Concept Paper

Partnership dialogue 6: Increasing scientific knowledge, and developing research capacity and transfer of marine technology

Concept paper for the Partnership dialogue 6, prepared in response to the General Assembly resolution 70/303, on increasing scientific knowledge, and developing research capacity and transfer of marine technology, is covering SDG targets14.a. The concept paper for this partnership dialogue is based on inputs received from Member States, the UN system and other stakeholders. Given the word limit for the concept paper, not all inputs have been included in their entirety, but they can be accessed under: https://oceanconference.un.org/documents.

I. Introduction

Marine science plays an important role in the fisheries management process, including for the adoption of conservation and management measures. Science also has an important role to play in managing other human pressures on the marine environment, including cumulative impacts from local pressures such as pollution, coastal development and resources extraction that act together with global impacts of climate change. Technology can help improve outcomes for many of the targets of SDG 14, for example, to help deliver more efficient and sustainable fishing methods, enhance monitoring and surveillance of fishing activities, facilitate pollution prevention and clean-up, and enhance marine spatial planning. It can also allow for better research and protection of the natural and cultural heritage of the oceans. Therefore, these issues in relations to SDG 14 can be approached from multiple perspectives.

Scientific understanding of the ocean is fundamental to carry out effective management of human activities that affect the marine environment and the biota that it contains. Scientific understanding is also essential to predict or forecast, mitigate and guide the adaptation of societies to cope with many ways the ocean affects human lives and infrastructures at different spatial and temporal scales.

Ocean research and observation activities cover a wide range of interests, sectors, users and uses, and disciplines. All of these activities are of great importance in reaching the goal embedded in UNCLOS to promote the equitable and efficient utilization of ocean resources, the conservation of their living resources, and the study, protection and preservation of the marine environment.

The basis for various maritime industries is a strong marine science and technology capability, and the development of human resources is essential to ensure a better understanding of marine science and technology and their potential. States need to have

not only full-time researchers but also technical support staff who services the equipment, computers and ships. Enhancing the skills and the knowledge base of academics, scientists, managers, field practitioners and local communities is critical.

The General Assembly of the United Nations (UNGA) has consistently called upon States and international financial institutions to continue to strengthen capacity-building activities in the field of marine scientific research by, inter alia, training personnel to develop and enhance relevant expertise, providing the necessary equipment, facilities and vessels and transferring environmentally sound technologies.[1]

UNCLOS, in its Part XIII, provides the legal framework for the conduct of marine scientific research. It requires States and competent international organizations to promote and facilitate the development and conduct of marine scientific research, as well as to promote international cooperation in marine scientific research. UNCLOS also provides for the obligation to make available by publication and dissemination information on proposed major programmes and their objectives as well as knowledge resulting from marine scientific research

Transfer of marine technology (TMT) is often considered as a tool to support capacity development. Under UNCLOS, Part XIV calls for inter alia all States to cooperate in accordance with their capabilities to promote actively the development and transfer of marine science and marine technology on fair and reasonable terms and conditions in order to help developing countries to access the benefits of oceans and seas. In addition to the 2030 Agenda for Sustainable Development, the need to facilitate TMT for countries to achieve sustainable use of the oceans and seas and their resources is also recognized by a number of international instruments related to sustainable development. [2]

II. Status and trends

For the purpose of the dialogue, activities in relation to target 14.a can be classified into three clusters: observation systems and knowledge base; capacity development; and transfer of marine technology.

Observation systems and knowledge base

Key global activities in marine scientific research include: the development of a permanent infrastructure to observe the ocean under the Global Ocean Observation System (GOOS) which has expanded its mandate to include observation requirements for ocean health; the technical coordination of the established elements of GOOS provided by the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM)[3]; the integration of observations from multiple platforms through the WMO Integrated Global

[1] See, for example, General Assembly resolutions 64/71, 63/11162/215, and 61/222.

[2] These include: the Rio+20 Outcome document, "The future we want" (Paragraph 160); the Samoa Pathway (para 58f); and annual UNGA resolutions on Oceans and Law of the Sea. TMT is also part of the package of issues currently being discussed by the Preparatory Committee established by resolution 69/292: Development of an international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction.

