

Inputs from the Intergovernmental Oceanographic Commission of UNESCO
to the Draft Outline of the Secretary-General's background note

2.a) Introduction

The IOC would like to recall that SDG 14 recognises that scientific understanding of the ocean is fundamental to carry out an effective management of the human activities that affect the marine environment and the biota that it contains. This scientific understanding is also essential to predict or forecast, mitigate and guide the adaptation of societies to cope with the many ways the ocean affects human lives and infrastructures at different spatial and temporal scales. The oceans provide various ecosystem services or what are also referred to as the "benefits that people desire from ecosystems" (Millennium Ecosystem Assessment, 2005). It is therefore necessary to know the types or nature of services that humans receive from the oceans and the scale or level of human activities that can be exerted without causing imbalances that could affect sustainability. Achieving sustainability therefore requires good science and strong public understanding of the importance of the ocean. This is relevant to all targets of SDG 14. Achieving both, requires effective science/policy interfaces at all levels to ensure that scientific information reaches out decision makers and citizens. The conduct of marine research and oceanography is expensive, few nations have the capacity to survey and operate scientific cruises in their national waters, yet alone in the open ocean. The level of capacity scientific and technological capacity of nations is highly correlated to national investments aimed at identifying knowledge gaps in science, technological advances, human skills development and infrastructure.

Specific inputs on Targets 14.2, 14.3 and 14.a.

Target 14.2: By 2020, sustainably manage, and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience and take action for their restoration, to achieve healthy and productive oceans

2(b) Current activities towards the conservation and sustainable use of the oceans, seas and marine resources, including capacity building activities.

The IOC is promoting the increase of institutional collective capacities of member states to respond to change and challenges in coastal and marine environments through further development of such science-based management tools as Integrated Coastal Area Management (ICAM), Marine Spatial Planning (MSP), Ecosystem-Based Management (EBM) and the Large Marine Ecosystem (LME) approaches.

IOC's coastal programmes focus in developing Member States' capacities in the application of ecosystem-based management tools and the integration of climate change adaptation and coastal hazards preparedness through the use of area-based management approaches.

There are emerging opportunities for the global community to enhance the contribution of the oceans to sustainable development, increase recognition of the concept of blue economy, renewable blue energy, genetic bio-resources, ecosystem services and the ocean's place in the Earth System amongst others, and initiatives such as ICAM and MSP are needed.

ICAM is still a relatively new and evolving concept at regional scale but the integration principle was developed in Agenda 21 from the first Rio summit in 1992, as a tool to pursue sustainable development in coastal zones, as well as an institutional process well codified that needs to be driven by science based information at each step of the process.

MSP arises as a public process of analysing and allocating the spatial and temporal distribution of human activities in marine areas to achieve ecological, economic and social objectives that usually have been specified through a political process.

Building on its experience in providing support to nations for the development of decision support tools for coastal management, IOC is bringing forward the latest knowledge in ecosystem based management and relevant supporting data products and services. Guidelines, training materials and tools by dedicated group of experts have been developed to support the institutional processes on integrated coastal area management and marine spatial planning in countries, regions and large marine ecosystems.

2(c) Challenges to the conservation and sustainable use of the oceans, seas and marine resources for sustainable development (e.g. areas where gaps exist, where more action is needed)

Challenges:

1. Strengthening ocean and coastal governance at all levels (local, provincial, national, regional), including both institutional/public and private stakeholders.
2. Financial issues in relation to the mobilization of national public funding to support integrated policy development.
3. Political instability and constant rotation of experts and civil servants.
4. Lack of commitment and contributions from partners or support institutions.

Gaps:

1. Interoperability of data and information to support coastal and marine management and planning.
2. Increase of uncontrolled urban sprawl and socio-economic activities in coastal and marine areas.
3. Lack of strong and coordinated public bodies to develop coastal and marine integrated management and planning.

2(d) Opportunities (e.g. interlinkages of SDG 14 with other relevant SDGs)

Coastal and marine ecosystem-based management tools provide solutions to specific needs at coastal community level covering all SDGs.

SDG 1, 3, 4, 5 – Coastal and marine management and planning provide the policy framework to accomplish a structured and sustainable social context able to reduce poverty, ensure good health and wellbeing of the local communities, the quality of education and gender equality.

