standard operating procedures, and the compatibility of equipment that can limit detection.

The presentation concluded by acknowledging the fact that to move forward, there is an obligation that countries should take more seriously and implement institutional considerations, to ensure the strengthening of national capacity. This should align both national and regional priorities, and the obligations under the Cartagena Convention and the LBS protocol, and other relevant legislation. This includes the development of new research, ensuring the data is collected can be distributed and interpreted nationally, and broadening the scope of work so countries can discuss on a bilateral basis.

❑ **Marine Life 2030 programme (endorsed by the Ocean Decade), Dr Frank Muller Karger.**

The presentation described the UN Ocean Decade endorsed Programme “Marine Life 2030: A Programme of the UN Decade of Ocean Science for Sustainable Development”. This program seeks collaborations across communities, disciplines, and regions to build global knowledge of marine life for local action in the Ocean Decade. Marine Life 2030 will establish a globally coordinated system to deliver actionable, transdisciplinary knowledge of ocean life to those who need it, promoting human well-being, sustainable development, and ocean conservation. It is necessary to implement the framework to unite existing and new programs into a global, interoperable network, transforming the observation and forecasting of marine life for the future for the benefit of all people.

Furthermore, the ocean we want hosts abundant and diverse life that supports humanity’s needs for food, natural products, and good livelihoods. Today, management of marine living resources relies mainly on proxy variables like temperature, salinity, and topography -- generally without measuring biology itself. Also, existing data on ocean species are inadequately coordinated, undigitized, of varying quality, and largely inaccessible. Part of the issue is that marine biodiversity science and observations are poorly linked to users and communities.

Overall, Marine Life 2030 is an open networking program to address these challenges. The science we need to achieve the ocean we want requires transformations in technology, in the culture of science, and the scale and nature of coordination. Everyone is invited to work with this and other Ocean Decade Programs and convene stakeholders -you, MBON, OBIS, Ocean Best Practices and others- around the world to co-design, coordinate and finance sustainable marine life observation and applications.

❑ **Comments**

After all this information and challenging talks, some participants commented about the need to recognize that our current model to colonized coastal ecosystems is responsible for the growing

eutrophication. They advise about the use of Nature-based solutions in order to produce a zero-footprint future. Proper management and treatment of continental run-off should provide a full condition of bioremediation and restoration of wetlands. Algal-Based solution (with algae cultivation, or seaweed aquaculture) can help to absorb nutrients among other pollutants mitigating their impacts, helping us to develop adaptation to ocean warming and acidification.

Another point of concern is Mining and oil exploration and their possible impacts in the environment. They pointed out about the need for strong action and that it is important to quantify and monitor pollutants, but also we should stop the main source of impacts. Also, it was mentioned the possibility of using emerging technologies against pollutants, using international standards according to regional specifications.

Another participants recommended to recognize the big problems in order to move forward to find solutions. This, for example, requires changes to the sewage treatment and water process protocols, and the remediation and restoration of coastal ecosystems, which would help fisheries and the aquaculture sector, but also benefit economies. Support to the network REMARCO was also mentioned, to strengthen the collaboration between different counties in the region.

A very important point was raised in the comments, about the need to integrate a transdisciplinary component that actually addresses the social and economic problems that exist behind the indicated problems. We can allocate resources and technologies to study and try to recover damages in the marine environment (coastal and oceanic). But if we do not attend from the education of the population and true transdisciplinary work from the continent where the problems are generated, there will not be enough resources to try to study and mitigate the problem. Related to this, there was the concern about the organizing institution that will act as the "intelligence" to cluster all of these.

❑ **Part 4. Open discussion to facilitate productive and interconnected discussions**.

What are our science gaps and objectives for achieving a clean ocean?

❑ **1. Pollutants, Sources and Channels** (transport and flow, ocean based, land based)

There are major concerns regarding the coastal sources of pollution, mainly at the Northern region of the Caribbean (Brazil), where over 80% of pollution comes from rivers and between river mouths. Furthermore, in 2019, oil pollution was found over 5000km of an 8000Km of coast, which is closely related to plastic pollution. As the Amazon River mouth has a lot of impact on the Caribbean region, data must be shared. It was also suggested that related to plastic pollution the adoption of alternatives to single-use plastics is fundamental to pursue.

