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IOC-32/4.3.Doc(1) Addendum

Paris, 18 May 2023
English only

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION
(of UNESCO)

Thirty-second Session of the Assembly
UNESCO, 21–30 June 2023

Item **4.3** of the Provisional Agenda

IOC CAPACITY DEVELOPMENT STRATEGY FOR 2023–2030

ADDENDUM

BACKGROUND INFORMATION

This document provide detailed background information to Document IOC-32/4.3.Doc(1) related to the process of reviewing and revising the Capacity Development Strategy of IOC.

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1. Background

1. The Intergovernmental Oceanographic Commission (IOC) of UNESCO has a recognized and unique role in the UN system in relation to ocean science and the science base for ocean and coastal management. It is recognized through the United Nations Convention on the Law of the Sea (UNCLOS) as the competent international organization in the fields of Marine Scientific Research (Part XIII) and Transfer of Marine Technology (Part XIV). Its status as a body with functional autonomy within UNESCO has been carefully designed to provide an efficient platform for coordination, information and sharing of knowledge to contribute to sustainable and peaceful development.

2. Enabling Member States to participate in and benefit from its programmes and actions has been a major goal of IOC's activities since its beginning, which translated into a number of resolutions and documents. They included the development of a *UNESCO/IOC Comprehensive Plan for a major assistance programme to enhance the marine science capabilities for developing countries* (IOC/INF-612[1], 1985), the development of an IOC Training, Education and Mutual Assistance Programme (TEMA) Strategy (TEMA-V/7, 1991) and Action Plan (TEMA V/9[2], 1991-1995) as well as observations and experiences of TEMA implementation, 1984–1994 (IOC-XVIII/Inf.2[3], 1995). *IOC Criteria and Guidelines for the Transfer of Marine Technology* (IOC/INF-1203[4]) its implementation plan (IOC/INF-1212[5]; 2005) and *IOC Principles and Strategy for Capacity-building* (IOC/INF-1211[6], 2005), were adopted in 2003.

3. In 2015, the 28th Session of the IOC Assembly adopted the IOC Capacity Development Strategy through Resolution XXVIII-2. It was developed for the period of 2015–2021 and was due to expire in December 2021. In 2017, the 29th Session of the IOC Assembly established the Group of Experts on Capacity Development (GE-CD) through Decision IOC-XXIX/10.1.

2. Steps Towards the IOC Capacity Development Strategy 2023–2030

4. The GE-CD at its second session[7] (2020) recommended the extension of the end date of the IOC Capacity Development Strategy 2015-2021 until July 2023. A *GE-CD Task Team related to the revision of the IOC CD strategy* was established and instructed to submit its report to the co-Chairs of the GE-CD for its approval and subsequent submission to the 31st Session of the IOC Assembly.

5. The Task Team considered in its review (IOC/INF-1396) the elements that would guide the revision of the Strategy beyond 2021, taking into account perspectives from other programmes and related CD initiatives such as the UN Decade of Ocean Science for Sustainable Development, the Global Ocean Science Report 2020, the CD survey outcomes, and consultations with other global and regional programmes, as well as with capacity development programmes of UN specialized agencies, non-UN IGOs, global and regional programmes or projects, NGOs, private sectors, etc.

6. The Assembly, at its 31st session, extended the IOC CD Strategy 2015–2021 until July 2023 and revised the Terms of Reference of the GE-CD through IOC Decision A-31/3.5.3:

[1] See: http://unesdoc.unesco.org/images/0006/000630/063061eo.pdf
[2] see: http://www.unesco.org/ulis/cgi-bin/ulis.pl?database=ged&mode=e&sc1=1&sc2=1&by=3&look=basic&req=2&no=88297
[3] see http://unesdoc.unesco.org/images/0014/001463/146372eo.pdf
[4] see: http://ioc-unesco.org/images/stories/LawoftheSea/Documents/ABELOS/cgtmt.pdf
[5] see http://unesdoc.unesco.org/images/0013/001397/139728e.pdf
[6] see: http://ioc-unesco.org/index.php?option=com_oe&task=viewDocumentRecord&docID=437
[7] Meeting report: http://www.ioc-cd.org/gecd2_report

Revision of the IOC Capacity Development Strategy

The Assembly,

Recognizing the importance of Capacity Development as one of the six functions of the IOC Medium- Term Strategy (2014–2021), enabling all Member States to participate in, and benefit from, ocean research and services that are vital to sustainable development and human welfare on the planet,

Recalling Resolution XXVIII-2 by which it adopted the IOC Capacity Development Strategy (2015–2021) at its 28th session,