SDG 2, 11, 12 – The development of initiatives for sustainable coastal communities together with a responsible consumption and the ocean health provides an insurance of food security for these communities living by the coast or in small islands around the globe.

SDG 7, 8, 9, 10 – Integrated coastal area management and marine spatial planning promote ecosystem-based management measures towards sustainable blue growth. Sustainable development actions related to the implementation of blue renewable energy will facilitate the creation of jobs and blue economic growth. This will be possible with a decisive development of innovation policies and the development of marine infrastructure.

SDG 6, 13, 15 – Ecosystem-based management requires an integrated view of both terrestrial and aquatic ecosystems in order to guarantee clean water and effective sanitation, identification and evaluation of terrestrial and water ecosystems, attending the effects of the climate change.

SDG 16, 17 – SDG14 contributes to peace and justice in managing coastal and marine resources and promoting partnerships for the goals.

2(e) Development of partnerships (stocktaking of existing partnerships and opportunities for synergies and collaboration, new partnerships to address gaps, in particular capacity gaps).

IOC continue the support to our member states and Regional Sub-Commissions of IOC-UNESCO in Africa, Caribbean / Latin America and the West Pacific to facilitate the interaction amongst countries and national institutions in developing synergies towards national, transboundary and regional ecosystem-based management tools for coastal and marine environment.

The new challenges of climate variability and change, alongside the other existing drivers that cause depletion and degradation within coastal and marine ecosystems, increases the urgency and the need to scale up these efforts at national and regional scales. There is now a need to support adaptive ecosystem-management and governance that is informed by and evolves through ongoing learning and adaptive processes, to help increase the resilience and well-being of societies dependent on marine goods and services.

More specifically, **IOC proposes a Global partnership on MSP implementation** as an opportunity to manage human uses and sustain ecosystem services while adapting to the impacts of climate change at global and regional scale. A strategic, efficient and coordinated response to the major challenges that the ocean is facing:

- 1) Scientific understanding of ocean and coastal processes to improve management,
- 2) Reduction of risks, mitigation of impacts and adaptation to climate change and
- 3) Reinforce Member states' institutional capacities to protect and sustainably manage ocean and coastal resources.

Large Marine Ecosystems (LMEs) as relatively large areas of ocean space (200.000 km² or greater) adjacent to the continents represent the context to promote synergies and collaboration amongst Member states for new partnerships and actions for the ocean.

IOC is proposing a dedicated Partnership to consolidate a global network of practitioners at LME scale, building on the LME:Learn Project, a partnership amongst GEF, UNDP, IOC, Conservation International, ICES, IUCN, and NOAA, as the best vehicle to achieve ecosystem based management objectives (SDG14.2) at regional scale, also integrating climate change adaptation and coastal hazards preparedness into the application of area-based management approaches.

Target 14.3: 'Minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels'

2b) Current activities

In light of Target 14.3 which urges to minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels, IOC-UNESCO supports several networks and initiatives addressing ocean acidification, being it observation, research, coordination, outreach and management.

IOC has a strong mandate in ocean observation, therefore it holds the secretariat of the **Global Ocean Observing System (GOOS)** and also is a strong partner in the **Global Ocean Acidification Observing Network (GOA-ON)**. GOA-ON is guiding the development of an integrated network for the detection and attribution of ocean acidification and ecosystem response. GOA-ON has also served to focus funding bodies and international research programs to integrate within a shared vision that extends from the coastal to open ocean domains. The objectives of GOA-ON are: to improve our understanding of global OA conditions, to improve our understanding of ecosystem response to OA, and to acquire and exchange data and knowledge necessary to optimize modeling for OA and its impacts.

Vast areas of the ocean are still under sampled in particular to its biology, and even time series stations observing the environmental change for decades are risking to lose their financial support. Therefore, it is indispensable to link existing observation activities with GOA-ON. The **International Group for Marine Ecological Time Series (IGMETS)** (<http://igmets.net/explorer>) shows possible partners and highlights areas of little no measurements at all, e.g. the Indian Ocean.

