Final Report: Regional Workshop Southeast Pacific

UN Decade of Ocean Science for Sustainable Development (2021-2030)

Permanent Commission for the South Pacific (CPPS) headquarters, Guayaquil, Ecuador

September 24-26, 2019

December - 2019

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Regional Workshop
Southeast Pacific

UN Decade of Ocean Science
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Decade:
Decade of Ocean Science for Sustainable Development

In December 2017, the General Assembly of the United Nations proclaimed the Decade of Ocean Science for Sustainable Development of the United Nations (2021-2030). This UN decision recognizes science as a prerequisite for managing the ocean in a sustainable manner and, therefore, as a pillar for the implementation of all the Sustainable Development Goals (SDGs) of the 2030 Agenda and more particularly SDG 14 related to the Ocean.

The Decade will work to support the needs of legislators, ocean industries, civil society and, of course, scientists. A successful Decade will require the international community to develop new and collaborative partnerships that can offer a more effective scientific management of our resources and ocean space. New knowledge on the current state of the ocean will be made available to all communities and governments, and will be supported through appropriately scalable capacity development that provides not only tools to carry out marine science, but also the ability to understand cutting-edge science and use this knowledge to inform society and policy makers.

The Decade presents a unique opportunity to provide scientific knowledge, foster technological innovation, and develop the capacity to implement the 2030 Agenda and reverse the deterioration of ocean health.

The Southeast Pacific Workshop offers a crucial opportunity to co-design mission-oriented research strategies in accordance with the 2030 Agenda and the Action Plan for the Protection of the Marine Environment and Coastal Areas in the South-East Pacific, focusing on needs and Priorities of the countries of the Southeast Pacific in terms of transformation of knowledge systems; acceleration of technology transfer; implementation of training and education; and the promotion of science-political dialogues.

The Southeast Pacific workshop seeks to identify:

- Knowledge gaps and regional priorities of ocean science for the 2030 Agenda and the Southeast Pacific Action Plan
- Associations / networks / existing relevant initiatives and potential partners / interested parties
- Priorities in capacity building / training.
- Priority issues and matters to be addressed in the Decade
- Other regional initiatives and meetings that will be aligned with the Decade.

This workshop will be part of a continuous global dialogue throughout 2019 and 2020 through events parallel to the conference, other thematic workshops and the online Decade Community Platform to inform on the planning of the Decade.

The Decade of Ocean Science is a global and inclusive initiative, and the key to its success is a high level of commitment from all stakeholders.

Workshop Development:
A shared vision from the CPPS Member States

WELCOMING REMARKS

The event was opened by Mr. Roberto Viteri, Vice Minister of Aquaculture and Fisheries, who highlighted the importance of the conservation of marine resources for the well-being of our peoples, as well as the elimination of illegal fishing. He also pointed out the importance of data collection produced by government-private sector alliances to implement fisheries management measures. He considered that the initiative of the Decade of Ocean Sciences will allow to manage resources to guarantee a better management of marine resources by promoting discussions among different sectors to reach sustainable solutions.

OPENING REMARKS

Mr. Peter Thompson, Special Envoy of the UN Secretary General for the Ocean, sent a message to the participants by videoconference, in which he made a call to transform the research, identify the knowledge gaps that still exist and promote capacity building. The opportunity is presented in the planning report for the decade, which will allow this dialogue to be redone to make it informative and inclusive.

Dr. Vladimir Ryabinin, Executive Secretary of IOC-UNESCO, also welcomed the workshop participants. He indicated that when we talk about the Decade, we are talking about ocean science and needs for sustainable development in the region, in which education, development capacity, and scientific and political discussions are integrated. It is an opportunity for the region to develop alliances and strengthen networks. We need advances in ocean science to learn how the ecosystem works. Therefore, we must define how to capitalize the efforts of the region.

Ariel Troisi, President of the Assembly of IOC-UNESCO, stated that the ocean currently has a special focus in the world. But we must be very clear on the focus of our region. There is no lack of capacities in the region and there is good infrastructure. The challenge is to identify the priorities and how to articulate it with the UN initiative and contribute to the preparation of the implementation. It is a unique opportunity, a key moment that we must seize to link science and sustainable development.

Ambassador Mentor Villagomez, Secretary General of the Permanent Commission for the South Pacific (CPPS), highlighted the importance of the Decade as a unique opportunity to promote science - political dialogue. He pointed out the needs and the priorities be considered among the activities to be developed in this initiative linked to the 2030 agenda. The challenges are complex, but not unbeatable. Technology and innovation are key, and he asked to make efforts to identify elements that can contribute to the initiative from the region.

INTRODUCTION TO THE OBJECTIVES OF THE DECADE

Ariel Troisi. He informed the background of the Decade initiative declared by the UN Assembly, who commissioned the IOC-UNESCO to prepare the implementation plan based on consultations with all stakeholders. The initiative takes place in the framework of a growing global attention on the ocean. He highlighted the interaction between the SDGs and the sea, and the complex structure of United Nations instruments and institutions involved. The ocean is spoken of as a finite system. We have gone from exploring, to understanding and predicting. Today the data is in real time and the generation of large amounts of data (big data), leads to better knowledge to guide decision making.

Ocean sciences do not have the financing of other disciplines, among other things, due to the high cost. This has to do with a new social contract in terms of marine sciences. This workshop allows to define priorities and where we want to reach. In general we are not so bad in Latin America in science generation. He recognizes that there are also gaps in knowledge and asymmetries between countries and regions, and highlighted the importance of communication through ocean literature to reduce them.

He explained the possibilities for the future in terms of science and technology, and how to ensure access. We have the opportunity to do something different. The decade is organized into 6 main objectives. Clean ocean, healthy and resilient ocean, a predictable ocean, a safe ocean, a sustainable productive ocean, and a transparent and accessible ocean. He identified research and development priorities and our current moment. He indicated that the Work Plan must be completed in nine months and the decade begins in 15 months. He asked the participants for audacity and creativity, to think in the long term, to guide solutions, collaboration, synergies, and links.

Cesar Toro. He also began his presentation with the message to locate us where we are and where we want to be. He reported on governance within the framework of IOC-UNESCO, the role of national science councils in this Decade process. The challenge is for them to be reflected in the budget and planning, for which we require specific policies. He highlighted the installed capacity in Latin America and the asymmetry in science with respect to other regions. He reported an exercise his organization carried out on science programs in Latin America and found that there are 777 ocean science programs, including over 185 doctoral programs. However, 70% of the capacity is concentrated in five countries: Brazil, Mexico, Chile, Argentina and Colombia. In general, the academic offer is very good compared to other regions. Something similar occurs with the installed capacity of ships. There is great potential and added value in science in the region, referring to the ERFEN program. He also underscored the importance of involving the industry in this process.

Francisco Arias. Member of the Decade Planning Group. He made a brief diagnosis of the limited knowledge we have on the ocean, due to the fact that, among other things, ocean science is expensive, research has been voluntary and governmental, and is not sufficiently funded. There are unequal capacities and a technological imbalance, and weak governance. In general, it is thought that marine sciences describe, but do not provide solutions. Therefore, it is necessary

that those who take advantage of the oceans to invest and share information. He highlighted the importance of UN resolution 72773 declaring the Decade of Ocean Sciences for the period 2012-2030, and the integrality of the science approach in this initiative. Expected achievements include: filling information gaps, promoting actions at all levels, changing knowledge of the contribution of the ocean to the stability of the planet, and translating the results of science into solutions. The initiative commits the private sector and the generation of new technologies.

He described the challenges for the region in terms of knowledge gaps, expected outputs, required actions, potential collaborations, resource mobilization, governance models, science-based solutions, potential climate change mitigation products, integrated coastal management, marine-spatial planning, risk plans, responsible fishing, and governance policies.

He identified ocean science and technology, civil society, industry and philanthropy as key stakeholders to generate ocean policies and achieve sustainable development. He highlighted the importance of taking ownership of the initiative, developing actions at different levels to send a message to our politicians.

MESSAGES FROM YOUNG SCIENTISTS

Message from Patricia Briseño. Eloy Alfaro Lay University. She highlighted the diversity of ocean science and the enormous challenges that make it hard to find the solutions. It is time to raise awareness on the importance of the oceans, because despite the impacts, we can repair them. It is a great mission and it is essential to develop scientific knowledge and make it accessible to the public and decision makers. Public policies based on science. Ocean conservation is up to all of us, not only scientists but even those who live far from the sea. It is now our turn to return what has been given to us and clearly define what needs to be done.

Maria Cecilia Teran, from the Nazca Institute. She also underscored the opportunity to generate knowledge, skills and technology from this initiative. It is a bridge of communication between science, politics and the social realm in all its dimensions. I see this with optimism and commitment, and hope that it turns into opportunities for alliances, and transformation for a better future.

Panel 1
A necessary reflection

Moderator:
Carlos Zapata | General Technical Coordinator of the General Directorate of Maritime Interests of Ecuador

Panelists:
Patricio Bernal | Coastal Marine Program of CSIRO-Chile and member of the World Commission for Marine Protected Areas of the International Union for Conservation of Nature (IUCN)
Andres Chipollini | Marine Institute of Peru (IMARPE)
Ana Lucia Caicedo | Oceanographic and Hydrographic Pacific Research Center (CCCP)
Virna Cedeño | Omic Biotechnologies Center (CEBIOMICS)

PATRICIO BERNAL

He stressed that in 1960 when the International Oceanographic Commission (IOC) was created, only 40 countries were member states, so the First Executive Secretary of the organization toured the world to promote the adhesion of other states (currently 150). An interesting aspect of this is that at that time the development of marine sciences was almost non-existing. Thus, just in Latin America and Asia, the only institutes dedicated to the study of oceanography and marine sciences were the National Armed Forces in some Latin American countries when the only representatives of a country to the (IOC) are usually people linked to the hydrographic and oceanographic service of the Navy.

In that sense, the development of marine sciences through the channels of the Academia and university in the last 50 years does not have the openness that is desired, making it necessary to establish national coordination lines. For example, at the national level, Chile has created the Ministry of Science, Technology and Innovation because it considers that there is an intrinsic relationship between industry and the private sector. Likewise, at the regional level, the Permanent Commission of the South Pacific (CPPS) in the 1960s had a key role in the scientific coordination of its member states, a role that today has suffered a decline, and needs to be strengthened.

In conclusion, there are two challenges: (i) To look broadly at the issues of national and international coordination in the field of marine sciences for the same fact that the flow of information today is increasingly dynamic, and, (ii) Strengthen regional coordination channels among scientists in the countries.

ANDRES CHIPOLLINI

He focuses his intervention on the progress of the region in ocean science, pointing out that the information produced is abundant and permanent. In fact, research institutions in the region, such as CPPS (ERFEN group) have allowed the integration of information from member countries to have a vision of what happens in the aquatic environment off their coasts. However, what should improve is the visibility and integration of the information, particularly associating the information produced and using it for predictive purposes. For example, CPPS countries have strong roots in fishing and, being located in one of the richest areas of ichthyological resources, are interested in knowing the environmental variability of the sea. In fact, the consequences of El Niño events always significantly impact the economy of the countries in spite of all the studies that have been carried out on the subject.

In that sense, the authorities of the countries must be motivated to allow this mechanism to continue and be maintained over time. For example, in terms of coordination between science and politics, Peru has managed to get the Ministry of Economy to allocate a budget per results (BPR), which is a modality of research funding that guarantees continuity and sustainability as long as one delivers attainable products that have a direct impact on productive activities or on disaster risk prevention activities. This mechanism guarantees to maintain the ocean observation system (which is expensive) but also promotes research by allowing citizens to participate in the results so they can learn or become interested in the interaction with the environment and the importance of its care, or the actions to prevent or minimize natural disasters.

The challenge then is to develop a level of regional integration of information or its centralization of and availability for local uses.

ANA LUCIA CAICEDO

Considers that everything should start at home. That is, we must do an internal exercise to evaluate the role of our institutions, their level of contribution and the degree of integration with other institutions at a country level. With this diagnosis, aspects to be modified can be identified.