The magnitude and diversity of marine pollution across the region, as a result of both land based and ocean sources needs to be tackled immediately (locally and regionally). There are 4 important pillars that need to be built everywhere in the decade to achieve a clean ocean. This includes building an inventory of contaminant sources and enhancing analytical capacity through institutional expertise

across the region (both requires a concerted capacity building plan). The third pillar relates to the production of a regional database of the baseline, and current values, which are necessary for interpreting future changes and trends. Finally, forming a better understanding of the cumulative impact of climate change on pollutants, which may cause the remobilisation of contaminants in coastal zones such as mangrove's and sea grasses. All 4 pillars not only require good intention, but the commitment of governments and funding for implementation.

It was also commented the need to develop efficient disposal tools, or to recycle more than 90% of our waste, especially in coastal communities. It is necessary to establish recycling industries, especially plastic recycling industries, in the coastal cities/towns.

It was emphasized the need to join efforts, unify programs, join efforts in the same direction in order to get integrated solutions, and it has been shown the need for more information, achievements, and data related to marine pollution. It is also important to strengthen national regulatory and legislative aspects.

❑ 2. **Quantification** (observation, identification, measuring)

There is an interest in quantification of plastic debris and micro plastics, standardized methodologies, sampling optimization and laboratory analysis, but funding is necessary. There is the need to work hard and together in order to obtain better results and at the same time have an awareness-raising approach and to generate scientific publications. Also, there is interest in quantification of the pharmaceutical industry, and the framework around it, including public consumption, the discharge through municipal waste systems.

There is the need to focus on action, and supporting qualified teams to scale up. It is important to determine how to amplify and accelerate pledge fund so they become real endorsements that ultimately lead to funding from groups. This does not have to be the "best practices" but should at least be "good practices" so that we can trigger some type of change and action.

Several responses came out to the question**:** how do we engage the youth and early career professionals to begin conducting research? It is important of engaging with young people, due to the limited amount of time we have left to act, as we are potentially the last generation to make a lasting impact. It is therefore important to engage at the university level, as there is a lot of potential form young people to engage. Early Career Ocean Professionals (ECOP) are currently cooperating with REMARCO, on quantification and working with eutrophication in the Caribbean regarding micro plastics. By other hand, another young researchers have experiences some challenges, they want to be part of projects and focused work teams, but due to lack of projects, budgets or work contracts there are not able to do it. While they are students they can work on their thesis projects, but once they are done it becomes difficult to be part of the project.

❑ 3. **Impacts** (acidification, eutrophication, toxicology)

It was mentioned the importance of ocean literacy, it is different from communicating about marine science. Ocean literacy not only involves knowledge and the understanding of the marine environment, but also the ability to apply that to people everyday lives. Ocean Literacy is a transversal and systemic tool to engage people in good practices of interacting with the sea organisms and ecosystems The UN's Ocean Literacy tool kit for all is a great baseline for understanding the concept of ocean literacy. However, it is important to note that not one size fits all and that we need to look at an adaptive capacity building when it comes to ocean literacy. The engagement of local communities, indigenous people and other relevant stakeholders in the development of frameworks is also important to note. Additionally, was very interested in Regional Activity Centre (RAC) discussion on how they can support concentrated and much focused ocean literacy, through the ocean literacy hub across the 8 countries already on board. This ultimately can serve as a great test for moving ocean literacy out in an adaptive way. There is an interest in implementing Ocean Literacy at Regional Activity Centres.

It was pointed out the concern about the situation regarding what is happening in Brazil regarding pollution. It was suggested the need for action, such as the signing of a letter to advertise the problem in Brazil to governments. Lorna Innis commented that The Cartagena Convention does not include Brazil, however this country has participated for many years as an observer. Over the last 5 years, the task has been to bring Brazil back on board to address the issues of pollutants. It has been a challenge, but we continue to get Brazil to work in the WTA. Some participants from Brazil mentioned their interest on that.

Another comment regarding to impacts raised the issue that our islands are operating beyond carrying capacity. It is hard to accept this, but without accepting this issue, we will not be successful in employing actions that will provide sustainable development.