[3] JCOMM is an intergovernmental body of technical experts that provides a mechanism for international coordination of oceanographic and marine meteorological observing, data management and services, combining the expertise, technologies and capacity building capabilities of the meteorological and oceanographic communities.

Observing System (WIGOS) and the development of its 2040 Vision for space and surface-based observing systems; the development of Ocean Biological Data repositories under the Ocean Biogeographic Information System (OBIS); Global earth system science under the World Climate Research Programme (WCRP), Future Earth projects (including the Integrated Marine Biochemistry and Ecosystem Research, IMBER); and global efforts to synthesize ocean research results into assessments of the state of the ocean under the Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects (Regular Process), the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP), and the recently approved IPCC Special Report on the Ocean and Cryosphere. A sustained research effort in support of decision-making was represented by the decade-long Census of Marine Life, a partnership of 2,700 scientists from more than 80 States, the results of which were published in October 2010.

Several States have developed marine policies that encompass marine science and technology plans and strategies for building human and technical capacity in the area of ocean affairs and the law of the sea. A number of developing countries have also established specific infrastructures regarding marine science and technology, although they are at different levels of development.

Most States and relevant organizations have established institutional infrastructures to carry out specific activities or programmes related to marine science, such as oceanographic institutes. They may be regional, national or international in scope and influence. An intergovernmental cooperation mechanism on ocean sciences is provided by the Intergovernmental Oceanographic Commission. Established in 1960, the Commission has grown to 148 Member States in 2016, representing 75 % of all independent States, but still not including all Parties to UNCLOS.

UN agencies are carrying out activities in relation to target 14.a, including strengthening the knowledge base for and implementing ecosystem approaches and maintaining information systems covering relevant science fields. One mechanism to track scientific knowledge and technology transfer is the Global Ocean Science Report (GOSR) of IOC, which will be issued for the Conference.[4]

The Regular Process is the global mechanism for reviewing the state of the marine environment, including socio-economic aspects, on a continual and systematic basis by providing regular assessments at the global and supraregional levels and an integrated view of environmental, economic and social aspects. The First Global Integrated Marine Assessment, the outcome of the first cycle of the Regular Process, is the first comprehensive report on the state of the world's oceans and our knowledge about them, and supports the implementation of the 2030 Agenda. This Assessment and future assessments will play a decisive supporting role for ocean-related intergovernmental processes.

Another important effort carried out by UN agencies is to assure and promote sustainability of observing systems as most observing efforts in the global ocean are funded by research activities and programmes are limited in time. Indeed, long term, sustained and consistent series of ocean data is required to address the research needs and operational applications.

[4] The GOSR will summarize information about the status of ocean research, investment in research infrastructure and human capacity, as well as potential gaps in marine sciences programmes in need of further investments. The Inter-Agency and Expert Group on Sustainable Development Goal Indicators accepted that parts of the GOSR will serve the indicator for SDG 14.a.

Efforts are also made to extend observations to the deep ocean allowing to address the long term (decadal and beyond) changes affecting the global ocean and climate and thereby contribute to IPCC assessment reports.

Efforts are also ongoing at the regional level to strengthen Science-Policy Interface. In the Mediterranean, the respective Regional Sea Convention (UN Environment/MAP-Barcelona Convention) and the Regional Fisheries Management Organization (General Fisheries Commission for the Mediterranean of the FAO, GFCM) have both adopted their own strategy to accelerate progress towards the implementation of SDG 14 and their respective mid-term strategies include goals to strengthen science-policy cooperation/interface and citizens' understanding of marine and coastal issues.

Furthermore, with the support of the EU, a specific science-policy interface and related process was established under the auspices of UN Environment/MAP-Barcelona Convention, to address science-policy interaction needs for the regional implementation of the ecosystem approach.

Capacity building

Several States provide training to developing countries in relation to a range of issues, including: fisheries research; stock assessment; fisheries statistics; implementation of ecosystem approach to management; data collection, handling and analysis; and monitoring, control and surveillance, underwater cultural heritage research and protection. Assistance also involves institutional strengthening and technology transfer of mitigation devices for the protection of marine biodiversity.