One of the great limitations of the researchers is the need to have more resources, because when the decision maker of the money to be provided nationwide often receives similar funding requests between two public institutions, which reveals a lack of coordination nor is there a joint

position on a particular issue and the funds are not delivered to one or the other. In other words, sometimes similar objectives are pursued. Colombia has been developing an initiative to centralize all funding requests for marine scientific research and avoid the duplication of orders and uniformity in research objectives, this increases coordination between institutions.

Another challenge is that the information that results from the research reaches the community, especially information related to biodiversity and marine resources since it is not about doing research just to fill out a researcher's curriculum. To achieve this, citizen participation is important throughout the process through its involvement in the formulation of initiatives, planning, publicity and appropriation of knowledge.

Another challenge is to advocate for the ocean to be part of the climate system, for example, the issues of El Niño events and its impact on sustainable development. That is, to teach the population that even those who live far from the sea still suffer the consequences of ocean changes, for example, their effects on agriculture.

VIRNA CEDEÑO

Biotechnologies are important tools (ocean floor explorations, characterization of decontaminating molecules, etc.) to better understand the ocean.

He considers that it is necessary to strengthen education in marine science matters and for that it is important to motivate children to take care of the planet so that they develop interest in these matters. There are studies that show that more and more children are unaware of nature. This shows that the first step is to understand nature and change certain habits.

Biotechnology is one of the best tools to reduce dependence on certain non-renewable resources and even to identify and assess the biodiversity of countries. Unfortunately, due to lack of knowledge, its usefulness is often unknown.

Another challenge is the dissemination of science or its socialization.

Panel 2
Capacity building and marine technology transfer

Moderator:
Rina Gabriel | Scientist to ERFEN and GRASP Alliance, delegated from Peru. Directorate of Hydrography and Navigation of Peru.

Panelists:
Carlos Zapata | DIGEIM
Francisco Arias | INVEMAR
Samuel Hormazabal | PUCV
Ruby Ortiz | CECOLDO

What priority needs do we have in the region to close the knowledge and monitoring gaps in this region?

- Develop mechanisms that allow to link the industry and academia in data collection, taking advantage of the economic support capacity of the industry and the scientific support of the academy.
- Develop capacity and technology to meet the needs taking into account regional diversity. It is necessary to take full advantage of the monitoring capacity already installed and include other variables.
- To develop and share technology it is first necessary to define what we want and what we need to measure. It is not enough to have access to technology, it is necessary to know what we want it for and develop the capabilities to get the most out of it.
- In terms of technologies in our region they are relatively good. We need agreements to share the technology available and, from there, balance the existing imbalances.
- Evaluate the possibility to develop proprietary technologies as a region

What do you think are the most relevant inequalities as a region?

- Make an inventory of capacities to know who to turn to when we have a problem.
- Each country has strengths that must be identified to enhance the capacity. Inequalities can become a strength. It is necessary to develop mechanisms to exchange experiences.
- Political will and the establishment of exchange mechanisms.

- There are different capacities and expertise in the region, as well as initiatives that tend to reduce disparities that must be enhanced, such as meetings, internships with intermediate training, among others.

What would be the most important marine research lines to improve observational capacity?

- Permanent and continuous programs are required.
- Use of existing data for model validation.
- Data of new observations oriented to other uses and services.
- Quality control and data exchange.
- Management of oceanographic instruments through standardized procedures with implications for data quality.
- Take better advantage of new technology, such as autonomous equipment.
- Improve data storage systems and improve the ability to interpret large volumes of data.
- Promote citizen science.
- At sea we have to think in three dimensions and also consider that natural processes are not linear.
- When it comes to operational oceanography the challenges are different from those of managing databases.
- The valuation of ecosystem services is important for decision making and planning.
- The data of the region must fit into a global vision.
- Better communication towards society, including politicians.

Panel 3
Partnerships and Funding

Moderator:
Mauricio Montalvo | Ministry of Foreign Affairs of Ecuador.

Panelists:
Jorge Jimenez | MARVIVA
Rodney Martinez | CIIFEN
Adriana Flachier | Ministry of Foreign Affairs of Ecuador

Our countries have reached a certain level of development that makes them less eligible for international cooperation. The challenges of this transition scenario are an important element to consider.

What could be the main alliances or cooperation mechanisms in this new scenario for the region?

- The Global Environmental Fund – GEF, continues to be one of the main donors despite being one of the oldest mechanisms dedicated to financing environmental issues. The GEF is currently seen as a counterpart, countries are obliged to provide funds to the GEF, and as long as we continue being members we are eligible by the GEF. However, Latin America is not taking full advantage of the GEF funds, the ocean being a focal area of the GEF. Other mechanisms such as the adaptation fund and a special climate change fund that began by feeding off of carbon sales are now nurtured through philanthropy.

- CIIFEN's experience in matters of cooperation could be a good example of how to raise funds. They took advantage of a window to boost climate services and vulnerability. We have to be specific and with a key message and work more in coordination at the regional level, since the spreading of issues weakens the regional position.

- Identify key issues aligned with global initiatives. Begin to see relevant international agendas, such as SENDAI, El Niño, impact and uncertainty of the impact of climate change. The Southeast Pacific is the region with the greatest contradiction regarding predictions and it is also the region that shares the least data. We must start by sharing data before continuing to generate it or buy technology.

- Adaptation to climate change opens up an opportunity to take advantage of the green climate and adaptation fund, presenting itself as a region with high uncertainty.

- Lack of political consensus at sea level. Science must be financed within a value chain from generation to decision making to improve people's quality of life.

- Regional alliances have not yielded the expected results because we cannot always access the funds.

How to link research with political decisions? Roles of governments, academia, private sector.

- Marine research is expensive. There is a lack of articulation between agencies and institutions in the region. A mapping of stakeholders must be initiated to determine and enhance stronger bonds and alliances.

- Research priorities must be defined. If it is with public funds, it must respond to national priorities.

- At the regional level, we must answer questions that will help solve the priority problems to achieve sustainable development. We must convince our governments that it is worth investing in research. Cooperation projects must be developed to demonstrate these approaches and convince governments to invest.

- Environmental services must be part of the national accounts. As for land activities, we need a marine tax system where companies pay for the use of marine space. For this we must make evident the economic benefit that maritime activities provide to our society. The funds must mainly be generated in each country and politicians must be involved to convince them. Political advocacy is required to achieve it.

- A parallel path is to make sure that ocean sciences interconnect to become ocean services, connected at multiple levels. With an established marine information society, we can generate pressure from the local level to the political one. We must migrate from science to multilevel information services and thus join forces among the population.

- The role of communicators and journalists as key stakeholders was highlighted, but they require training so they may communicate properly.

Panel 4
Cross-cutting issues: Traditional knowledge

Moderator:
Fernando Felix | Regional Technical Coordinator for the Southeast Pacific Action Plan

Panelists:
Doris Ortiz | Representative of the Humanist Institute for Cooperation with Developing Countries (HIVOS)
Carlos Tapia Jopia | Director of the Center for Social Studies (CESS)
Xavier Chalén | Director of the International Marine and Coastal Conservation Program

He made a brief description of traditional and ancestral knowledge defined as those that indigenous communities possess and that have been passed down from generation to generation for centuries. Such knowledge and uses related to nature and the universe encompass a series of knowledge, techniques, skills, practices and representations that communities have created in their interaction with the natural environment.

These ways of thinking that are expressed in language, oral tradition, feelings of attachment to a place, memory, spirituality and vision of the world considerably influence values and beliefs, and constitute the foundation of many social uses and cultural traditions.

This field of knowledge includes several aspects: (i) Traditional ecological knowledge; (ii) Knowledge on local fauna and flora; (iii) Traditional medicines; (iv) Shamanic rituals and practices; (v) Beliefs; (vi) Social organizations; (vii) Holidays; (viii) Dialects and visual arts, among others.

As can be seen, traditional knowledge and uses constitute the foundation of the cultural identity of a community, but its preservation – as a result of globalization - is in grave danger.

Although it is difficult to quantify the immaterial aspect as ancestral knowledge in an objective way, how important do you consider that ancestral knowledge is in the coastal and island communities of Ecuador?

Doris Ortiz

Traditional and ancestral knowledge is very important. She brings up her professional experience in one of the most remote areas of Ecuador near the border with Colombia where most of its members are Afro-descendant communities dedicated to the exploitation of mangrove shells. In this case, she highlighted the importance of dialogue as a tool to relate and interact with its members in order to know beforehand their feelings, experiences and needs to -from there- design joint work that will enhance their exploitation and conservation capabilities.

In that sense, dialogue constitutes a key process for interacting with two different logics: science and ancestral knowledge. This process involves recognizing the counterpart as a different subject with different knowledge and positions. Thus, an open, respectful and frank dialogue allows scientific professionals to access this traditional knowledge.

For example, in the case of Ecuador, early tsunami warning systems as disaster prevention tools possibly took into account the ancestral experiences of coastal and island communities for their design that, due to their relationship with the sea, have developed a particular sensitivity that allows them to perceive changes in temperature or anomalies in the ocean that tsunamis usually announce. This knowledge has led to many lives saved by early warning systems.

Ancestral knowledge, culture and coastal societies. Could the Decade of Ocean Science help preserve the ancestral knowledge and way of life of these communities in a world where social values are of little importance?

Carlos Tapia Jopia

Yes. Ancestral knowledge can contribute to ocean science. As well as the opinion of Doris Ortiz, traditional knowledge has an important contribution in the actions of environmental conservation since it has to do with the life experience of the communities over time and can be complementary to scientific knowledge.

She stresses the beginning of a systematization process of ancestral practices that have proven effective in restoring ecosystems. In this context, a challenge of this systematization is not only to identify certain ancestral practices, but also to identify the historical context, principles, values and governance systems on which these ancestral practices are based. The latter is important to understand the cultural differences between different communities and to demonstrate the viability of replicating such practices in a given context.

In response to this, a relevant element is that systematization must be integral and multidisciplinary in order to combine the application of ancestral practices and the cultural identity of each community.

Regarding the question asked, in his opinion, the main challenge is not only to learn from the ancestral practices of the indigenous communities, but also to take into account fundamental issues such as the economic model of the countries where the communities are located, and the role that their respective governments and the different stakeholders linked to the scientific world and conservation must play, being that although ancestral knowledge can be an important contribution to conservation, it demands the effort of other sectors.

Another challenge for the scientific field is the training of professionals and the design of methodological approaches to promote -through various techniques- dialogue with indigenous communities not only to obtain their traditional knowledge, but also to identify their needs and integrate them in the actions for the conservation of resources respecting their cultural identity.

In your opinion, what could be the most important contributions of ancestral knowledge to the process of the Decade of Ocean Science of the United Nations?

Xavier Chalen

First, the importance of good ancestral or traditional practices in environmental conservation must be recognized, as well as the ability -among the members of the communities themselves- to transmit this knowledge from generation to generation. The latter is important because one aspect that we must learn from these individuals is how they manage to pass down their traditions and customs to future generations, without that knowledge being altered over time. Thus, for example, eco-management practices in aspects of governance must be amplified and included -together with science- as part of the oceans.

Additionally, gender aspects are also important to ensure the transmission of knowledge where women play a fundamental role in it.

Another aspect is the fishing methodologies that, as part of ancestral practices, have an important value because they eliminate bycatch and promote a sustainable and orderly conservation of resources without the need for scientific advice to properly manage a stock. Consequently, in scientific terms, the articulation of these aspects through certification mechanisms, such as "Firstrade", "Marine Stewardship Council" or others can make traditional knowledge work together with the applied science that supports (through objective proof) the sustainable exploitation of a certain resource.

In this way, duly organized communities (such as fishing unions) have an important role to play because through the transmission of their knowledge they can generate greater social awareness about the importance of proper resource management.