The indicator for nations to report against SDG target 14.3 is “Average marine acidity (pH) measured at agreed suite of representative sampling stations”. In order to achieve this target, it will be essential to develop and maintain easy data access worldwide to pH data as well as broader ocean acidification-related data covering the entire EOVC carbonate system. Since its launch in 2012, GOA-ON (scientists from more than 67 countries involved) has significantly contributed to advancing ocean acidification (OA) monitoring worldwide. As a natural next step to increase international collaboration and data sharing on OA, GOA-ON in cooperation with IOC has started to develop a “one-stop-shop” data portal comprising available and quality-controlled OA controlled integrative global data products, and inventories of existing monitoring efforts. The data portal will provide easy access to metadata and data, and will give access to attractive visualizations of, for example, the progress of ocean acidification in space and time. At present nothing similar exists worldwide. The creation of such a globally user-friendly online application that improves the accessibility and utilization of such data requires: consistent quality control (QC) of raw data, linkages between existing measurements and data centers, enhanced data intercomparisons, and especially greater participation and technical capacity by OA data producers and consumers in low-income and lower-middle-income countries. The expected products of the data portal, which will help to report to the 14.3.1 indicator are:

- Global ocean acidification data portal: Connecting data sets assessing ocean acidification worldwide including the parameters temperature, salinity, DIC, pH, TA, pCO₂; and encompassing both individual in-situ assets and higher-level, quality controlled global or regionalized data products.
- Guidelines for quality control of ocean observations of the carbonate system, (in cooperation with GOOS and IOCCP - http://www.ioccp.org/images/10FOO/03_EOV_BGC_CarbonateSystem.pdf)

- Attractive data products/visualizations of OA at the global and regional, as well as national level (subject to availability of data).
- Improved local and regional capacity for OA data management, quality control.
- Vast areas of the ocean are still

In addition, IOC co-coordinates the **biological working group of GOA-ON**. For the first time this group will publish guidelines on how to measure the impacts of ocean acidification on marine life with globally comparable parameters in 2017. These guidelines will help to establish biological OA monitoring activities, which currently only exist in some countries, e.g. the US, Thailand, UK. The group's aim is that the biological OA observation strategy will be part of the natural progression of moving from a chemical dominated OA observation towards a more integrated approach including biological and chemical measurements.

Close cooperation with the OA-ICC of the IAEA result in joint workshops to support the previously mentioned activities, but also to strengthen the science behind socioeconomic impacts of ocean acidification, to increase human capacity in less developed countries and to raise awareness for the impacts of ocean acidification (e.g., via the OA-iRUG).

2c) Challenges

1. Restrictions in data sharing.
2. Guidelines to measure the impacts of OA are missing.
3. Human and technical capacities needed to detect impact of climate change and ocean acidification on marine biodiversity and ecosystems at the national, regional and global level, in the open ocean and coastal areas.
4. Current indicator do not give sufficient information to assess and achieve the target.
5. Long term observations are needed – Distinguishing between climate variability and climate change.
6. Global model projections might be difficult to use for predicting local change and impacts.

2d) Linkages to other SDGs

There is a clear connection between SDG target 14.3 the SDG 13 'Take urgent action to combat climate change and its impacts', as climate change and ocean acidification are both results of increased CO₂ emissions to the atmosphere and ocean. Climate change and ocean acidification are not happening in isolation. Therefore, it is important when looking at marine ecosystem response to the changing environment, to follow an multistressor approach, including rising temperatures, ocean acidification, and deoxygenation.

And while of course all target of the SDG 14 are interlinked, target 14.a 'Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries.' is especially relevant, as only increasing scientific knowledge and capacity will enable member states to detect the impacts of ocean acidification.

2e) Partnerships

GOA-ON –scientific network – this network links scientists worldwide, creates a platform for scientific exchange and capacity building, increasing support is needed to equip specialists and research institutions to create an active environment, which can serve as a data source (data portal), can provide guidance, and transfer knowledge and technical capacity. It is proposed that GOA-ON will provide

Biological Working Group of GOA-ON – high-level scientists, biologists working in different marine environments, who establish guidelines in order to enable globally and regionally comparable data sets to detect the impact of OA in conjunction with other stressors as climate change, deoxygenation, pollution.