The Global environmental Facility (GEF) International Water Programme on Large Marine Ecosystems contributes to building technical and institutional capacity in regions for the assessment and transboundary management of shared resources. The IOC Capacity Development Strategy and Programme aims to assist States with developing and sustaining capacity in ocean sciences, observation and services. This includes the establishment of IOC regional training centers through the Global Ocean Teacher Academy and other IOC sub-regional bodies. The International Seabed Authority (ISA) has three active training streams namely: the Endowment Fund supporting the participation of qualified researchers from developing countries in cooperative research on the international seabed area, the Contractor training programme through which personnel from developing States are provided with appropriate operational expertise, including at-sea training and, the internship programme. In addition, several ocean literacy networks aim to raise awareness of citizens on how the ocean influences people and how people influence the ocean. These include the European Marine Science Educators Association, the Consortium for Ocean Science Exploration and Engagement, among others. Moreover, under the 2001 Convention on the Protection of the Underwater Cultural Heritage, UNESCO organizes trainings in underwater archaeology and is supported by a University Network joining some twenty institutions in this effort. IOC and DOALOS, in partnership with the Korea Maritime Institute, have developed a training course on marine scientific research under UNCLOS, which aims to provide government officials with the required knowledge to conduct marine scientific research in accordance with UNCLOS.

Technology transfer

TMT occurs on a regular basis through bilateral cooperation among States and through UN bodies and international organization such as IOC, the International Maritime Organization (IMO), FAO and the ISA, among others. Universities and research institutions also regularly undertake both capacity building and technology transfer as part of their research activities in developing countries. The IOC Criteria and Guidelines on the Transfer of Marine Technology (CGTMT), which are directly referenced in SDG 14.a, constitute a reference document on this matter.

III. Challenges and opportunities

The ocean is still one of the least known areas of the world. Our understanding of the processes that are taking place is currently not keeping up with the pace of changes in the oceans. There is a need to better understand ecosystem processes and functions and their implications for ecosystem conservation and restoration, ecological limits, tipping points, socio-ecological resilience and ecosystem services. In particular, the effects upon biodiversity and ocean productivity from cumulative impacts as well as socioeconomic impacts are often not well understood in order for the adequate political and business decisions to be made.

Many aspects of integrated coastal zone management still present important knowledge gaps. Many coastal areas are experiencing the effects of sea level rise as well as extreme weather events that are causing widespread loss of life and the extensive destruction of infrastructure, settlements and facilities that support their livelihoods and existence. Therefore, there is a need for improving the observation, coastal bathymetric data, modelling and forecasting of extreme weather events and the development of multi-hazard early warning systems and risk management strategies embedded in integrated coastal management approaches. There is also a gap in terms of understanding species and the diversity of marine resources. Data and knowledge gaps exist with respect to pollution, including all aspects of the life cycle of marine debris, plastics and micro-plastics, heavy metals and other hazardous substances. The precise scope of the impacts of acidification on the marine environment remains unclear, particularly in the polar regions. Further research is needed on ocean acidification, especially programmes of observation and measurement, as well as increased scientific activity to better understand the effects of climate change on the marine environment and marine biodiversity. There is still limited scientific understanding of the effectiveness and impact of conservation measures, including with regard to their socioeconomic benefits and how marine- and land-based human activities impact their effectiveness. A majority of underwater cultural heritage sites remains un-inventoried and thus un-researched and unprotected. The limited amount of scientific knowledge of areas beyond national jurisdiction means that the extent of impacts and the productivity limits and recovery time of ecosystems and biodiversity in those areas cannot be easily predicted.

Ocean science needs to apply a holistic approach towards understanding and addressing cumulative impacts of various threats such as climate change, acidification, pollution, coastal erosion and overfishing. There are opportunities for enhanced multidisciplinary and transdisciplinary research on oceans, with natural and social scientists working together with holders of relevant traditional knowledge to better understand the nature of the complex interactions between humans and marine and coastal ecosystems. Comprehensive databases, at the country and the regional level, are required. Leading research institutions within each region should seek to work collaboratively and ensure that research efforts are not duplicated, and that limited resources are efficiently utilized.

Observation systems and knowledge base

The sustained ocean observing system today has been developed over the last 20-30 years and represents an impressive achievement. However, it is largely funded through short term research budgets and hence support is very fragile. There is a need to strengthen and diversify the support for sustained observations, inter alia, by ensuring that the users, articulate and advocate needs for sustained observations as the foundation of the intelligence and information to be delivered.