Carlos Tapia Jopia

One of the main contributions of traditional knowledge is the way in which communities relate to nature from a broad point of view, i.e., beyond the ways of relating to the environment (for example through certain fishing gear), but also understand their economic approaches and models. This is especially important if the intention is to replicate traditional practices in a group or community other than from where they originate since it creates a series of adaptability difficulties. It must be remembered that the cultural values and beliefs of one community are not necessarily equal to others. He brings up his professional experience in Rapanui, Easter Island.

Another aspect to consider is the practices related to the conservation of water resources where the restoration of certain ecosystems depends on the recovery of ancestral practices. In view of the above, traditional knowledge shows that it has a very important utility in the conservation of resources, so its use or application on a larger scale requires a prior analysis of social, economic and cultural factors.

Work Group 1

A clean ocean where contamination sources are identified and eliminated

Co-moderators:
Dr. Luisa Espinosa Díaz | INVEMAR, Colombia
Dr. Nelson Vásquez Farreaut | Catholic University of the North, Chile

The topics raised below correspond to the compilation of the discussion session, the survey results (8 in total), and the complement of the discussion in the plenary session.

1. KNOWLEDGE GAPS AND RESEARCH PRIORITIES

1.1. Gaps

a) Unify marine research with terrestrial research, due to land sources of pollution, which are the largest.

b) Strengthen environmental quality standards, by engaging the State, the academia and the private sector.

c) Research to change education models so they may reach communities to change the mentality regarding their perception of the ocean.

d) Research on automatic measurement systems, technology development in the region.

e) Regional monitoring and modeling with the use of new technologies.

f) Tear down paradigms, maintain long-term research programs, and support the training of marine scientists.

Of the total issues identified to carry out research for a clean ocean, in the assembly it was decided to define three as the priority ones. The first refers to knowledge needs regarding sources of pollution, types of pollutants and their effects on the environment, organisms and human health; the second refers to technologies aimed at strengthening monitoring systems and to solve pollution; and the third one oriented towards education, so that the questions are answered: (a) How to educate to achieve pro-environmental behavioral changes?, (b) How to transfer knowledge so that it is attractive and meaningful to the decision makers?

The items discussed are described below:

1.2. 2. Research priorities

1.2.1. Need of knowledge regarding sources of pollution, types of pollutants and their effects on the environment, organisms and human health.

a) Identification of pollution sources.

b) Emerging contaminants (antibiotics, pharmaceuticals, among others).

c) Other contaminants such as pesticides, hydrocarbons, metals, plastics.

d) Impact on ecosystems, organisms, human health.

e) Noxious algae blooms due to an increase of nutrients in the sea.

f) Presence of invasive species and drifting plastics as elements that favor the dispersion of these species.

g) Investigations to determine the ranges of tolerance of species and ecosystems to different types of pollutants to learn the levels of impact and determine the balance points.

h) Rates of CO_2 increase and their environmental impact due to acidification.

1.2.2. Monitoring Technologies in search of solutions to pollution

a) Technologies for real-time measurings.

b) Strategies to measure and evaluate discharges - degree of treatment.

c) Lack of infrastructure.

d) Use of decontaminating native microorganisms.

e) More efficient and clean fisheries (control of ghost nets and control of fishery wastes).

f) Waste recovery for commercialization.

1.2.3. Education How to educate to achieve pro-environmental behavioral changes? And how to transfer knowledge so that it is attractive and meaningful to decision makers?

a) Change in education and action

b) Change of vision of the ocean and its importance for human life

c) Society in general to value the ecosystem services that the ocean is providing

d) Change in business model

e) Ecological cities

2. BARRIERS, LIMITS AND RECOMMENDATIONS FOR

2.1. In research:

a) Strengthen the ability to explore the scientific information that already exists by the scientists of the countries

b) Engage the social sciences. Implementation by the Ministries of Education

c) New era biotechnologies as one of the research priorities to decontaminate ecosystems

d) Master's programs in omic biotechnologies, offered to scholarship holders in the region who develop theses on topics of interest to each country.

2.2. In legislation:

a) Political will to take action

b) Promote incentives to improve water quality

c) "Who pollutes pays" policies. With assessments of the impact generated

d) Lack of regulation

e) Lack of political management to comply with standards such as MARPOL

f) Groups that take oversight, control and surveillance seriously

g) Strengthening oversight

h) Regulation as an element of coordination

i) Caution in the exploration of seabed resources

j) Shared responsibility

k) Efforts are needed to prevent pollution

3. EXISTING NETWORKS AND NEW OPPORTUNITIES FOR ASSOCIATIONS

Thanks to the surveys, the networks that currently exist in the region and are working on marine pollution issues could be established.

3.1. Existing networks

a) REMARCO Marine-Coastal Research Network.

b) Southeast Pacific Data and Information Network to Support the Integrated Coastal Area Management Project (SPINCAM).

c) The Colombian Surveillance Network for Conservation and Protection of Marine and Coastal Water (REDCAM).

d) Global Partnership on Marine Litter (GPM).

e) Latin American Ocean Acidification Network (LAOCA).

f) Garbage Scientists Network (RECIBA).

3.2. New opportunities

a) Strengthen networks of marine protected areas.

b) Strengthen the development and implementation of a ballast water Regional strategy.

c) Create a ship scrapping network.

d) Share experiences such as the London Protocol

e) Citizen science programs.

f) Generate ocean observatories.

g) Simultaneous ocean surveys, such as ERFEN.

h) Strengthen alliances with scientific committees that work along the same lines.

i) Establish networks with the private sector

4. FINANCING

During the group's activity, the following were proposed as financing possibilities:

1. Multisectoral commissions to allow the participation of the private sector.

2. Percentage of taxes (ports, cruises, merchants, etc.) for the marine sciences. Additionally, the surveys identified other possibilities that we grouped into two options:

In the region:

a) Inter-American Development Bank

b) UN Oceans

c) FAO

d) NGOs

e) ROCRAM

f) IMO

g) Scientific Wastes Program

h) UNEP

Beyond the Region:

a) International Atomic Energy Agency

b) Japan international Cooperation Agency (JICA)

c) European Union

d) The Ocean Fundation

e) NatGeo

f) Programa Glofouling

g) Whitley Award

h) Projects such as SPINCAM and MSP GLOBAL

It was discussed that countries should have a technical committee, either Ministries of Science and Technology, Environment or from research centers in the region, with central coordination from the CPPS to develop common projects applying to existing financing opportunities.

5. GOALS

Now (0 to 2 years)

Capacity and infrastructure diagnosis in the region Standardization at the region level:

a) Diagnostic of capacities.

b) Standardization of evaluation methods to measure pollutants (concentrations, types, impacts, etc.).

c) Standardization of monitoring methods for contaminants and their sources.

d) Use the ocean health index as a basis for the diagnosis of pollution in the region.

Medium Term (3 to 5 years)

a) Begin in a coordinated manner between the different institutions and countries the monitoring of the main pollution items, such as garbage of plastic material, emerging pollutants and the tolerance levels of organisms against these pollutants.

b) Report the results found.

c) Begin with the institutions of the existing networks, and others that can be identified in order to carry out dissemination and education activities that address these issues through didactic strategies that allow to achieve effective mitigation and prevention objectives. Network agencies that are already working on it could guide or train other institutions to take advantage of pre-existing experiences in these matters.

d) Build a strategy to disseminate national and regional monitoring results, aimed at decision makers.

Long term (6 to 10 years)

a) Political decision making based on the results of the monitorings.

b) Evaluations in pro-environmental terms to learn the impact of dissemination and education activities on the population.

Work Group 2:

A healthy and resilient ocean where marine ecosystems are mapped and protected

Co-moderators:

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1. INTRODUCTION

This report presents the information collected during the development of the activities carried out jointly in Working Group Number 02, A Resilient and Healthy Ocean, established within the framework of the Southeast Pacific Region Preparatory Workshop for the UN Decade of Ocean Sciences for Sustainable Development 2021-2030. This initiative, among other things, seeks to generate interinstitutional and intersectoral synergies around the world, which will allow the promotion of actions to improve conditions for the sustainable development of the oceans. To this end, the main objective is to identify knowledge gaps and research priorities, as well as existing initiatives and networks that contribute to the fulfillment of the Sustainable Development Goals (SDGs), mainly related to the ocean and climate in the region.

For the development of information exchange activities within the working group, the guidelines provided by the Permanent Commission for the South Pacific (CPPS) were taken into account, among which is the Summary Report of the First Global Planning Meeting: United Nations Decade of Marine Science for Sustainable Development, the Guide for Working Groups and Indications for Working Groups. The document was made thanks to the contribution of over 15 institutions from countries of the Southeast Pacific through their participation in the thematic sessions designed and proposed by the Workshop. With this, it was possible, in addition to identifying limitations in terms of knowledge and existing capacities around the work theme, to identify possible existing initiatives and networks, as well as new strengthening opportunities with sights on this purpose at a regional and international level.

The document includes a brief description of the methodology adopted for the compilation of the information by the participants of Working Group A Resilient and Healthy Ocean, following the seven guidelines of the aforementioned guide document, which went from the identification of the interested parties, to guidelines for submitting reports to the plenary. Subsequently, the results of the workshop will be presented in the same order suggested in the guide for the socialization of the results, as well as in a table summarizing the short, medium and long term scope of the initiatives identified, associating them to aspects related to possible barriers and / or existing limitations. On the other hand, with the purpose of providing a broader context of the

opinions and specific contributions in each of the points presented to the participants, in some cases, the specific comments collected during the session are included, which led to the definition of the registered points.

2. METHODOLOGY

As a first step, and taking into account the guidelines described in the support material provided by the official organizers of the Southeast Pacific Region's Preparatory Workshop for the UN Decade of Ocean Science for Sustainable Development 2021-2030, a brief presentation of the group's attendees was proposed, seeking to identify the institutional profiles, and with that, be able to classify their contributions according to their thematic expertise.

The above is prior to the definition of roles by the co-moderators, designating interlocutor and rapporteur functions (see Figure 1, left). In this way, the information transmitted by the attendees was recorded simultaneously in the information panel (Figure 1, right), while the comments and details on each of their contributions were digitized in a document for the purpose of later review and classification.

Subsequently, a reading of the condensed information was made during the session by the co-moderator with rapporteur functions in order to be able to make possible precisions on the opinions recorded. Once with the material, meetings were held between the co-moderates to synthesize the information collected, highlighting the most relevant items and classifying specifically according to the guidelines stipulated by the workshop organizers. This compilation included five questionnaires filled out and sent via email by the attendees of GT02 prior to the event.

Figure 1. Information gathering process by the Resilient and Healthy Ocean Working Group. Own source.

3. RESULTS

Below are the results recorded in each of the seven stipulated axes, which include (A) identification of research priorities, (B) initiatives and programs to be strengthened and / or generate, (C) creation of new alliances and (D) recommendations for actions, (E) the organizations responsible for leading to the consolidation of the defined strategies, as well as (F) the specific needs for the development of technological transfer capabilities to achieve the social outcome.

A. Research priorities for the region to comply with the social result

1. Dynamic mapping of coastal and ocean areas in the countries of the region based on continuous monitoring as a basis for generating information under formats that contribute to the actions of national legislation, thereby seeking to identify habitats of high ecological relevance.

2. Mapping of ocean floors (with a physical, chemical and biological approach) beyond and within the jurisdiction of the countries - Areas Beyond National Jurisdiction Program (ABNJ).

3. Definition of indicators of dynamic ecosystem services (socioecologic indicators) and integrated regional monitoring systems that allow to obtain information with the adequate periodicity.