Having examined the Report of the GE-CD Task Team related to the revision of the IOC Capacity Development Strategy 2015–2021,

Decides to extend the current IOC Capacity Development Strategy until July 2023,

Decides also to revise the Terms of Reference of the IOC Group of Experts on Capacity Development as follows:

(i) assist global and regional programmes with the implementation of capacity development needs assessments in a consistent manner;

(ii) assist global and regional programmes with the development of programmatic and regionally relevant capacity development work plans based on the IOC CD strategy and related needs assessments, building on ongoing activities and making use of existing training and education facilities;

(iii) provide advice to global and regional programmes on relevant methods and tools to improve the quality and impact of CD efforts;

(iv) repeat the CD survey at regular intervals in 2022 and biannually thereafter, possibly including CD implementation impact monitoring/metrics, also taking into account other methods such as regional reviews, science conferences etc.;

(v) ensure coordination of the work of the Group of Experts and its Task Teams with GOSR and CD aspects of the UN Decade of Ocean Science for Sustainable Development;

(vi) advise the Assembly on the Transfer of Marine Technology Clearing House Mechanism (CHM) as requested by the *IOC Criteria and Guidelines on the Transfer of Marine Technology* (IOC/INF-1203), making use, to the largest extent possible, of existing data and information systems and building upon the Ocean InfoHub project (2020–2023);

(vii) revise the IOC Capacity Development Strategy and prepare a proposal for submission to the IOC Assembly at its 32nd Session;

(viii) prepare a proposal to promote visibility and reach of the revised IOC CD Strategy so that its target audience will read through and appreciate the document as a guide in implementing capacity development activities for submission and submit it to the IOC Assembly at its 32nd Session;

Calls on IOC's regional subsidiary bodies as well as regional components of global programmes to:

(i) promote contributions to the CD survey;

(ii) identify CD efforts of other organizations and seek complementary cooperation;

(iii) link with other global, regional and national processes and strengthen the relationships with philanthropic, private partnerships and other regional organizations;

Invites Member States to:

(i) participate actively in the co-development of IOC capacity development by designating focal points for IOC capacity development, and by nominating members of the IOC Group of Experts on Capacity Development;

(ii) participate actively in IOC programmes, projects and steering groups;

(iii) involve universities in IOC surveys on capacity development needs;

(iv) contribute to IOC capacity development activities through financial and/or in-kind contributions;

Agrees that the regular budget for these activities will be identified as part of the Resolution on Governance, Programming and Budgeting Matters of the Commission (IOC Resolution A-31/2).

7. The 3rd session of the GE-CD[8] (2021) established the Working Group on revision of CD Strategy to prepare the draft IOC CD Strategy for 2023–2030. The WG had three meetings in early 2022 to work on the revisions of the IOC CD Strategy. At its first meeting, the Group proposed the creation of an online capacity development compendium. It led to the establishment of the of the Ocean CD-Hub, a global repository of capacity development opportunities.

8. IOC Circular Letter 2890 (2022) invited National Focal Points to respond to a short Capacity Development Compendium survey by informing the CD Secretariat of relevant national contacts who could provide information on capacity development (CD) activities provided by their country or organization. A total of 14 Member States responded and submitted contact information of relevant people, whom the Secretariat later reached out to in order to compile CD related activities (especially for developing country nationals) and detailed information that can be entered in the compendium.

9. A Working Group on Outreach was also established to prepare a proposal for an outreach and communications plan to promote the IOC CD Strategy. The Outreach WG met two times in late 2022 and prepared a proposal for outreach and communications plan (IOC-32/4.3.Doc(2)) for submission to the 32nd Session of the IOC Assembly.

10. The 4th session of the GE-CD[9] reviewed and approved the draft IOC Capacity Development Strategy 2023-2030 for submission to the 32nd Session of the IOC Assembly. The Secretariat implemented all proposed revisions from the Group in preparing the final draft of the IOC Capacity Development Strategy 2023-2030 (IOC-32/4.3.Doc(1)).