Technology development in autonomous platforms, communications and sensors provide a tremendous opportunity; increasing our ability to measure more of the oceans (deep ocean, under the ice), measure more variables (chemistry and biology), more cost effectively, and deliver data more quickly. JCOMM is developing a strategy for the roll out of new technologies across the observing networks.

The reliability of long-term climate change predictions in the Arctic and Antarctic is severely limited by the lack of systematic *in situ* observations of and beneath the sea-ice. For example, changes in the cryosphere in the oceans, and sea-ice in particular, have substantial impact on climate. It is also critical to be able to understand and predict such changes at various time scales in order to support human activities in polar regions (e.g. maritime safety, aid to navigation). There is a variety of UN Agencies, international organizations and actors playing a role with regard to observations in polar regions, and there is a need to strengthen collaborations between them, establish partnerships, and better integrate and sustain such activities in the view to better address research and operational requirements.

Although the monitoring of the oceans is carried out under various programmes the protocols used tend to be different, preventing comparisons and the harmonization of data. Efforts under JCOMM aim to evaluate the standards and best practices (from sensor calibration to data delivery) used across the observing networks as a package, to ensure data can be delivered by variable of known quality. Regional Sea Conventions existing monitoring and assessment practices already provide a key knowledge base on the status of the marine (and coastal) environment, which could be further built on and should be the basis of further harmonization between national, regional and international levels.

Ocean research or related services and acquisition of sufficient credible scientific data and information are still weak in many countries due to their high cost. National ocean research policies to support sustainable development plans are rare. The establishment of the Regular Process has improved the science-policy interface at the global level and it is hoped that it will contribute to enhancing this interface at the regional and national levels. However, gaps remain in the ability to integrate the results of scientific research into policy development.

In many countries, higher education is heavily dependent on the type and expertise of guest researchers. Technical education in marine-related fields is often absent or inadequate. Infrastructure for marine research is often weak, inadequate or in need of upgrading. There is often an overdependence on project-oriented, short-term international support.

Developing countries have expressed the need for the availability of data and information that are reliable and accessible through appropriate data centres, such as those of the International Oceanographic Data and Information Exchange of the Intergovernmental Oceanographic Commission of UNESCO and the International Council for Science. The international exchange of climate relevant data, such as coastal interface data, in particular sea level,

waves and storm surges, is also critical for the delivery of climate services and management purposes.

With regard to small island developing States (SIDS), it has been noted that inadequate scientific support systems prevent their full participation in global ocean science programmes. There is a need to undertake marine scientific research and develop the associated technological capacity of SIDS, including through the establishment of dedicated national and regional marine scientific and technological centres in accordance with part XIV of UNCLOS and the provision of technical assistance.

Finally, there is a gap in our collective capacity to effectively measure progress in many areas of SDG 14. Although indicators have been developed for all targets under SDG 14, data gathering is a challenge for many of those indicators. Currently, the Global SDG Indicators Database contains information on only two indicators for targets under SDG 14.[5] Data gathering in order to be able to follow the progress made on target 14.a is a challenge. To date, no global database containing information related to the indicator 14.a.1 exists. While general information on investments toward research and development is available, the multidisciplinary character of ocean science and marine technology transfer makes it difficult to classify.

Opportunities in relation to ocean research and education include the following: strengthening universities and technical institutions in human resources and infrastructure; continuing education of locally available capacity through involvement in capacity development actions; supporting measures to retain existing capacity in marine sectors; promoting the establishment of consortia of higher education at the appropriate geographic scale; establishing and maintaining a register of infrastructure open to international cooperation to facilitate access to developing countries; promoting further scientific research in the area beyond national jurisdiction to fill data gaps and enhance understanding; promoting the development of public information (communication) departments in ocean research institutions; fostering development of ocean literacy programmes as communities of practice to share experience within and across regions; and promoting and assisting with the development of alumni scientific networks. In addition, countries could consider establishing ocean science advisory bodies at the national level in order to strengthen the science-policy interface.

Capacity building

Gaps in capacity-building hamper less developed countries in taking advantage of what the ocean can offer them, as well as reduce their capability to address the factors that degrade the ocean. Although many international training initiatives on marine sciences exist, no comprehensive global catalogue of these efforts exists to date.