   Comments:

   - *These indicators and services should consider biophysical structures and processes, ecosystem functions and services, benefits captured by human groups and values derived from the benefit (cascade model), which jointly aim to reduce subjectivity in the application of the models, and that at the same time provide a unified vision for the implementation of measures. These indicators must be coupled to land ecosystems, taking into account that some of the most important anthropogenic stressors that alter the health and resilience of the oceans (agricultural production) come from them.*

   - *It is necessary to identify specific areas that do not have integrated regional indicators that provide information on the health status of biodiversity (as is the case with the issue of ocean acidification) at different levels of biological organization.*

   - *Subjectivity implies, for example that socially, mangroves have a higher social value, while corals are valued from another approach with greater weight.*

   - *The indicators should address a differentiating approach with respect to the issue of spatial scales, identifying those suitable for the coastal zone, as well as those necessary for the deep ocean, considering that the latter lacks the community component that the first does have.*

   - *It is recommended to take into account the experience and achievements of some initiatives, such as those achieved by SPINCAM (South Pacific Data and Information Network to support the Integrated Coastal Area Management Project; five agreed indicators) on matters of generation of indicators for coastal areas.*

- *There is an ocean health index, but it is not adapted for the Southeast Pacific region under standardized methodologies in accordance with the characteristics of our ecosystems.*

4. Generation of environmental DNA information ((environmental DNA, eDNA)) to obtain real time "life images" in the ocean.

5. Evaluation of the cumulative impact of the high intensity fisheries systems operation on the ecosystem and ecological services provided by society, both at the coastal and high seas levels.

6. Evaluation of functional ecological connectivity processes (potential and real) at the regional level that allows prioritizing conservation areas for the design and / or strengthening of a Marine Protected Areas Network (MPA).

7. Definition of a strategy to strengthen marine biodiversity inventories through new DNA barcode registrations of specimens collected within the international BoldSystems (Barcode of life Data System) platform.

8. Develop standardized methodologies for the identification of anthropogenic stressors, considering the spatial scale of ecosystems, prioritizing those related to ocean areas, also considering the evolution and natural (non-static) dynamics of ecosystems.

9. Research associated with the protection of marine ecosystems in the deep ocean (high seas ecosystems), beyond the maritime jurisdiction of the countries of the region, taking into account the existing support of international regulations.

10. Long-term monitoring of marine ecosystems, especially related to protected areas through the institutionalization of this activity through standardized methodologies at the regional level, including among others, the strengthening of research platforms that provide information in real time.

11. Adoption of new data and available databases (and those generated in the future) to demonstrate significant progress in the identification of species and understanding of anthropogenic and natural controllers, as well as biodiversity and the function of ecosystems.
    Comment: The above, adopting emerging observation technologies (seaglidder, remote sensing, underwater networks, water column profilers of biogeochemical variables) that solve existing limitations in resource issues for the development of oceanographic cruises and vandalism issue of which ocean buoys are victims, and that are part of the conventional monitoring networks of our countries.

12. Coupling of economic and ecological models, which allow an adequate valuation of marine ecosystems, taking into account the non-linear relationships that are part of their components (definition of ecosystem valuation units).
    Comment: see InVEST project methodology Integrated Evaluation of Ecosystem and Compensation Services, Natural Capital project).

13. Biotechnology applied to generate actions related to a healthy and resilient ocean, bearing in mind the problems associated with microplastics as an anthropogenic stressor with great impact on ecosystems and human life.

14. Identification of the effects of plastics in different marine ecosystems, taking into account the magnification process in the trophic chain, and its impact on human consumption.
    Comment: performing models that allow the analysis of different scenarios and project their associated impacts. The foregoing as a basis for documenting this affectation with greater truth, as a basis for raising awareness on this problem and promote conservation actions in conjunction with the communities.

15. Analysis of the impact of sedimentation on the health and resilience of ecosystems as a result of deforestation of land ecosystems (principally mangroves) that alter the ecological conditions of ecosystems located in coastal areas.
    Comments: Ecuador has developed efforts associated with the simulation of scenarios that involve dredging activities, identifying a high impact on ecosystems. Similarly, the role of mangroves in their natural function as "sediment traps" and the preservation of ecosystems is recognized.

16. Lines of research associated with the protection of marine ecosystems in the southern region (Antarctic Continent).

17. Studies oriented to the identification of real biological connections to evaluate the relevance of the designs implemented in marine protected areas, taking into account, among others, the cumulative impacts of the ecosystems and their constant dynamics.

Note: During the activity, the need was raised to generate technical and scientific information that would allow to explore issues related to offshore aquaculture, as an alternative strategy to respond to the demand of protein in the region, seeking not to deplete fishery resources through conventional extraction techniques; however, it is left as a comment, since no official consensus was reached.

B. Initiatives / Programs with priority in research that will be linked to the Regional Plan for the Decade

1. The Eastern Tropical Pacific Marine Corridor (CEMAR).
   Comment: taking into account its strength in the study of the biological connectivity of ecosystems from Costa Rica to Chile.

2. Southeast Pacific Data and Information Network to support the Integrated Coastal Area Management Project (SPINCAN).
   Comment: its inclusion is suggested taking into account the five agreed indicators and their results in the mapping of coastal ecosystems in the region during the last 10 years.

3. Ocean Biogeographic Information System (OBIS).
   Comment: Initiative of the Intergovernmental Oceanographic Commission of UNESCO, to which CPPS is linked at the regional level. OBIS coordinates and manages the database and global knowledge on marine biodiversity, from bacteria to cetaceans, contributing to the planning and generation of ocean conservation policies worldwide.

4. Group of experts from the Permanent Commission for the South Pacific (CPPS) and Specialized Institutions attached to the Pacific Alliance associated with the subject.

5. South Pacific Regional Fisheries Management Organization (SPRFMO).
   Comment: this being an intergovernmental organization created by an international treaty, the Convention on the Conservation and Management of High Seas Fishery Resources in the South Pacific Ocean, it would be appropriate to provide actions that allow progress in its implementation / adoption in the region.

6. Eastern Boundary Current Upwelling System Program of (EBUS) Climate Variability and Predictability (CLIVAR).
   Comment: Although this program ends its current phase this year (2019), taking into account its experience and successful results in the study of the California Current and the Southern Ocean, a next phase could be focused on the generation of knowledge of the upwelling system of the Chile-Peru Current, considering among others, not only its regional impact, but also the global climate processes.

7. Latin American Observatory of Extraordinary Events (OLE2).
   Comment: Taking into account their contributions and advances in the generation of information on the dynamics of ocean-atmospheric processes in the Southeast Pacific, and work experience with Specialized Institutions attached to the CPPS, in cooperation with the International Institute for Climate Research and Society (IRI) and the Center for Scientific Modeling (CMC).

8. International Research Institute for Climate and Society (IRI).
   Comment: Considering its expertise in generating operational information on issues associated with climate variability and its repercussions on natural resources, adapted to the needs of communities from different sectors.

9. Monitoring Network of hydrometeomarine stations of the Regional Study of the El Niño Phenomenon (ERFEN) program that contributes to the preparation of the Climate Alert Bulletin (BAC, for its acronym in Spanish).

10. Latin-American Ocean Acidification Network (LAOCA Network).

11. Ocean Teacher Global Academy (OTGA), IODE-Intergovernmental Oceanographic Commission-UNESCO. Iniciative.

12. Regional Alliance of the Global Ocean Observing System (GOOS) for the Southeast Pacific (GRASP).

13. Protocol Relating to Specially Protected Areas and Wildlife in the Wider Caribbean Region -the regional legal framework for biodiversity (SPAW).

14. International Research Center on El Niño (CIIFEN).

15. Pacific Tsunami Warning Center (PTWC).
    Comment: its inclusion is with the purpose of obtaining access to the records of physical variables from the Deep Ocean Assesment and Reporting of Tsunami buoys (DART), which contribute to the understanding of the ocean-atmospheric dynamics and its influence on the ecological conditions of some species.

16. Colombian Ocean Commission (CCO).
    Comment: Taking into account its experience and leadership in the subject, as well as in the generation of the National Ocean and Coastal Spaces Policy (Colombia).

17. Ministries of Environment and Sustainable Development or the like, affiliated to the countries of the region.

18. World Wildlife Fund (WWF).

19. Jose Benito Vives de Andreis Marine and Coastal Research Institute (Invemar).

20. General Maritime Directorate of Colombia (Dimar) through its Scientific Research Centers (Center for Oceanographic and Hydrographic Research of the Pacific and Caribbean).

21. Science for the conservation of migratory marine species in the Eastern Pacific (MigraMar).

22. United Nations Food and Agriculture Organization (FAO).

23. Sustainable Development and Fisheries Center (CeDePesca).

C. NEW ALLIANCES / NETWORKS / PROGRAMS TO BE DEVELOPED

1. Establish a network of networks, which will allow the articulation and coordination of existing regional initiatives already identified, evaluating the effectiveness of existing networks and considering lessons learned.

2. Promote the creation of an MPA network for the South Pacific Ocean, which helps coordinate efforts and improve management in the conservation of marine biodiversity and adaptation to climate change.

D. RECOMMENDATIONS FOR ACTIONS / CONCRETE DELIVERABLES

1. The evaluation of the functioning and assertiveness of current networks and platforms must be carried out in order to have a diagnosis in 2021 (before the beginning of the decade), and improve, and strengthen existing networks during the (2021-2030) decade. Systematization of existing information, save, recover information generated through national and regional initiatives as a contribution to this objective.

2. Implement and / or strengthen integrated information systems, which include, among others, remote perception open data consolidation systems (Open Data Cube Technology).

3. Support a high-performance scientific computer network, which allows the interconnection of supercomputers available nationwide and operate in the region.

4. Carry out actions tending to solve limitations in regulatory, control and surveillance issues of marine protected areas at a regional level, in the context of objectives related to a clean and resilient ocean, engaging and relating authorities in ecosystem services, highlighting the importance of the oceans.

5. Availability and mobility of resources for cooperation between institutions (human, information systems and equipment, cooperation, there must be synergies, mobilization).

6. Generate actions to ensure the job stability of professionals and scientific researchers who perform specific functions in specialized institutions, seeking to preserve the traceability of activities and final consolidation of results.
   Comment: The turnover of heads of laboratories of the specialized institutions, without considering their expertise, does not allow an optimal development of the initiatives proposed in the areas of ecosystem preservation, monitoring of marine resources and generation of specific products that contribute to initiatives focused on a resilient and healthy ocean.

7. Include the dialogue of knowledge with communities taking into account ethnic diversity, as differentiated approaches, with the support of academic institutions, incorporating traditional (multicultural) knowledge, while recognizing their empirical knowledge.

8. Integrate citizen science initiatives into the generation of knowledge. Incursion of technology so that the community can contribute to the care of the environment.

9. Improving communication with the industrial scale should be a component for the issue of health and resilience. Solve limitations in the communication of fishing information, large pelagics, there are still barriers. There are information gaps. Translate the information generated by researchers to politicians in terms of efficient communication, this to improve the definition of public policies.

10. Propose the inclusion of Panama in the Regional Study of the El Niño Phenomenon (ERFEN), as well as other appropriate regional initiatives promoted by the Permanent Commission for the South Pacific (CPPS), allowing greater knowledge of climate variability and its relationship with the dynamics of fishery resources, considering the highly influential ocean-atmospheric processes that affect this sector (Panama wind jet). *Comment: This integration can also link from other countries in the region, such as Costa Rica.*

11. Have incidence, from a marine scientific research perspective, on the policy of our governments, including law of the sea and legislative processes.

E. ORGANIZACIÓN/INDIVIDUO RESPONSABLE DE LA ACCIÓN Y PRIORIDAD DE ESTA INVESTIGACIÓN

Comisión Permanente del Pacífico Sur (CPPS) con la participación de los entes articuladores de cada uno de los países participantes.

F. SPECIFIC NEEDS FOR CAPACITY DEVELOPMENT AND TECHNOLOGICAL TRANSFER TO ACHIEVE THE SOCIAL RESULT

1. Implementation of observation systems based on social and environmental components as a tool for decision-making to face future ocean changes that result from natural and anthropogenic factors.
   Comment: for example, plastics imply an improvement in human behavior from its origin, due to the bad practices of land ecosystems. It has to do with the organization of each of the countries.

2. Generate actions that promote scientific journalism.
   Comment: The foregoing, in such a way as to guarantee an exchange of knowledge and feedback on the effectiveness of actions aimed at guaranteeing a resilient and healthy ocean, with different sectors (social, industrial, economic) and the community in general, incorporating its empirical knowledge.