Another comment recommended the management of Sargassum bloom as a golden opportunity to produce biomass and reduce eutrophication problems

❑ 4. **Reduction and Technologies** (policies, clean up initiatives, environmental education, adaption)

It was mentioned the need to incorporate a mass education push for the general public in moving towards a reduction in plastic pollution in our countries and regionally. Also, it was recommended we should spend more resources on providing proper garbage receptacles and management systems so that we limit the amount of plastic that blows or falls into our streams.

Regarding to how to reduce the use of marine litter? As it is one thing to get dispose of litter properly, but how do we reduce use in a public education public programme? The answer was Implementing the carrier bag ban was found to be a bit difficult to apply at first, however, if we submit to them the right alternatives, which can be affordable and not inconvenience them by switching to the alternatives, should allow for a smooth transition.

By other hand, it was commented the importance to go to circular together, as although we can do it as an individual island or as an institution, doing it together throughout the decade will give us a better result for the ocean we want. Going circular by taking out harmful substances and reusing material

wouldn't be the only scientific initiative. Another participant commented that we need innovative and operative solutions; not just by the governments, but society as a whole. Ocean literacy is fundamental, and oriented science that provides a solution. It was also commented the importance of participation of civil society together with researchers in dealing with plastic pollution.

It was suggested the use of sensors technologies to give more of the real-time data to work with increased capabilities. Working together would improve that, through identifying contaminants, creating new sensors and applying them.

❑ Part 5. Summary and Call to Action

Everyone is to be considered an active participant and member of the Clean Ocean Working Group. It is also anticipated that each participant has a series of partners in your counties or the private sectors, which we can also integrate into this group. Currently, we have not experienced much engagement with the private sector or indigenous persons, thus it is important to commence engagement.

The co-design process of working collaboratively through transdisciplinary practice, a key piece of this work, to deliver this both natural science and social science -i.e. behaviour change- is imperative to achieving a Clean Ocean. We foresee this being an active working group.

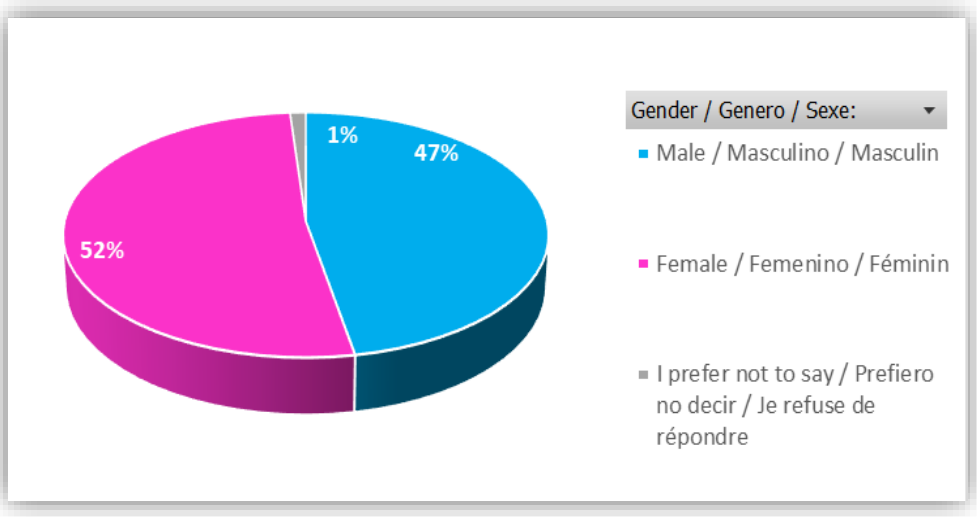
This workshop is the foundation for the preparation of the next actions for a Clean Ocean within the framework of the UN Decade.