In the follow up to the Rio+20 conference, the IOC conducted a baseline study for assessing national capacities and needs in marine research, observation and data and information management.[6] The assessment shows that requirements and priorities for capacity development vary from region to region, and that capacity development interventions need to adapt to regional priorities. The First Global Integrated Marine Assessment identified common capacity development needs in relation to marine research across the regions: (i) data accessibility and data sharing; (ii) the provisions for mentoring and training

[5] Indicators 14.4.1 and 14.5.1. See http://unstats.un.org/sdgs/indicators/database.
[6] See IOC/INF-1313.

opportunities for less experienced scientists and practitioners; (iii) data collection and marine habitat mapping to inform management of ecosystems, biodiversity and fisheries; (iv) the need to improve professional capacities to assess socioeconomic issues; and (v) the lack of capacity to conduct integrated and ecosystem services assessments.

Training and retaining staff in small Pacific countries is a critical need. Brain drain is a concern in many developing countries, with trained staff often leaving to take international positions. This challenge can be addressed by changes in the support, working culture, and quality of staff positions available in country to attract and maintain national staff.

It is critical to intensify efforts to build capacity for developing countries, in particular for the least developed countries and small island developing States, as well as coastal African States. Opportunities include the following: establishing a global mechanism for reporting training and capacity development activities in ocean science, hence facilitating access to scientists; providing technical support for the development of national ocean research plans in accordance with national development plans and ocean policy processes; exploring the possibility of creating regional training centres in new regions, especially to address the issues faced by SIDS; and seeking support from Member States with ship capabilities for ship time and explore ship sharing mechanisms. Capacity development efforts in marine sciences, including training programmes, need to take a long term perspective. In addition to traditional capacity development assistance through North-South cooperation, there is a potential to foster capacity development partnerships that mobilize South-South cooperation and to develop initiatives to systematically take advantage of the pool of expatriated national experts for capacity development actions.

The United Nations General Assembly established a Technology Bank to strengthen Least Developed Countries' science, technology and innovation capacities, foster development of national and regional innovation ecosystems, and generate home grown research.

Technology transfer

In spite of its importance, as reflected in UNCLOS and many international documents, transfer of marine technology seems to be an insufficiently monitored area. Most developing States are inadequately equipped to be able to fully benefit from ocean activities and resources and to deal with impacts on the marine environment and continue to express the need for the development of technology, its transfer and technical assistance. Furthermore, most developing States are inadequately equipped to deal with the environmental impacts of ocean uses.

For a number of countries, in particular SIDS, oceans represent a potential for building strong, innovative and resilient economies. Identifying context-specific options for ocean-based economic activities and incorporating them into coherent science and technology roadmaps that support national development strategies will be critical to these efforts. In this context, the Technology Bank for LDCs intends to promote and facilitate the identification, utilization and access of appropriate technologies, and as well as their transfer to the LDCs, while respecting intellectual property rights and fostering the national and regional capacity of LDCs for the effective utilisation of technology to bring about transformative change.

States have been encouraged to further use the CGTMT. It was noted that trade can be an important tool to facilitate and accelerate the dissemination of environmental technologies around the world, including those that contribute to ocean health and the conservation of marine resources.

IV. Existing partnerships

A great number of partnerships cover various aspects of target 14.a, with some of them covering multiple targets of SDG 14. [7] These partnerships involve a range of stakeholders and modalities. Stakeholders include States, intergovernmental organizations, international and national non-governmental organizations, scientific institutions, networks and projects, foundations and other private entities. UN organizations are involved in many partnerships, often in relation to one of their core mandates. Some partnerships contribute to the science-policy interface.

Beyond the global observation systems mentioned above, examples of partnerships identified in the submissions for the Conference included: the Partnership for Observation of the Global Oceans (POGO); the Argo Program, which manages a broad-scale global array of temperature/salinity profiling floats; FAO partnerships with Google/ Global Fishing Watch; the Pacific Islands Universities Research Network (PIURN); the Pacific Islands Global Ocean Observing System (PI-GOOS); the DOALOS-IOC-KMI training course on the conduct of marine scientific research under UNCLOS; and the Global University Partnership for Environmental Sustainability. It was mentioned that the EU Horizon 2020-funded Project BlueBRIDGE and the iMarine initiative offer a framework for future partnership development to address gaps. The Secretariat of the Convention on Biological Diversity (CBD) coordinates the Sustainable Ocean Initiative (SOI) a global capacity building partnership, which supports the achievement of the Aichi Biodiversity Targets and relevant Sustainable Development Goals.