3. Implementation of a real time numerical oceanographic model of free access to the community, based on an open information system, validated with on-site records from platforms and available monitoring systems.
   Comment: This item is cross-cutting to the Group on a Predictable Ocean.

4. Encourage the participation of companies and programs focused on the generation of capabilities related to “disruptive” technologies in the region, such as Big Data, artificial intelligence, Internet of Things (IoT), among others.

5. Generation of public-private alliances that allow the financing of innovations with social and economic impact in the countries of the region.

Comment: this, taking into account that they are users of the currently available platforms / ocean dynamics observation systems at the coastal and ocean level, currently available.

6. Generation of a digital platform for the offer of international cooperation (linking existing ones) for oceanic and marine-coastal planning studies, biodiversity conservation, research related to aquaculture, among others. The above, while promoting academic and scientific exchange, through internships in specialized institutes, as well as research seedbeds at the level of universities and colleges.

7. Development of updateable information platforms based on the incorporation of databases and the potential of Geographic Information Systems (GIS).

8. Strengthening and / or generation of strategy lines focused on a Resilient and Healthy Ocean within the Ministries of Science and Technology of the coastal countries of the region.
   Comment: As in the case of Colombia, the Administrative Department of Science, Technology and Innovation (Colciencias).

G. FINANCING OPPORTUNITIES

1. Two fundamental foci are considered, the first one based on financing by public and private organizations in research topics and associated capacities (emerging research platforms adjusted to coastal realities, human resources, among others). The second is through international financing, through the Debt Exchange modality (for example, Ecuador), taking into account the experience of countries in the region in this area, which is proposed to be the official modality to be implemented in the (2021-2030) ocean decade

2. Management of economic resources through the Global Environment Facility (GEF 7) on the theme of connectivity for the Marine Protected Areas Network of the Southeast Pacific.

H. EXPERTS / INSTITUTIONS THAT WILL REPRESENT THE REGION AT THE GLOBAL LEVEL

Expert group appointed by the Permanent Commission for the South Pacific (CPPS).

Grupo de Trabajo 3

A predictable ocean where society has the ability to understand present and future ocean conditions

Co-moderators:
PhD. Samuel Hormazabal | Catholic University of Valparaíso
PhD. Adolfo Chamorro | Marine Institute of Peru

1. KNOWLEDGE GAPS AND RESEARCH PRIORITIES

In the Southeast Pacific region, the knowledge gaps that arise to have a Predictable Ocean are related to the poor performance of global, regional and local models, associated with deficiencies in the ability to reproduce the dynamic and biogeochemical aspects of the region, mainly the coupling of atmospheric and biogeochemical components. On the other hand, the existing operational models are insufficient to forecast the ocean conditions with the resolution required in the different locations. The technical and infrastructure capabilities oriented to numerical modeling are insufficient to address these needs. Strengthening training in numerical modeling and access to high-level IT infrastructure is required. Finally, the information services of the ocean (climate / ecosystem) oriented to the requirements of society are scarce.

Therefore, research priorities in the region should be aimed at improving knowledge of physical and biogeochemical dynamics in the Southeast Pacific region, for which in the short term (1-3 years) it is required to coordinate regional strategies to improve numerical diagnostic and prognostic models, developing national and international alliances to improve numerical modeling capabilities in the region. In the long term (5-10 years) it is necessary to develop and / or improve regional / local models that match the hydrodynamic, atmospheric and biogeochemical aspects. It is also necessary to identify the ocean forecast services that are required for the benefit of society.

2. BARRIERS OR LIMITS AND RECOMMENDATIONS FOR ACTION.

The barriers or limits associated with a predictable ocean are linked to the uncertainty of numerical models, timely access to oceanographic data, insufficient technical capacity and lack of adequate infrastructure to develop predictive numerical models with appropriate spatial and temporal resolution for decision making. To supplement this, it is necessary to implement a regional, collaborative training program in numerical modeling (short term 1-3 years), which allows to improve the predictive ability of the models (long term 5-10 years). In addition, it is recommended to develop and implement ocean prediction services oriented to the requirements of society, and keep prediction services updated in the context of a changing ocean (long term 5-10 years).

3. EXISTING INITIATIVES / NETWORKS AND NEW OPPORTUNITIES FOR PARTNERSHIPS

There are national and international networks that provide data and results of intermediate complexity models (e.g. CPPS, ERFEN), in addition to results of numerical models for ocean and climate prediction (e.g. GOOS). Also, there are international networks and programs with resources and numerical modeling capabilities for ocean and climate prediction. An adequate coordination between the existing networks, through strategic alliances with both national and international programs, will allow the implementation of a regional, collaborative training program in numerical modeling, aimed at improving the predictive ability of the models and the development of ocean prediction services oriented to the requirements of the company (short term 1-3 years). In the long term (5-10 years) the challenge is to keep the forecasting services updated in a changing ocean.

The CPPS as an international coordination body between the countries of the region, with the collaboration of the respective Ministries or Councils of Science and Environment, could assume the responsibility of regionally coordinating strategies aimed at improving the prediction of models and develop national and international alliances that lead to a predictable ocean in the Southeast Pacific region.

GT3: A Predictable Ocean, A Predictable Ocean where society has the ability to understand present and future ocean conditions.

Subject	Now	Soon	Future	Impact
1. Regional/local models do not adequately reproduce the dynamic and biogeochemical aspects in the Southeast Pacific region	1. Regionally coordinate strategies to improve models and develop national and international alliances.	1. Develop and/or improve regional/local models, both hydrodynamic, atmospheric and biogeochemical	1. Implement coupled hydrodynamic, atmospheric and biogeochemical models	1. Reduce uncertainty in the predictions of regional /local models 1. Have a better understanding of the dynamics of the region
2. Lack of integration of observations in the models	2. Availability of observations /data to integrate them into the models.	2. Integrate observations in model development (validation and calibration)	2. Implement models with data assimilation	2. Reduce model uncertainty
3. Lack of operational models for the region	3. Coordinate national and international efforts for the development of operational models	3. Develop operational models with data assimilation	3. Implement operational models with data assimilation	3. Have operational models results
4. Insufficient technical and IT infrastructure capabilities for modeling	4. Develop national/ international collaborative strategies for the training of professionals and attainment of computer resources	4. Implement a regional, collaborative, training program in numerical modeling. Implement computer systems	4. Create a specialized group for numerical modeling in the region	4. Have professionals trained in numerical modeling 4. Have adequate infrastructure for modeling
5. Little information services of the ocean (climate/ecosystem) oriented to the requirements of society	5. Determine the ocean prediction services that society requires	5. Develop and implement ocean prediction services oriented to society's requirements	5. Keep prediction forecasting services up to date in a changing ocean	5. Have ocean information services oriented to the requirements of society 5. Contribute to the adaptation of society to climate change

Question	Are there existing networks and/or initiatives aligned with our purpose?	What are the Research priorities in this region?	Investigate opportunities, collaborations, financing, alliances,	What do we need to act?	Identify barriers or limits In our region.
Which is what?	There are national networks that provide data and results of intermediate complexity models (CPPS, ERFEN), in addition to International numerical modeling network for ocean and climate prediction (GOOS)	Improve knowledge of physical and biogeochemical dynamics in the Southeast Pacific region. Identify the ocean prediction services that society requires.	There are international networks and programs with resources and numerical modeling capabilities for ocean and climate forecasting	Carry out effective regional coordination Develop and implement the ocean prediction services that society requires	Uncertainty of models. Insufficient technical capacity and availability of infrastructure to develop numerical predictive models
Where to continue? How?	1. Develop national agreements to implement predictive regional models 2. Articulate regional numerical modeling efforts with international networks.	1. Regionally coordinate strategies to improve models and develop national and international alliances 2. Develop and/or improve regional/local hydrodynamic, atmospheric and biogeochemical models 3. Implement coupled hydrodynamic, atmospheric and biogeochemical models	1. Develop strategic alliances with existing international networks and programs..	1. Develop and implement the ocean prediction services that society require 2. Keep prediction services up to date in a changing ocean	1. Implement a regional collaborative program for training in numerical models. 2. Improve the models' forecasting skills
When will it be done?	Short term (1-3 years)	1. Short term (1-3 years) 2 and 3. Long term (5-10 years)	Short term (1-3 years)	Short term (1-3 years)	1. Short term (1-3 years) 2. Long term (5-10 years)
Who will be responsible?	CPPS as an international coordination body among the countries of the region, with the collaboration of the respective Ministries or Councils of Science and Environment.	CPPS as an international coordination body among the countries of the region, with the collaboration of the respective Ministries or Councils of Science and Environment.	CPPS as an international coordination body among the countries of the region, with the collaboration of the respective Ministries or Councils of Science and Environment.	CPPS as an international coordination body among the countries of the region, with the collaboration of the respective Ministries or Councils of Science and Environment.	CPPS as an international coordination body among the countries of the region, with the collaboration of the respective Ministries or Councils of Science and Environment.

Work Group 4

A safe ocean by which human communities are protected from ocean hazards and where the safety of operations at sea and on the coast is guaranteed

Co-moderators:

Constanza Ricaurte | Coordinator of the Marine Geoscience program, INVEMAR, Colombia

Mary Rengifo | Responsible for the Tsunami Warning Center, DIMAR, Colombia.

1. REVIEW AND IDENTIFICATION OF OCEAN HAZARDS IN THE REGION

A review of the ocean threats defined at the first preparatory meeting on ocean sciences for sustainable development was carried out and it was agreed that the decade should work on the following, considering that some may be cross-cutting to complement other groups:

a) Storm tides

b) Tsunamis (generated by its different sources: earthquake, volcanic eruption, submarine or aerial landslides, meteorological or meteorites impacts)

c) Coastal erosion and sedimentation

d) Tectonic processes (subsidence, underwater volcanism) and others associated with marine seabeds.

e) Marine waterspouts

f) Harmful algae blooms (cross-cutting with other groups)

g) Invasive species (cross-cutting with other groups)

h) El Niño events

i) Increase in sea level

j) Torrential avenues in estuarine delta systems

k) Emerging risks (pathogens, meteors, space debris)

2. PROBLEM IDENTIFICATION

Taking into account that the majority of threats that affect our oceans are of natural origin and cannot be intervened or mitigated, the problem is clearly not geared towards them but rather to the "impact of ocean disasters on coastal communities and maritime activities", which translates into VULNERABILITY AND EXPOSURE of people and infrastructure in maritime and coastal areas.

There are factors that add to this problem such as:

a) Lack of information for prediction, modeling of events, networks and sensors for early and accurate alerts.

b) Timely access to information

c) Accurate and timely information for decision makers

d) Appropriate response plans to act in response to each ocean hazards.

3. CAUSES OF VULNERABILITY AND EXPOSURE

Vulnerability and exposure increase every day through the rise in maritime activities such as:

a) The increase in marine and coastal recreation.

b) The unplanned increase in access to the sea by a multitude of users.

c) Lack of resilience of communities and coastal infrastructure.

d) Anthropic and economic expansion in the maritime domain.

e) Adaptation plans not consistent with climate change and event variability.

f) Increasing the impacts of climate change with implications for society and maritime activities.

4. CONSEQUENCES OF THE MATERIALIZATION OF THREATS

Of the multiple consequences that the materialization of threats would bring, the following stand out:

a) The loss of human lives, infrastructure and economic impact.

b) Loss of the social fabric of the communities: when an oceanic disaster is generated, the communities are forced to move and change their life habits.

c) Reduction of productivity and restriction in the use of the sea for economic activities.

5. LINES OF ACTION ON WHICH THE RESEARCH SHOULD BE BASED IN THE DECADE:

The group agreed to consider the lines established at the first meeting of the decade as follows:

a) Reduce and minimize the impacts of threats through adaptation and mitigation.

b) Evaluate social and physical vulnerability.

c) Identify natural and man-made changes and understand their interaction: this line is not written this way in the original document, it is proposed to modify the wording.

d) Development of integrated multi-hazard warning systems in all basins, thus contributing to greater preparation and awareness of society.

e) Introduction and use of new technologies through public-private alliances.

f) The community's capacity to adapt (includes education, awareness and response)

g) Use of observations and data (predictive and real-time modeling).

h) Improve the efficiency of early warning systems to reduce the impacts of natural and anthropogenic threats.