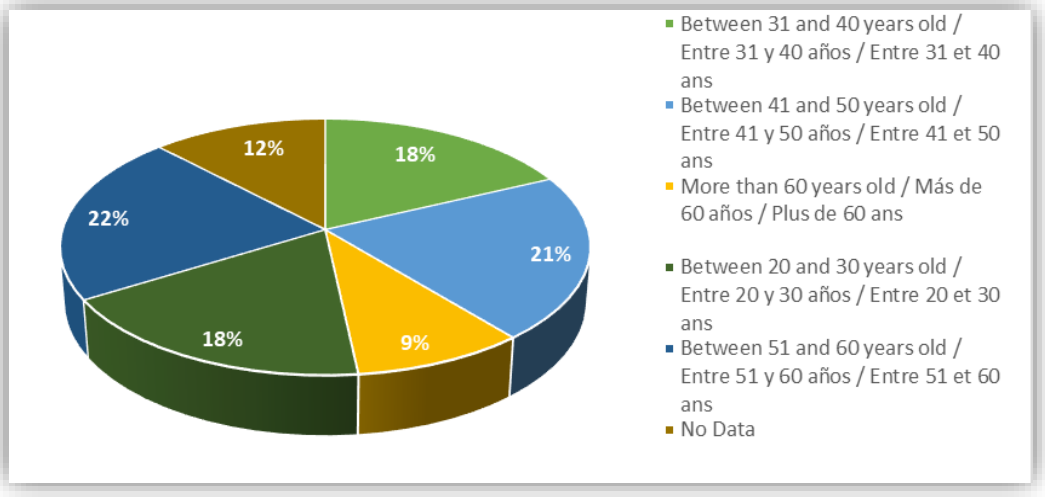
Way Forward

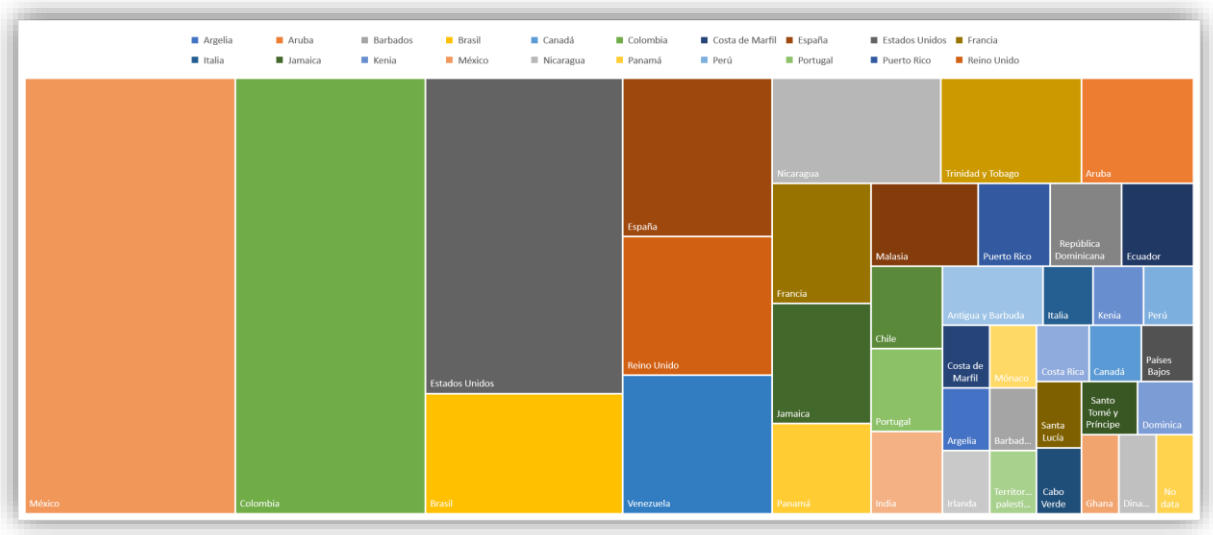
The Clean Ocean Working Group will prepare a proposal based on the outcomes from this workshop for adoption and endorsement through the Ocean Decade Governance bodies and mechanisms. The proposal will be prepared in close collaboration with the COWG and the other WTA working groups, and relevant stakeholders, form private, public, and academic sectors. This task will have the support of a regional consultant.