11. The resulting draft IOC Capacity Development Strategy 2023–2030 reflects the Working Group's recommendations to:

- reflect the increased recognition that the ocean plays in political, commercial, science and society;
- reflect the importance of capacity development in the delivery of the UN Decade of Ocean Science for Sustainable Development;
- underline IOC's critical role in fostering international cooperation through collaboration and partnerships, while using the strategy as the motivation to develop an implementation plan, such that IOC CD activities are clearly articulated and that the benefits are more readily identified.
- highlight long-term CD strategies sustaining existing capacity through coordinated initiatives that are able to allocate financial resources in the long-term and with coherent, integrated objectives;
- integrate natural sciences and societal disciplines into a holistic assessment of the marine environment as a general principle in CD strategies and initiatives;
- address barriers to full gender and geographic diversity, and guarantee equitable access to ocean knowledge, ocean-related education, training, and transfer of marine technology;
- consider appropriate form and structure with an ideal length enough to entice target audience to read through and appreciate the document as a guide in implementing capacity development activities; and

[8] Meeting report: http://www.ioc-cd.org/gecd3_report
[9] Meeting report: http://www.ioc-cd.org/gecd4_report

- promote visibility and reach of the revised IOC CD Strategy.

3. Capacity Development Perspectives with Global and Regional Programmes and Other International Organizations

12. This chapter provides a summary of elements considered in revising the strategy, from the perspectives and consultations with other global and regional programmes, projects and other international organizations. The results of this analysis have been used to guide the review of the expected results and outputs of the revised strategic plan.

3.1 UN Decade of Ocean Science for Sustainable Development

13. A comparative analysis of the IOC CD Strategy vis-à-vis the CD Chapter of the Decade revealed additional considerations in the updated version of the IOC CD Strategy.

14. The UN Decade of Ocean Science for Sustainable Development (hereafter referred to as 'the Ocean Decade') will provide the enabling framework across the UN system to support countries in achieving their ocean-related 2030 Agenda priorities. It will facilitate the transformation of existing or new knowledge and understanding into effective action supporting improved ocean management, stewardship, and sustainable development.

15. Capacity development (CD) is an essential tenet of the Ocean Decade. It has the ultimate aim of achieving evenly distributed capacity across the globe, across generations, and across genders and thus reverse asymmetry in knowledge, skills and access to technology. Importantly, capacity development efforts will focus not only on capacity to do the science, but also on capacity to understand the societal relevance of the science, and to use the science to support decisions for sustainable development. In this sense, the targets of capacity development as part of the Ocean Decade include not only scientists, but also the end-users of knowledge such as governments and policymakers.

16. With the aim to identify how the CD Action Framework of the Ocean Decade Implementation Plan (IP) may inform the elements for revision of the current IOC CD strategy, the task team made a comparison between the key elements in the CD Chapter Ocean Decade IP vis-à-vis the current IOC CD Strategy.

17. The Ocean Decade capacity development efforts focus on capacity to do the science, as well as on the capacity to influence the design of the science and participate in co-design efforts to develop solutions for sustainable development. This implies increased capacity to understand why ocean science is important for achieving the UN Sustainable Development Goals (SDG), as well as capacity development targeting a wide range of sustainable development solutions (for example, evidence-based policymaking, management, innovation or technology). In this sense, capacity development targets include not only scientists, but also the users of knowledge such as governments, policymakers, managers and innovators.

18. The Ocean Decade can highlight the critical role of sustained ocean data, observations, and knowledge for future sustainable development solutions and climate action. It can provide a global forum to identify the most urgent needs in ocean knowledge and capacity development to contribute to a post-COVID-19 recovery in the context of a changing climate, and it can accelerate the development of technology, including, for example, autonomous research equipment to collect ocean data or enhanced platforms for online collaboration and data sharing.

19. The Ocean Decade can highlight the inequalities that exist in ocean science capacity between countries and stakeholders and thus push and amplify resources to bridge the widening divide. Also, Ocean Decade CD efforts will focus on, but will not be limited to LDCs, SIDS and LLDCs. Specific approaches for these beneficiaries will be required including the use of low-bandwidth / low technology tools in areas where access to digital telecommunications is limited. The resource needs

for SIDS, LDCs and LLDCs to participate in capacity development efforts will be addressed as part of resource mobilization efforts.

20. As expressed by the members of the task team during its first meeting, the revised IOC CD strategy should consider the role of CD in the context of the Ocean Decade objectives and challenges. This was also recognized in the survey where Ocean Decade Challenge 2 (Understand the effects of multiple stressors on ocean ecosystems, and develop solutions to monitor, protect, manage and restore ecosystems and their biodiversity under changing environmental, social, and climate conditions) and Ocean Decade Objective 3 (Increase the use of ocean knowledge and understanding and develop capacity to contribute to sustainable development solutions) were identified as areas of particular interest by the survey respondents

21. Capacity development activities during the Ocean Decade will contribute to the implementation of international agreements and frameworks, notably capacity building and transfer of marine technology targets of a new international legally binding instrument under UNCLOS on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction. A revised strategy will also include a focus on transforming scientific knowledge to information read by decision-makers.