Considering the needs of the region, the following lines are added:

i) Adaptation and risk management based on ecosystems, science and traditional knowledge: it is important it is important to take into consideration science, the knowledge of the communities and the use of ecosystems.

j) Research on the use of ecosystem services for risk reduction: it is necessary to quantify and know the value of ecosystems that can be used in risk management.

6. KNOWLEDGE GAPS / BARRIERS

To have a safe ocean, the following knowledge gaps or barriers were identified:

a) Availability of high resolution data: to have more precise models and at the same time better forecasts of the impact of threats, it is necessary to have high resolution information such as bathymetry, deep sea and shallow sea level records, meteorological parameters, among others.

b) Lack of continuous, standardized and coordinated monitoring systems for the different threats: although there are monitoring systems for some threats it is necessary for them work continuously and also be standardized so that they can be interpreted throughout the region, these Systems must include the different sources of tsunami, the early identification of harmful algae blooms and be dynamic systems to detect emerging hazards.

c) Absence of flood charts, digital terrain models and other inputs for decision making: it is necessary to map the entire region, characterize it to achieve the necessary inputs for decision making.

d) Lack of capacity in the modeling of more precise events: progress has been made in the modeling of some events, however, not having high resolution information means that the results are not as accurate, on the other hand, there are threats for which there is no precise modeling.

e) Identification of the cost of false alerts: not having accurate results, or adequate monitoring and alert systems can lead to generating false alerts which can be even more expensive than the monitoring network devices themselves.

f) Education, awareness and assertive communication programs to coastal communities (including the coastal community and maritime areas such as platforms, navigators etc.) with a differential approach: it is necessary to have education programs focused on each one of the communities, making use of an adequate language and aimed at children, teenagers, adults, senior adults, indigenous people, etc.

g) Awareness and sensitization programs at the political level for the construction of laws and regulations: in addition to the way of carrying the message to the maritime communities, it is necessary to translate all scientific knowledge into a language that includes the community of leaders and politicians of each country, as this will allow for better risk management.

h) Involve traditional knowledge in research processes: it is necessary to consider complementing scientific knowledge, contrasting results with traditional knowledge, nobody knows the territory better than those who live in it.

i) More research on certain phenomena such as current dynamics, extreme wave events, sea level rise and threats of biological origin (harmful algae blooms and invasive species).

j) Integrated coastal planning system that contemplates the knowledge of threats and coastal dynamics: it is required to have a system for coastal planning that considers each one of the risks by which the region is affected, that allows infrastructure projects to be built in places with less exposure etc.

k) Reduced capacity (hardware, software and human resources) for data management (big data): to obtain accurate results, high precision information is required, which in turn requires high processing and storage equipment.

l) Actions to minimize the socioeconomic effects of different threats.

7. REGIONAL OF OCEAN SCIENCE PRIORITIES

Timeframe: short (2 years), medium (5 years) and long term (10 years)

Short term

1. Identify the most vulnerable areas and the frequency of occurrence of biological origin threats.

Medium term

1. Transfer of technology and knowledge between countries.
2. Adaptation and mitigation based on ecosystems.
3. Study of ecosystem services associated with risk reduction.
4. Identification of the causes and consequences of threats of biological origin.
5. Knowledge improvement in sea level rise (causes and consequences)
6. Development of regulations for the use and management of introduced species.

Long term

1. Strengthening of the tsunami warning systems and ENSO (better technology, data transfer and standardization)
2. Development of social programs to educate, sensitize and communicate risk with a differential approach.
3. Studies on emerging ocean hazards.

8. PRIORITIES IN CAPACITY BUILDING / TRAINING

1. Strengthening of capacities for the development of numerical models for marine-coastal area management.

2. Implementation of training and awareness programs for different target audiences (continuous process).

3. Increase the critical mass on issues associated with ocean risks.

4. Personnel trained in the development of proprietary technologies

5. Implementation of new technologies (eg GNSS networks for the issue of tsunamis) and alternative technologies (sensors in submarine telecommunications cables) for monitoring and detection of ocean hazards and information deployment.

9. ASOCIACIONES / REDES / INICIATIVAS RELEVANTES EXISTENTES

- PTWS (Tsunami Warning System and mitigation of its effects in the Pacific, includes monitoring networks).
- GTATPS (Tsunami Warning Group in the Southeast Pacific).
- Universities
- Private sector
- ERFEN research groups
- CPPS
- GOOS
- Unesco IOC
- Bilateral and multilateral agreements
- Network of scientific platforms (equipment, laboratories, ships, etc)
- Pacífico Alliance
- GRASP Alliance
- Pacific marine corridor

10. POTENTIAL PARTNERS / INTERESTED PARTIES / FINANCING

a) Industries and/or settled companies and/or that make use of marine and coastal areas:
    - Industrial sector
    - Fishing sector
    - Hydrocarbon sector
    - Tourism sector
    - Maritime transportation sector
    - Defense sector
    - Insurance companies
    - The Academia
    - Telecommunications sector (sensors in underwater cables)
    - Local governments, public institutions and community.
    - International agencies.
    - NGOs.

11. RECOMENDATIONS

a) Establish strategic alliances in accordance with the type of ocean disaster.
b) Establish links with ocean science scientific communities.
c) Construction of protocols and standards for data exchange.
d) Mechanisms for monitoring processes associated with ocean disasters at the regional level.
e) Include the subject of clean energy in one of the groups.

Work Group 5

A sustainable and productive ocean, a sustainably exploited ocean that ensures the provision of food

Co-moderators:
PhD., Rodrigo Sfeir | Catholic University of the North, expert in environmental economics.
Pilar Solis | Director of the National Fisheries Institute - INP

1. KNOWLEDGE GAPS AND RESEARCH PRIORITIES

a) Management of fisheries with an ecosystem approach and not of resources. Multi-use Marine Coastal Protected Areas models should guide this new way of understanding the management of marine resources, taking into account conflicts of use and possible productive complementarities

b) Development of tools to measure the sustainability of environmental assets (ecosystem goods and services, ecosystem health)

c) Diversification of hydrobiological resources and repopulation strategies

d) Research associated with the development of aquaculture, identification of potential species and the impact of aquaculture activities on ecosystems

e) Development of a circular economy around hydrobiological resources

f) Socio-economic studies for new productive alternatives (reduce extractive pressure through productive reconversion or diversification)

g) The impact of climate change on fisheries, how it is affecting the distribution and location of resources, coastal economies and how much of the problem observed in the decline in catches is due to this phenomenon and not to overexploitation

h) Improvement in the design, adaptation or technological innovation in fishing gear that allows to reduce bycatch and minimize ecosystem damage

i) Sustainable use of residual bycatch as a source of protein for human consumption

j) Data standardization and systematization, use of big data and generation of information shared between countries

k) Inclusion of empirical knowledge of fishing communities in the design of research projects.

2. BARRIERS OR LIMITS AND RECOMMENDATIONS FOR ACTION

Barriers:

a) Lack of international research networks

b) Zeal in the management of information

c) Absence of coordinated ocean policies among the countries of the region

Recommendations for action:

a) Identify (and develop) new technologies that can be applied at the regional level

b) Include specialized human resources in decision-making entities

c) Communicate the importance of the oceans to influence public policy and continuity of financing lines

d) Communication and socialization campaigns aimed at civil society (use of social media, public spaces, etc.) on the importance and contributions of the oceans

3. EXISTING INITIATIVES / NETWORKS AND NEW OPPORTUNITIES FOR PARTNERSHIPS

Existing international initiatives / programs / associations that could help address knowledge gaps:

a) FAO Blue Growth Initiative: fisheries and aquaculture with sustainable development (seeks to maximize economic and social benefits and minimize environmental degradation in sectors related to fisheries and aquaculture)

b) United Nations Network for Sustainable Development Solutions (seeks to accelerate learning together and help overcome differences between technical work and policy generation by promoting an integrated approach to environmental, social and economic challenges that the world faces)

Potential international initiatives / programs / associations that could help address knowledge gaps

a) Establish connection mechanisms for with:
    i. International Research Institute for Climate and Society (IRI of the University of Columbia): promotes the study of environmental conditions with a view to

contribute to the development of communities taking into account, among other aspects, the productive ones.

ii. Environment for Development (EfD): promotes collaborative research programs between research centers, improving access to data, enhancing complementary analytical capacity and facilitating access to policy makers and stakeholders

iii. UNESCO Man and the Biosphere Program: Intergovernmental scientific program that seeks to establish scientific bases to cement the long-term improvement of relations between people and the environment.

b) Considering that marine ecosystems transcend the borders of countries, and to deepen supranational policies, it is necessary to strengthen the networks of international, interdisciplinary and multidisciplinary researchers and scientists. The formation of a nucleus of researchers and international scientists is key to take advantage of the experiences and particular knowledge, thus generating synergies.

c) Alliances between the countries of the region (agreements, MoUs, exchange of technologies and capabilities, etc.)

4. PARTNERSHIPS AND FINANCING

Organizations, institutions or organizations that should be part of new alliances or networks:

a) CPPS, IATTC, RFMO, IOC, NOAA, universities and research centers, science and technology institutions, NGOs, etc.

b) International Mangrove Network, Colombian Ocean Commission, National Network of Ancestral Mangrove Users and Custodians of Ecuador, community associations or civil society, etc.

Financing

a) States, public-private partnerships, tax incentives, international funds, NGOs, IDB, FAO

b) Identification of benefits as compensation for the private sector

5. HOW TO INCLUDE TRADITIONAL KNOWLEDGE

a) Engage local stakeholders and communities in the design and development of research projects

Work Group 6

A transparent and accessible ocean. With free access to information, data and technology.

Co-moderators:
Paula Sierra-Correa | Research and Information Coordinator, INVEMAR
Carmen Grados | Oceanographic Information Service of El Niño, IMARPE

The United Nations Decade of Ocean Science for Sustainable Development offers an invaluable opportunity in the global and, particularly regional, context to rethink and coordinate the integrated efforts of countries, with an integrative, interdisciplinary and transdisciplinary approach to science in the Southeast Pacific to improve ocean health and improve conditions for sustainable ocean development.

Taking the results of the First Global Planning Meeting for the Decade[1] as a frame of reference, the discussions of Working Group No. 6 "A Transparent and Accessible Ocean" (with free access to information, data and technologies) that met on September 25th of this year in the city of Guayaquil, Ecuador, focused on the following topics:

- A transparent and accessible ocean: All nations, stakeholders and citizens have access to ocean data and information, to technologies and have the capacity to make informed decisions.
- More ocean information at a scientific, governmental, private and public level. It demands a radical change in oceanic education.
- Digital revolution to support the delivery of data and information to interested parties.
- Ocean literacy to train stakeholders to have a more responsible and informed behavior towards the ocean and its resources.
- Innovative capacity development schemes with south-south and north-south cooperation.
- Courses for technicians, technologists, developers and professionals that promote solutions for treatment, disposal and dissemination of data and information. Acceso abierto a datos e información.

[1] Summary Report of the First Global Planning Meeting: United Nations Decade of Marine Science for Sustainable Development, Copenhagen, May 13-15, 2019
http://www.ioc-unesco.org/index.php?option=com_oe&task=viewDocumentRecord&docID=24807

This same document identifies the following Gaps vs. Priorities in order to reduce them:

- Need to clarify the science-political interface at the national level: Can the Decade help with providing a common scientific and technical program around which various ocean-related agencies can communicate and coordinate their efforts?

- Need to coordinate among United Nations (UN) agencies at the regional level: Could the Decade ask the UN to coordinate efforts to collect ocean data and establish all regional centers as a coordinated entity?