Global Earth Observations – Global Ocean Observing System – Improving the cooperation between OA researchers and global observing systems, which try to monitor changes in the ocean and the atmosphere will facilitate the production of predictions via modeling calculations and ensure a wide community of data providers and users.

International Group for Marine Ecological Time Series (IGMETS) – increased cooperation between the OA observing community and ship based time series is needed to connect existing biological monitoring of phyto- and zooplankton with the expertise of OA scientists. Both networks would benefit, the time-series network via including a broader mandate in terms of observation needs and the OA community by relatively easy becoming access to ongoing biological monitoring.

Regional networks – LAOCA, IOC-WESTPAC, ApHrica – These regional networks help to create the human and technical capacity in less developed countries. Local and regional networks facilitate communication, ensure strong cooperation and regional capacity building. Only via these networks observation strategies are translated into actions, they connect local stakeholders with local scientists.

Research programmes – GLODAP, SOCAT, IPACOA – Experiences made by these programmes are highly important to improve and ensure quality control of OA measurements, further they provide the technical capacity and guidance to establish the GOA-ON data portal.

Project offices/UN organizations - IAEA/OA-ICC, IOCCP, Regional Seas – UNEP - Global Coral Reef Monitoring Network GRCM – All these agencies/offices/programmes are partners of the IOC in order to reach out to technical capacities in particular regions, to facilitate communication with relevant stakeholders and to align the ongoing programmes relevant to OA.

OA-iRUG – IOC is member of the Ocean Acidification International Reference User Group which brings together scientists and stakeholders from various backgrounds such as industry and governmental and non-governmental organizations, to facilitate networking and the presentation of key findings to interested non-scientific parties.

National governments – National Institutions – Linking the envisaged efforts to achieve the target 14.3 with national governments, relevant ministries and institutions is mandatory to ensure a national coordinated flux of data.

Target 14.a : Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health and to enhance the contribution of

marine biodiversity to the development of developing countries, in particular small island developing States and least developed countries.

2b) Current activities

Scientific knowledge and research capacity are the backbone for a sustainable management of the ocean and its resources. Without science one would not know the consequences for and impacts of e.g. climate change, pollution and extensive fisheries on the marine environment.

Examples of Key international activities in capacity development include:

- The **International Seabed Authority (ISA)** has three active training streams, the *Endowment Fund* supporting the participation of qualified researchers from developing countries in cooperative research on the seabed;
- The **FAO/Norway Nansen programme** supports the development of technical capacity for the implementation of the ecosystem approach in the management of marine fisheries in developing
- **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** is aiming to assist Member States with developing and sustaining the necessary capacity in ocean sciences, observation and services. This include the establishment of IOC regional training centers through the Global Ocean Teacher Academy and other IOC sub-regional bodies.
- The **Partnership for Observation of the Global Oceans, POGO**, which brings together major oceanographic institutions around the world to promote global oceanography and related education and training.
- Various **ocean literacy networks** that 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, amongst others.

Target 14.a based on the definition of marine technology described in the published **IOC Guidelines on Transfer of Marine Technology**, relates to that. In this context, marine technology is defined as:

- Information and data, in a user-friendly format, on marine sciences and related marine operations and services
- Manuals, guidelines, criteria, standards, reference materials
- Sampling and methodology equipment (e.g., for water, geological, biological, chemical samples)
- Observation facilities and equipment (e.g., remote sensing equipment, buoys, tide gauges, shipboard and other means of ocean observation)
- Equipment for in situ and laboratory observations, analysis and experimentation
- Computer and computer software, including models and modeling techniques
- Expertise, knowledge, skills, technical/scientific/legal know-how and analytical methods related to marine scientific research and observation

More info: <http://unesdoc.unesco.org/images/0013/001391/139193m.pdf>

One mechanism to track scientific knowledge and technology transfer is the Global Ocean Science Report (GOSR) launched by IOC Member States in 2014. The GOSR was established to assist local and national governments, academic and research institutions, as well as international organizations and donors, in making informed decisions on future research investment. It summarizes 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.