6. ANNEX 1

LIST OF PARTICIPANTS






Argelia
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México
Nicaragua
Panamá
Perú
Portugal
Puerto Rico
Reino Unido
México
Colombia
Estados Unidos
Brasil
España
Reino Unido
Venezuela
Nicaragua
Trinidad y Tobago
Aruba
Francia
Jamaica
Panamá
Malasia
Puerto Rico
República Dominicana
Ecuador
Chile
Portugal
India
Antigua y Barbuda
Italia
Kenia
Perú
Costa de Marfil
Mónaco
Argelia
Barbad...
Irlanda
Territor... palestí...
Costa Rica
Canadá
Países Bajos
Santa Lucía
Santo Tomé y Príncipe
Dominica
Cabo Verde
Ghana
Dina...
No data

7. ANNEX 2

AGENDA

The UN Decade of Ocean Science for Sustainable Development 2021-2030:

Tropical Americas A Clean Ocean Co-Design Workshop

CLEAN OCEAN WORKING GROUP

The Year 2031, A Clean Ocean – Steps to Success

Tuesday, August 31st at 9h00 Colombia Time (10h00 AST, 14h00 UTC).

Hosted by IOC of UNESCO Sub commission for the Caribbean and Adjacent Regions- IOCARIBE

Web: http://iocaribe.ioc-unesco.org/webinarseries/cleanocean

Register at: http://iocaribe.ioc-unesco.org/webinarseries/cleanocean/regcleanocean

Simultaneous interpretation will be provided: English, French, and Spanish.

Programme

Cartagena Time	ITEM
	Part 1 **Welcome/Overview**
09:00 – 09:05	**Technical Briefing** **Dr Lorna Inniss / Dr Soraya Silva** Co-Chairs Clean Ocean Working Group
	Poll #1 How familiar are you with the UN Decade on Ocean Science?
09:05 – 09:08	**Welcome** **Dr Lorna Inniss** Co-chair Clean Ocean WG • Overview of Ocean Decade • Objectives of the Meeting • Structure of workshop
09:08 – 09:23	**Part 2**

	State of pollution in the Western Tropical Atlantic **Moderator**: Lorna Inniss/Soraya Silva **Western Tropical Atlantic region.** **Dr Darryl Banjoo** Senior research officer - Institute of Marine Affairs and the Cartagena Convention Regional Activity Centre. Trinidad and Tobago
09:23 – 09:30	**Plastic Pollution in the Caribbean Large Marine Ecosystem.** **Dr La Daana Kanha** Marine Scientist - The University of the West Indies-
09:30 – 09:35	**Moderator**: Shivani Patel Presentation of the answers to the registration question: "*In a single word, can you comment on what area you think should be prioritised during the decade*."
09:35 – 10:05	**Part 3** **Panel Discussion: Identifying knowledge gaps and priority areas** **Moderator**: Lorna Inniss
09:35 – 09:40	**Identification of sources and quantification of pollution by agricultural fertilizers** **Dr Carolina Ruiz** Researcher - Institute of Marine Sciences and Limnology, National Autonomous University of Mexico. Associate researcher at the University of Quebec in Montreal
09:40 – 09:45	**Plastic Pollution** **Dr Winnie Courtene Jones** Post-Doctoral Research Fellow - University of Plymouth, UK
09:45 –09:50	**Sargassum** **Dr Franziska Elmer** Host and Executive Producer of The Sargassum Podcast
09:50 –09:55	**Pollution quantification/ science gaps** **Dr Linroy Christian** Director of Analytical Services at the Ministry of Agriculture, Land, Fisheries and Barbuda Affairs in Antigua and Barbuda
09:55 –10:00	**Marine Life 2030 programme (endorsed by the Ocean Decade)** **Dr Frank Muller Karger** Professor - College of Marine Science, University of South Florida

10:00 – 10:05	**Q&A - post questions and comment in chat**

10:05 – 10:50	**Part 4** **Open discussion –** to facilitate productive and interconnected discussions **Moderator**: Lorna Inniss ***What transformative ocean science solutions and actions*** *have been proposed to improve the arrangements to address marine pollution as well as science gaps and governance obstacles achieving its objectives and contribute to a Clean Ocean by 2030?* 1. **Pollutants, Sources and Channels** (transport and flow, ocean based, land based) 2. **Quantification** (observation, identification, measuring) 3. **Reduction and Technologies** (policies, clean up initiatives, environmental education, adaption) 4. **Impacts** (acidification, Eutrophication, toxicology) **Cross Cutting issues** • **Sectors** (tourism, aquaculture fisheries) • **Areas** (Coastal, estuaries, terrestrial, marine) • **Capacity building** - link with other working groups on issues. What are the capacity limitations within countries to address marine pollution? Are there specific training programmes that institutions and the working group can support during the Decade?
10:50 – 10:55	**Poll #2**