- Design of the data system of the decade: To solve data control problems. Incorporate data from the private sector. Interoperability, metadata, coding, custody, etc.? Computer needs? Promotion of alliances for the mutual use of data. Citizen science data (introduce the concept of "reliable data" and traceability).

- Oceanic information as a public good: Could there be an ocean information system that would increase participation, exchange, visualization and evaluation of information in relation to the social agenda? Shared access to infrastructure?

- Use of data, value, access problems and knowledge gaps. At the end of the decade, an objective should be "not to leave any ocean data unused"

- Promote the Global Ocean Assessment to provide reliable advice. How do they do it for the IPCC and the CBD?

This document presents the results of the GT6 session held on September 25, which was attended by 29 specialists (Annex. 1). It also includes the information sent through questionnaires prior to the regional workshop. It should be noted that during the session a methodology was used that promoted individual and collective participation to distinguish knowledge gaps, regional priorities in order of importance according to participants' criteria, and timing in action planning (A = Now = Next year; P = Soon = 2-4 years; F = Future => 4 years). Finally, an exercise was carried out on how participants view the Southeast Pacific at the end of the Decade, towards the year 2030.

KNOWLEDGE GAPS AND PRIORITIES OF OCEAN SCIENCE IN THE SOUTHEAST PACIFIC.

The knowledge gaps identified according to degree of importance (in parentheses), are the following:

- Low level of “Ocean Literacy”, requiring two-way literacy between scientists and the media (8 + 3), and other “non-scientific” audiences (2).

- There is a need to adopt policies for access and exchange of data and information, and disseminate them (9 + 1).

- There are policies for access to data and information at the international level (e.g. IOC, WMO, ICSU); countries in the region have policies, information transparency laws and regulations, so it is necessary to make these documents publicly known and distinguish which ones will be adopted by the Decade for open data.

- Data dispersed, duplicated or difficult to access (8).

- Data management (complete cycle) and capacity of the centers to manage them (6).

- Absence of civil society participation in ocean affairs (channels, instruments) (6), and scarce citizen participation models for participatory monitoring and mechanisms to return information (2). For example: how we reach users of fishery resources and teach them not only to collect information but to interpret (and use) it.

- Little known data and information services (5). Services

- Data sovereignty vs. open access (public domain) (4).

- Low interoperability of data and information sources (3).

- Absence of a research focus or network in socio-ecological systems in the Region (2).

The priorities, of which the first are the most relevant according to the criteria of the participants, and are the following:

- Strategic alliances for access, data collection, analysis, and to communicate them to all sectors/stakeholders (15).

- Ocean Communication Strategy (11).

- Digital Revolution: Artificial intelligence, bigdata, disruptive technologies, block chain, others; to have open, useful and relevant data (8). Part of the digital revolution considers generating sensations through the media and there are two oriented towards it: virtual reality and augmented reality, the latter has a number of benefits. The citizen can have the data in their hands.

- Educational Revolution: “Non-formal” ocean training programs in data and information management, and their disposition and dissemination (8); as well as professionalization of the field of communication to "translate complex information into simple one" (2).

- Promotion and Support to Citizen Science (more hands/more eyes/more data collection) and link it to traditional knowledge (7).

- Literacy to multiple audiences (governments/politicians, youth, developers, etc.) (4) and "ocean immersion" for education of those who cannot "see them", and the new generations (2).

- Joint work with the academia (thesis) for further data processing (2).

RECOMMENDATIONS FOR ACTION

The GT6 recommends the following actions that have been identified to be executed next year (A = Now), between 2 and 4 years (P = Soon) and> 4 years (F = Future).

- Regional coordination between agencies/programs/networks (A).

- Evaluate the efficiency of regional networks (A).

- Periodic Global Ocean Assessment Report to provide reliable advisory.

- Establishment or strengthening of national mechanisms so that all data and information generators are involved and that the "report" channel is clarified and ensures that there is "communication" among all the reports, ensuring that "everything produced" within the countries is visible and communicated in different languages according to stakeholders (A-P).

- An Ocean information system that increases participation, exchange, visualization and evaluation of information in relation to government, sectoral, citizenship, and scientific needs, with shared access to infrastructure and data (P-F).

- Common scientific and technical program around which countries cooperate in the region (GT1-5 themes).

- Cooperation for the use of shared scientific infrastructures (for example, platforms for data collection, sufficient capacities for data processing) (P-F), initial evaluation of what exists and where it is and the will, to cooperate (A-P).

- Communication strategy that includes all stakeholders, different "languages" and "didactics" for each one of them (A-P).

- Make visible under new forms of communication.

EXISTING INITIATIVES / NETWORKS AND NEW OPPORTUNITIES FOR PARTNERSHIPS

The following initiatives, programs, existing international associations and resources in this region that could contribute to addressing knowledge gaps have been identified.

- Ocean Teacher Global Academy (OTGA-RTC-LAC) Regional Training Center in Marine Sciences for Latin America and the Caribbean.

- Network for the Exchange of Information and Experiences Between Countries of Latin America and the Caribbean to Prevent, Discourage and Eliminate Illegal, Unreported and Unregulated Fishing (IUU) in Latin American countries http://www.redpescaindnr.gob.pe/.

- Korea-Peru Research Laboratory in Marine Science and Technology for Latin America (Kope-Lar) http://kope-lar.org/.

- Marine-Coastal Research Network (REMARCO) http://remarco.cl/.

- Latin American Ocean Acidification Network (LAOCA) / Global Ocean Acidification Observing Network (GOAON) https://laoca.cl/red-laoca/.

- Citizen science program at the school level "Scientists of Garbage" (ReCiBa) http://www.cientificosdelabasura.cl/es/.

- ANTARES Network (home.antares.ws).

- Latin American young journalists network (https://jovenesperiodistas.org/).

- CPPS working groups and programs (SPINCAM http://www.spincam3.net/, ERFEN http://cpps-int.org/index.php/protocolo-erfen, Regional Oceanographic Cruises and Database Working Group http://cpps-int.org/index.php/nodo-de-conocimiento/nodo-oceano/crucero, Tsunamis, etc).

- Network for Research and Conservation of Migratory Marine Species in the Eastern Pacific (MigraMar) http://migramar.org/hi/es/.

- Global Fishing.

- REMECA.

- International Transparency Network for the Law on Access to Public Information (RTA) https://redrta.org.

- Centre for Environmental and Molecular Algal Research (CEMAR) http://www2.unb.ca/cemar/.

- Information and data programs of the Intergovernmental Oceanographic Commission (Strategy 2030 of GOOS, GRASP, JCOMM (particularly, the Data Buoy Cooperation Panel (DBCP), Ocean Gliders Programm, Global OceanSITES Network (http://www.oceansites.org/), IODE, OBIS, among others).

- Tropical Pacific Observing System (TPOS) http://tpos2020.org/.

WHAT DO WE NEED? / WHO WILL DO IT?
(Financing, how? Capacity building in what? Alliances with whom? Exchange of experiences and lessons learned among whom?)

- National, regional and international alliances: Acadeia, sectors (private, public), citizen science networks, civil society, philanthropy.

- Promote spaces for exchanging experiences between communicators and researchers (through the academia, projects, etc.).

Examples of good practices:

Within the framework of the project "Mangroves, Marine Pastures and Local Communities: Development and exchange of experiences of the comprehensive management of biodiversity and its services in the Caribbean region" (MAPCO) of INVEMAR, a group of national and local journalists from different media were taken to the field. After the visit, today there is a good understanding of the mangrove ecosystem, and a month of producing communication about the mangrove system, an unexpected result, which occurred when all those people who communicated realized that there was a story to tell and they understood what the story was about.

The effects of El Niño in Peru determined the need to promote spaces of convergence between the generators of scientific information and citizens. The Multisectoral Committee in Charge of the Study on the El Niño Phenomenon in Peru (ENFEN), for example, developed a communication strategy with the aim of disseminating and improving the understanding of information and knowledge about the El Niño-Southern Oscillation (ENSO) event. In Peru, it is aimed at journalists from local and international media and included "El Niño Correspondents Workshops," guided visits to the ENFEN institutions, as well as strengthening the communication skills of the "communicating" researchers. These types of events also contribute to connect public management stakeholders with communicators in a task that requires joint and coordinated work to be effective and timely for the population and for improved risk management.

- Strengthen the dialogue between science and politics for decision making.

- Institutional listening of science.

- In the media think outside of what is traditional.

- Pensum/curriculum with "Ocean" always included.

Good practices:

With regard to access to information, useful oriented data and knowledge, the "Oceanographic Information Service of the El Niño Phenomenon" is a cross-cutting proposal that groups different

elements of local and international information on the variability of the Peruvian sea and the adjacent atmosphere to anticipate the presence of El Niño in order to contribute to disaster risk reduction in support of the Peruvian State.

The implementation of the service was possible by virtue of initiatives such as: the establishment of new multi-year averages of reference for the estimation of anomalies, definition of climate indices, evaluation and definition of satellite information for the monitoring of the Peruvian sea, process automation, free access to data (http://www.imarpe.gob.pe/imarpe/servicios/series-tiempo) and local information (http://www.imarpe.gob.pe/imarpe/servicios/climatologias) as access to the international data sources for extensive use by citizens and the State for multiple applications and the generation of value, an action that also applies internationally due to the global nature of El Niño. These actions are complemented by the publication of 838 newsletters per year in support of the interpretation of the state of the ocean by citizens.

The dissemination of the practice is done through the electronic platform http://www.imarpe.gob.pe/imarpe/index.php?id_seccion=I017801000000000000000 and a list of subscribers. Likewise, the National Oceanic and Atmospheric Administration (NOAA) provides the link to SIO-FEN and recognizes it as a global resource for information on El Niño (https://www.climate.gov/enso). In 2018, SIO-FEN was recognized as "Good Practice in Public Management 2018" in the category: Transparency and Access to Information https://drive.google.com/drive/folders/1TnUqJnaEReXmD7NoEFqoWaMClAUf5EwR.

The product is part of the Activity "Information Generation and Monitoring of the El Niño Phenomenon" of the Strategic Budget Program for Vulnerability Reduction and Emergency Disaster Assistance in the Results Budget Framework (PREVAED 0068 http://www.pcm.gob.pe /wp-content/uploads/2019/02/Contents-M%C3%ADnimos-del-Programa-Quupuestal-0068-2019-compressed.pdf) of the Presidency of the Council of Ministers of Peru.

IMARPE publishes reports of pelagic and demersal fishing activity on a daily, weekly, monthly and/or quarterly basis. The information is available at the following link http://www.imarpe.gob.pe/imarpe/index.php?id_seccion=reportes.

CAPACITY BUILDING AND TECHNOLOGY TRANSFER:

- Reactivate ODINCARSA (with new technologies)
- Training of human talent in communication skills.
- Establish mechanisms for collaboration in countries that collect data and information priorities for the Decade (cross-cutting).
- Bear in mind the capacities of the region to assume the reports of the Decade.
- Strengthen existing mechanisms in the region to implement concrete actions, considering the analysis of existing instruments.

POTENTIAL PROGRAMS

Among the potential programs identified in accordance with the forms submitted, the following are considered:

- There is CHM as a conceptual initiative, under the work of Data Science (BigData) to have a tool for Discovery and integration of information resources.
- Program for “Mapping the Southeast Pacific seabed”.
- Data capture and analysis program based on indicators: “Healthy Oceans of the Southeast Pacific”.
- Program for marine life inventory with eDNA data.
- Scientific and technical program in the Southeast Pacific to establish communication and coordinate national and regional efforts.
- Ocean marine computing platform for data analysis and dissemination of these products for different audiences.
- Signing of inter-institutional agreements for the opening and delivery of information.
- Academic exchanges and scholarship programs (formal/non-formal).
- Reporting mechanism similar to the IPCC/CBD that complements the Global Ocean Science Report GOSR.
- Dissemination of information access platforms in workshops and seminars, as well as social networks.