In cooperation with the UNESCO Institute for Statistics and the IOC programme for International Oceanographic Data and Information Exchange (IODE) a full methodology for the indicator 14.a.1 will be prepared, including instructions on data gathering, data analysis, data storage and reporting by March 2017. First results will be published in June 2017.

2c) challenges

Data gathering to be able to follow the progress made in order to follow the target 14.a is the main challenge. To date no global data basis containing information related to the indicator 14.a.1 exists, while general financial information about the investment toward research and development are available the multidisciplinary character of ocean science and marine technology transfer makes it difficult to categorize. Further research structures within the member states differ a lot

As this total amount of financial support for marine technology is highly correlated to the total number of financial resources allocated to research and development, the GOSR as well as the SDG indicator 14.a.1 refers to the proportion of resources allocated for marine technology in relation to the R&D in general in their analyses. The amounts for R&D national funding are obtained with the support of the UIS, which undertakes regular assessments in this regard.

The proportion of resources allocated for marine technology compared to the total R&D funding is a proxy, which can be applied across different development levels, regions and country sizes.

2d) Linkages to other SDGs

The target 14.a is linked to all the other SDG 14 targets. In addition, there is a clear relationship to the SDG 17, which asked for capacity building and knowledge transfer via enforcing partnerships between regions and globally.

2e) Partnerships

Project offices/UN organizations - IOC-UNESCO (incl. IODE), UIS, OECD, Worldbank – IOC connects with these projects/programmes in order to not only illustrate the proportion of the investment towards ocean science but also to show its impacts, how this connects to the ocean economy, to blue growth and if there are linkages to wealth and human wellbeing.

Research and Development Ministries – National governments, their ministries need to be involved in the process of achieving the target 14.a, as most of the implementation will fall back to their research and development funds. It is indispensable to show the importance of ocean science for particularly coastal communities. Ocean Science, existing human and technical capacities is directly correlated to

national investments. Highlighting the importance of increased commitments towards ocean science to sustain the services and goods provided by the ocean is crucial.

National institutions – universities, research institutions – strong cooperation between the implementing scientists and institutions is mandatory in order to know where to increase ocean science. Only direct communication and cooperation between the IOC and the research community will ensure directed and needed investments.

NGOs, Foundations – NGOs and Foundations are important to fund science. Especially in less developed countries, highly vulnerable nations directed capacity building efforts help to increase local and regional human and technical capacities.

Additional Partnerships to be highlighted at the UN conference of a cross-cutting nature would include :

-Seabed 2030 - Roadmap for Future Ocean Floor Mapping – under the auspices of IOC and IHO, GEBCO is proposing to launch a global program with the focused goal of compiling a high-resolution openly available Digital Bathymetric Model (DBM) portraying the World Ocean seabed at the highest resolution possible from the coast to the deepest trenches by the year 2030. This DBM should efficiently provide bathymetric information to end users and leave no features of the World Ocean floor smaller than 100 m unmapped by the completion of the program.

- Long-term international Ocean Science initiative in support of Sustainable Development. The IOC through its Member States, is considering launching such initiative to support the implementation of Agenda 2030 by making a decisive step for turning the scientific knowledge on and understanding of the ocean and sea floor processes and conditions and about marine resources into effective actions supporting improved ocean governance, stewardship and sustainable development of the ocean (blue) economy and by identifying and filling the significant remaining gaps in our knowledge. This would also include the development of substantial technological developments and related transfer of marine technology, including modelling tools, through persistent cooperation over time, also stimulating capacity building. Operating under an intergovernmental framework, this initiative would coordinate contributions of nations and other stakeholders in the development of ocean science, ocean exploration, technology and capacity development to support the science based requirements of all relevant ocean SDG targets. Building on the capacity needs identified in the Global Ocean Science Report to be launched at the UN SDG 14 Conference, a dedicated Capacity Development Fund should be established to facilitate transfer of technology and the development of adequate ocean research infrastructure in developing nations, especially SIDS and LDCs.

Possible Theme for the Partnership Dialogue Session

IOC would like to propose the following cross cutting theme:

Ocean Science and related capacity development as catalyst for SDG 14 implementation.

Such a theme would address all the targets under SDG 14 as well as benefit SDGs 1,2, 3, 4, 8, 11, 12, 13, and 17.