10:55 – 11:00	**Part 5** **CLOSING SESSION** **Summary and Call to Action**
	Summary and Call for Action. *Next Steps and Way Forward for the Clean Ocean* ***Schedule for other WTA workshops and Kick off conference*** **Co chair or moderator - Secretariat**

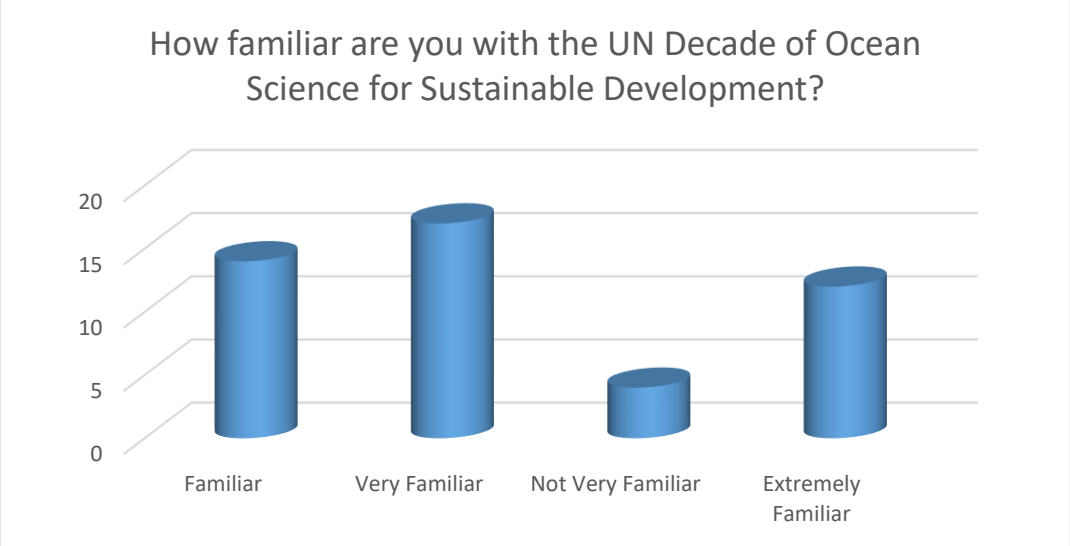
8. ANNEX 3

POLL QUESTIONS

POLL #1

How familiar are you with the UN Decade of Ocean Science for Sustainable Development?

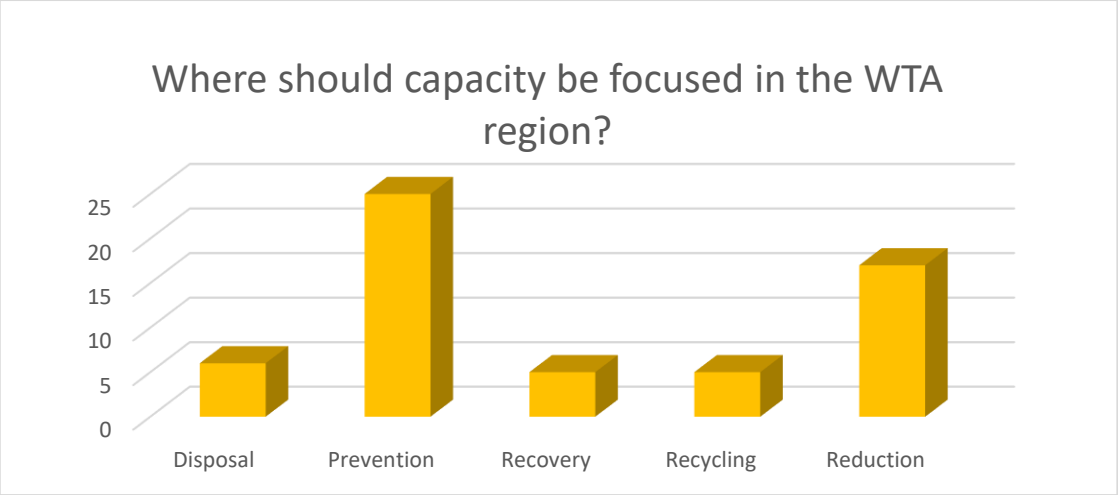
a) Extremely Familiar
b) Very Familiar
c) Familiar
d) Not Very Familiar
e) Not at All