INSTITUTIONS/PROGRAMS/NETWORKS AND THEIR POSSIBLE COMMITMENT IN THE PREPARATIONS AND IMPLEMENTATION OF THE DECADE

- The countries of the Region with internal coordination mechanisms that involve all those who produce or use data (for example, Foreign, Armed Relations, Ministries of Science and Technology, Environment, Agriculture, Tourism, Commerce, Ports, Research Institutes).
- CPPS with its groups and programs, rethinking, in line with the priorities of the Decade, promotes and verifies that its point of contact brings together interested parties.
- Involving other cooperation mechanisms (for example, the Pacific Alliance).

A VIEW OF THE SOUTHEAST PACIFIC AT THE END OF THE DECADE

Our dream for 2030 is:

- National and regional agendas that include the Ocean as a priority.
- Multiple stakeholders sharing information from the oceans, working with a single objective: Conservation.
- Free and easily accessible data for all interested parties and who can use it to prevent problems.
- For the Southeast Pacific region to have reliable databases, and interoperable information systems, which provide useful and relevant data for all sectors.
- A regional network of integrated, operational monitoring, providing real-time data and access to interested parties.
- Work networks with data collected and guarded under standardized protocols and their communication channels, in appropriate languages according to the target audience.
- A literate community that responsibly improves ocean policy and contributes to the management of the joint agenda.
- Research has a high impact on decision making.
- A pilot exercise generates a database of fishery resources shared with data from the past decade.
- Decision-making based on scientific evidence, decisions that are monitored by a population empowered to maintain the health of the ocean.
- National and regional experience exchange forums, which are based on educational platforms for access to studies, publications, products, projects at the regional level (freely available).
- Cooperation between the Academia and public and private institutions , which facilitates access to information, processing and data analysis that improves scientific perception in the population and decision makers.
- Autonomous and easily interpreted technological platforms for the general public.
- A regional ocean observation system in the southeast Pacific.
- A society sensitized and informed on the importance of the ocean.

- The science of data that supports regional and national decision-making, which generates a two-way engagement of all interested parties (science-interested parties). Data and information are provided.

- A regional network that allows easy access to oceanographic and meteorological data, quality data that allows to accurately assess the environmental conditions so that communities can make sustainable use of ecosystem services.

- Integrated system of citizen information on the ocean in operation.

- Ocean governance under the commitment of governments, fully assumed, to not use the oceans as garbage dumps of humanity and work together in their conservation and sustainable use.

Follow-up and participation in the Global Process, summary and next steps

Francisco Arias explained the next steps of the process that has been initiated to enhance marine research in the United Nations Decade for Sustainable Development. There are political lessons in this region regarding the needs of a common agenda that allow us to respond to natural phenomena within the framework of the SDGs. We are still in a preliminary stage, a learning stage, the next step is the consolidation of reports to prepare an explicit, easy to address document, recognizing the differences and imbalances between regions.

Cesar Toro indicated that it is necessary to be inclusive with other stakeholders who are powerful in this process, who must assess the socio-economic potential of the ocean. Ocean sciences must be a transformative element to achieve sustainable development. We cannot continue with the same practices, and science must help in this process. Much has been done in this region in terms of scientific research, we must continue to capitalize on what we have. Create the conditions to access existing information. We must use the decade as a transformative platform.

Final Comments

Salvador Vega, from the Ministry of Foreign Affairs of Chile, on behalf of the CPPS member countries, thanked CPPS, IOC-UNESCO for organizing this event. This is the beginning and we all have work ahead. The states have a giant challenge. One of the issues mentioned repeatedly is what is the role of CPPS in this process. International organizations are dynamic and we must respond to these challenges. And the decade is one of the great challenges, as is the BBNJ process. CPPS has the strength of being a point of encounter, beyond the differences in criteria on these issues between countries. CPPS is a meeting place. These types of workshops are the space to identify these topics. We have to identify that role and see how from CPPS we generate networks. We carry out the task of replicating this exercise at the national level to put all the issues in the forefront. By understanding the differences we can find common ground. There is much to tell the world from this region, let's continue working in our countries so that these contributions become real.

Ariel Troisi. He recognized the effort that the participants have put into these three days. There were differences that enriched the discussion. Ideas have come out to implement from to 10 years. If something is missing it is our responsibility to incorporate it. Society asks us for a transformative vision, to stop doing things the same way and look for a different one. Consider in this process the social impacts. Do not lose focus of young people who in 10 years will be driving science. We must also work with the community. We do not have to start from scratch, seize the moment and show results in the short term.

Ambassador Mentor Villagomez, after thanking the participants, indicated that there are deficiencies in the region, but we have the possibility to overcome them. We know how to solve

them. This is a joint effort that requires coordination. The data is necessary, they exist in the region, but access is restricted. Data, training, technology, but above all we need the conviction that we must work together, governments and institutions. To start this task one of the main issues is to define the diagnosis situation as a starting point. It has been an excellent job that has come out of here and will be an important contribution for the decade. It was very satisfying to hear that they considered the secretary and CPPS as the competent regional body to handle ocean issues. That role that you ask CPPS to assume has to be shared with all national institutions. The role of CPPS is basically coordination.

ANNEX

Workshop Agenda

DAY 1: TUESDAY, SEPTEMBER 24, 2019		
08:30-09:00 Registration		
Plenary		
09:00-09:10	**Welcome**	• Roberto Viteri, Vice Minister of Aquaculture and Fisheries of Ecuador
09:10-09:25	**Opening comments**	• Video message from **His Excellency the Ambassador Thomson Peter**, special envoy of the General Secretary for the Ocean. • Video message from **Vladimir Ryabinin**, Executive Secretary, Intergovernmental Oceanographic Commission of UNESCO • **Troisi Ariel** President of the Assembly, IOC-UNESCO • **Villagómez Mentor**, General Secretary CPPS
09:25-09:30	**Perspectives**	• Video message from the **Executive Planning Group**
09:30-10:15	**Introduction to the Decade and its preparatory phase**	**Introduction to the Objectives of the Decade, preparatory activities, and goals of the Pacific Community Workshop** • **Troisi Ariel** President of the Assembly, IOC-UNESCO • **Toro Cesar**, Secretary, IO-CARIBE • **Arias Isaza Francisco**, Member EPG
10:15-10:25	**Group photo**	**All participants**
10:25 – 11:00 Coffee break		
11:00-11:15	**Introduction to SLI.DO**	• **Erique Steve**, IT System Manager, CPPS
11:15-11:20	**Perspectives**	• Video messages from **Young Scientists** around the World (VIDEO) • **Castillo Briceño Patricia**, Lay University of Ecuador • **María Cecilia Terán Espinosa** Nazca Institute for Marine Research
11:20-12:20	**Panel 1: Defining a vision for the Decade**	**Moderator:** **Zapata Carlos**, General Technical Coordinator of the General Directorate of Maritime Interests of Ecuador **Panelists:** • **Bernal Patricio,** CSIRO Chile – IUCN/WCPA • **Chipollini Andrés,** Marine Institute of Peru – IMARPE

		• **Caicedo Ana Lucia**, PhD., Oceanographer, Pacific Oceanographic and Hydrographic Research Center (CCCP) • **Cedeño Virna**, PhD. Omic Biotechnologies Center (CEBIOMICS), Manta, Ecuador
12:20-12:30	**Definition of Working Groups**	**Workgroup Announcements** • **Arias Isaza Francisco**, Member of the Executive Planning Group (GEP)
12:30 – 13:30 Lunch		
Parallel Sessions		
13:30-15:00	**Work Group 1: A clean Ocean** (Where contamination sources are identified and eliminated) **Co-moderators:** **Espinosa Luisa**, Program Coordinator INVEMAR **Vásquez Nelson**, Catholic University of the North	**Work Group 2: A healthy and resilient ocean** (Where marine ecosystems are mapped and protected) **Co-moderators:** **Caicedo Ana Lucia,** PhD., Oceanographer, Pacific Oceanographic and Hydrographic Research Center (CCCP) **Santibañez Juan Francisco,** Department of Protected Areas, Ministry of Environment, Chile
15:00 – 15:30 Coffee break		
15:30-17:00	**Continuation of Group 1**	**Continuation of Group 2**

DAY 2: WEDNESDAY, SEPTEMBER 25, 2019		
Parallel Sessions		
09.00-10.30	**Work Group 3: A Predictable Ocean** (Where society has the ability to understand ocean conditions) **Co-moderators:** **Hormazabal Samuel**, PhD., Oceanographer, Pontifical Catholic University of Valparaíso. **Chamorro Adolfo**, Marine Institute of Peru, IMARPE	**Work Group 4: A Safe Ocean** (Where people are protected from ocean disasters) **Co-moderators:** **Ricaurte Constanza,** Geosciences Program Coordinator, INVEMAR **Rengifo Mary,** DIMAR
10:30-11:00 Coffee break		
11.00-12.30	**Continuation of Group 3**	**Continuation of Group 4**
12:30-13:30 Lunch		
13:30-17:00	**Work Group 5: A sustainable and productive ocean** (Assurance of food supply) **Co-moderators:** **Sfeir Rodrigo**, PhD., Environmental Economics expert, Catholic University of the North **Solis Pilar,** Director of National Fishing Institute - INP	**Work Group 6: A transparent and accessible Ocean** (With free access to information, data and technologies) **Co-moderators:** **Sierra-Correa Paula**, Information and research coordinator, INVEMAR **Grados Carmen**, Oceanographic Information Service of El Niño, IMARPE
15:00-15:30 Coffee Break		
15.30-17.00	**Continuation of Group 5**	**Continuation of Group 6**

DAY 3: THURSDAY, SEPTEMBER 26, 2019		
Plenary		
09:00-09:45	**Group 1 and 2 Report**	**Moderators:** will be chosen by each group **Groups presentations.** 20 minutes per group for reports and questions from the public
09:45-10:30	**Group 3 and 4 Report**	**Moderators:** will be chosen by each group **Groups presentations.** 20 minutes per group for reports and questions from the public
10:30-11:00 Coffee break		
11:00–11:45	**Group 5 and 6 Report**	**Moderators:** will be chosen by each group **Groups presentations.** 20 minutes per group for reports and questions from the public
11:45-12:30	**Panel 2 on cross-cutting issues: Capacity development and transfer of marine technology.**	**Moderator:** **Gabriel Rina,** Scientific delegate of Peru to ERFEN and the GRASP Alliance. Directorate of Hydrography and Navigation of Peru. **Panelists:** • **Zapata Carlos,** General Technical Coordinator of the General Directorate of Maritime Interests of Ecuador • **Arias Isaza Francisco**, Member GEP • **Hormazabal Samuel**, PhD., Oceanographer, Pontifical Catholic University of Valparaíso. • **Ortiz Ruby,** Colombian Center for Oceanographic Data, Cecoldo
12:30-13:30 Lunch		
13:30-14:15	**Panel 3 on cross-cutting issues: Partnerships and financing**	**Moderator:** **Montalvo Mauricio,** Sub-secretary of International Cooperation Foreign Ministry of Ecuador • **Jimenez Jorge**, Director of MarViva Ecuador • **Martinez Rodney,** Director of CIIFEN • **Flachier Adriana,** Political Focal Point, GEF Ecuador
14:15-15:00	**Panel 4 on cross-cutting issues: Traditional Knowledge**	**Moderator: Felix Fernando,** Coordinator of Southeast Pacific Regional Action Plan. Ecuador. **Panelists:** • **Tapia Jopia Carlos,** Director of the Center for Social Studies–CESSO, Chile • **Ortiz Doris,** HIVOS

		• **Xavier Chalen,** Director of the Marine and Coastal Program Conservation International
15:00-15:30 Coffee break		
15:30-16:00	**Monitoring and participation in the global process, summary and next steps**	• **Arias Isaza Francisco,** Member of EPG • **Toro Cesar,** Secretary, IO-CARIBE
16:00-16:30	**Comentarios finales**	• **Salvador Vega**, Representative de Chile • **Ariel Troisi** President of the Assembly, IOC-UNESCO • **Villagomez Mentor**, General Secretary, CPPS

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