To promote observations in polar regions, the World Climate Research Programme and the Prince Albert II of Monaco Foundation are jointly promoting, together with other co-sponsors, a Polar Challenge[8] to reward the first team to complete a 2000 km continuous mission with an Autonomous Underwater Vehicle under the Arctic or Antarctic sea-ice.

The relatively large number of partnerships addressing science and technology issues in relation to oceans may conceal limited effectiveness, lack of resources, fragmentation or duplication. More work would be needed to assess their impact as a whole, as well as for individual countries or groups of countries.

The Technology Facilitation Mechanism (TFM), set up as part of Agenda 2030, seeks to advance knowledge sharing and multi-stakeholder collaborations through which STI can accelerate progress towards the SDGs. As components of the TFM, the annual STI Forum provides opportunities to take this forward with regard to SDG 14; and the on-line platform, currently under design, will also facilitate such exchanges in the years to come.

[7] See http://sustainabledevelopment.un.org for a list of partnerships identified in the preparatory work for the conference.
[8] https://www.wcrp-climate.org/polarchallenge

V. Possible areas for new partnerships

Submissions made for the preparation of the conference in terms of areas for new partnerships included the following:

- New partnerships could focus on capacity-building activities, in particular in developing countries, in the field of marine scientific research, as well as on transfer of marine technology;
- Strategic partnerships between UN organizations and universities and research institutes could bring added value in filling existing capacity gaps. Partnerships could be developed with IOC-UNESCO, UN Environment, LME programmes, local and international reference universities and regional marine science associations;
- Regional or sub-regional centres could be used as hubs to deliver a suite of activities covering the whole spectrum of needs for marine scientific research in relation to SDG 14 and associated capacity building;
- Under the auspices of IOC and IHO, GEBCO is proposing to launch Seabed 2030 - Roadmap for Future Ocean Floor Mapping;
- Through its Member States, IOC is considering launching a long-term international ocean science initiative to support the implementation of Agenda 2030. Building on the capacity needs identified in the GOSR, a dedicated Capacity Development Fund would be established to facilitate transfer of technology and the development of adequate ocean research infrastructure in developing countries, especially SIDS and LDCs;
- Country experts could be trained and supported by cross-boundary learning experiences, such as internships or training fellowships, to support implementation;
- National ocean advisory councils, with national and regional mentoring support, could support national coastal and marine management and progress toward SDG14;
- The creation of a Pacific Ocean Research Alliance, supporting the policy and sectoral approaches of the Pacific Ocean Alliance and the Marine Sector Working Group;
- Partnerships to train and retain staff in small Pacific countries;
- Developing a dedicated segment on ocean-related science and technology under the technology facilitation mechanism mandated by paragraph 123 of the Addis Ababa Action Agenda while avoiding duplication with other existing mechanisms in this area;
- A new partnership, building on existing efforts, to enable scientists to better predict the El Niño/Southern Oscillation and other ocean oscillations – and thus the climate and weather;
- A new partnership, building on existing efforts, for the enhancement of a Global El Niño Information System to enable scientists to better predict the El Niño/Southern Oscillation and other ocean oscillations;
- Strengthening maritime and coastal safety services, in particular for SIDS and LDCs (including early warning of coastal inundation, optimization of Search and Rescue and environmental emergencies and operations, and investigation of cost recovery mechanisms for marine services).

VI. Guiding questions for the dialogue

The dialogue could consider the following questions:

- How can partnerships help the international community enhance scientific understanding of the functioning of the ocean and its interactions with human systems?
- How do we ensure that capacity building and technology transfer meet the identified needs of developing countries in the long term, moving away from project-based funding and externally-identified priorities?
- Do technological developments (autonomous platforms, new sensors) and new observing frontiers (deep ocean, under ice) bring opportunity to bring in new partners to sustained observations? What types of partnerships could be put in place to encourage and better monitor the transfer of marine technologies to developing countries?
- What partnerships are needed to create science and technology roadmaps that support strong, innovative and resilient ocean-based economies in Small island developing States?