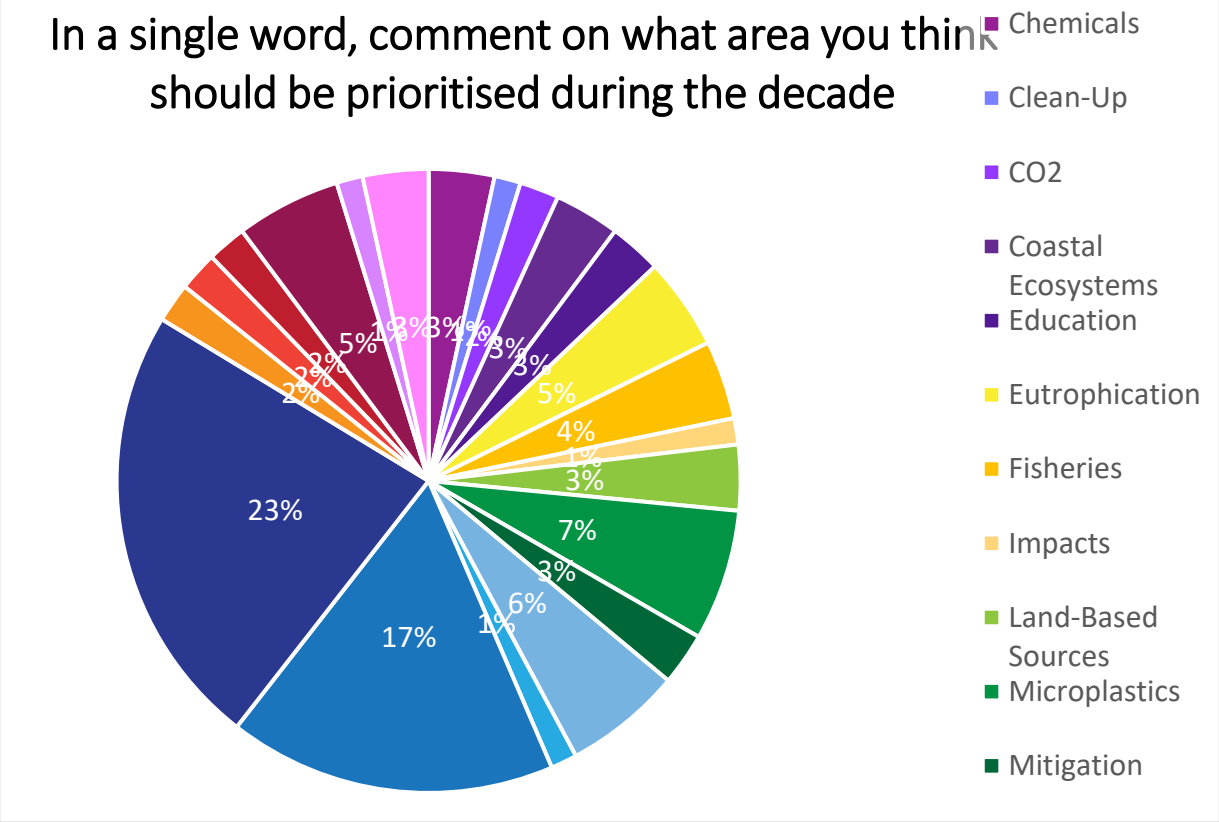


POLL #2

Where should capacity be focused in the WTA region?

a) Prevention
b) Reduction
c) Recycling
d) Recovery
e) Disposal


Where should capacity be focused in the WTA region?
25
20
15
10
5
0
Disposal
Prevention
Recovery
Recycling
Reduction


In a single word, comment on what area you think should be prioritised during the decade
23%
17%
6%
1%
7%
3%
3%
4%
5%
3%
3%
1%
3%
5%
2%
2%
2%
Chemicals
Clean-Up
CO2
Coastal Ecosystems
Education
Eutrophication
Fisheries
Impacts
Land-Based Sources
Microplastics
Mitigation

9. ANNEX 4

UN Endorsed Programmes and other Programmes of Interest to The Transparent and Accessible Ocean Working Group – For Cooperation And Interaction

The list of programs and initiatives that are relevant (the full list of UN Endorsed Programmes (28) and Contributions (33) can be accessed at https://oceandecade.com/resource/166/Results-of-the-first-Call-for-Decade-Actions-No-012020).

The following are a list of programs and initiatives that are relevant:

- ❏ UN Decade Programme Ocean Best Practices
- ❏ UN Decade Endorsed Program – Coast Predict - Observing and Predicting the Global Coastal Ocean
- ❏ UN Decade Endorsed Program, The Nippon Foundation-GEBCO Seabed 2030 Project, a component is MACHC, Meso America and Caribbean Hydrographic Commission/IOCARIBE
- ❏ USA Decade Contribution - Committee on Earth Observation Satellite - Coastal Observation, Practices
- ❏ UNESCO/IOC Decade Tsunami Programme, more quickly detect, measure, forecast and warn for tsunamis, even from the near-instant they form, and to enhance the preparedness of coastal though the communities for tsunamis UNESCO/IOC Tsunami Ready Programme;‘
- ❏ Coastal Flooding - Inundation Forecast Initiative in the Caribbean – RAIV, WMO WTA WG Accessible and Transparent
- ❏ Ocean Observing Co-Design: evolving ocean observing for a sustainable future
- ❏ Observing Together: Meeting Stakeholder Needs and Making Every Observation Count
- ❏ Ocean Practices for the Decade

The OIH will first work with IOC-associated online resources – including OceanExpert, OceanDocs/Aquadocs, the Ocean Best Practices System, the Ocean Biodiversity Information System (OBIS), the World Ocean Database (WOD) and Ocean Data Portal (ODP) – extended by partnerships with EurOcean, Marinetraining.eu, EMODNET, and other sources in the IOC ODIS Catalogue of Sources (ODIScat).

Based on feedback from the three pilot regions, the initial thematic focus of OIH will be on

i. experts and institutions/organizations,
ii. documents,
iii. Spatial data and maps,
iv. research vessels,
v. education and training opportunities,
vi. Projects.

10. ANNEX 5

WTA WG Webinar Series Update

WORKING GROUP	LEADER (S)	DATE/TIME (COT)	TITLE OF WEBINAR	UN PARTNER AGENCY
A safe ocean	Christa von Hillebrandt	**8th July**, 2021; 14:00 – 16:00	"Breaking down the Silos for More Effective Early Hazard Warning Services"	United Nations Office for Disaster Risk Reduction UNDRR
A transparent and accessible ocean	Albert Martis Edgar Cabrera	**29th July**, 2021 9:00 - 11:30	"A transparent Ocean with open information and technologies access"	World Meteorological Organization WMO
Capacity Development	Elva Escobar Ariel Troisi	**19th August** 2021 10:00-12:00	"Deep sea Capacity Development needs in the WTA and the ETP for the Ocean we want"	International Seabed Authority ISA
A Clean Ocean	Lorna Inniss	**31 de August** 2021 9:00-11:00	"The Year 2031, A Clean Ocean - Steps to Success"	UN Environment Programme UNEP Cartagena Convention
A healthy and resilient ocean	Francisco Arias	**9th September**, 2021 9:00-11:00	"Co-designing the path to sail the Decade of Ocean Science to reach the knowledge we need for the ocean we want in the WTA"	
A predicted ocean	Marck Oduber	**23rd September** 2021 9:00-11:30	"Changing the vibe to predict smooth sailing in the WTA and ETP: A Theory of Change approach"	World Meteorological Organization WMO
A sustainably harvested and productive ocean	Alejandro Acosta	**7th October** 2021 9:00 - 11:30	"Co-existing Opportunities and Synergies: Exploring Opportunities for a sustainably harvested and productive ocean in the WTA"	Food and Agricultural Organization FAO