22. The capacity development approach developed in the strategic framework (Implementation Plan) of the Ocean Decade builds on the current IOC Capacity Development Strategy 2015–2021, which itself was developed following an analysis of the capacity development plans and strategies of partner UN agencies. As such, the principles, expected outcomes and priority activities in the Ocean Decade CD chapter closely align with the outputs and activities in the current IOC CD Strategy. Nevertheless, there are several substantial elements in the Ocean Decade CD Chapter that require consideration when revising the IOC CD Strategy.

23. Both the IOC CD Strategy and CD Chapter of the Decade include human resources as one of the six outputs, since it is important to develop, at individual and institutional levels, the very foundation required for any research or management activity. On priority activities, however, IOC CD Strategy need to include reference to online and distance learning, training of trainers, integration of ocean science in curricula in primary and secondary schools, including information on ocean science careers, and actively improving gender, generational and geographic diversity.

24. Technology is a focus that needs to be added in the IOC CD Strategy including: high power computing and data storage facilities, digital telecommunications, etc.; skills building for leadership in technology and infrastructure development; and promoting technical and technological cooperation, and peer to peer exchange between stakeholders. Also, there is a need for low-bandwidth / low-technology tools in areas where access to digital telecommunications is limited.

25. The call for Decade actions that are transformative requires strengthening global, regional and sub-regional mechanisms which are essential to enhance close interaction and communication among global and regional and subregional programmes. The Ocean Decade IP raises their profile to be leaders and amplifiers of capacity development as a requirement for successful programme implementation and capacity development. The IOC CD Strategy will highlight this as an important element to scale-up and accelerate CD efforts.

26. Both documents emphasize this crucial need for targeted natural and social science research that builds understanding of ocean processes, helps identify possible solutions to critical challenges, and provides the knowledge needed to catalyse transformational changes in human behaviour for sustainable development. The revised IOC CD Strategy will also highlight the role and values of the ocean, including informal education approaches through collaboration with museums, zoos or aquariums.

27. Output 6 on sustained long -term resource mobilization on the revised IOC CD Strategy may nevertheless need to explore this part more in the context of networks, partnerships and

collaboration, optimizing opportunities for cooperation and exchange as a pillar of the Ocean Decade Actions.

3.2 Global Ocean Science Report

28. In 2020, the IOC published the *Global Ocean Science Report 2020*, a resource for a wide range of stakeholders, including policymakers and academics, seeking to understand and harness the potential of ocean science for addressing global challenges. Its findings inform on the global current status of ocean science capacity and therefore have relevant implications for sustainable development policies and provide additional elements for revising the IOC CD Strategy.

29. The *Global Ocean Science Report* (GOSR) envisages providing an overview of (i) investments, (ii) resources, and (iii) scientific productivity in Ocean Science. Ocean Science, as used in this document, includes all research disciplines related to the study of the ocean: physical, biological, chemical, geological, hydrographic, health, and social sciences, as well as engineering, the humanities, and multidisciplinary research on the relationship between humans and the ocean. Ocean science seeks to understand complex, multi-scale social-ecological systems and services, which requires observations and multidisciplinary and collaborative research.

30. The report will deliver an overview on where and by whom ocean science is conducted addressing the key aspects of ocean science regarding sustainable development and blue growth. The report will help to optimize the sustainable use of marine resources, to encourage capacity development and transfer of technology marine environment, and to facilitate international cooperation in coastal and global marine research and management. In brief, the GOSR will provide information on where the science capacity exists to address the challenges raised by the World Ocean Assessment.

31. The findings of the GOSR relevant to CD highlighted gaps such as:

- Funding for ocean science is largely inadequate, undermining the ability of ocean science to support the sustainable provision of ocean ecosystem services to humanity.
- Women in ocean science continue to be under-represented, particularly in the highly technical categories.
- Gender equality in ocean science is far from having been achieved but the challenge to reach it is realistic. Female researchers account for 39% of global ocean scientists, 10% higher than the global share of female researchers in natural sciences. Female ocean scientists are increasingly talking to the world. Female participants account for 29% to 53% of total conference participants, depending on ocean science category and region.
- Lack of recognition of the role that early career ocean scientists and professionals as intellectual source and workforce in the future.
- Unequal distribution of technical capacity of ocean science, accentuated by short-term or ad hoc funding for ocean science.
- Countries are inadequately equipped to manage their ocean data and information, which hampers open access and data sharing.
- Systematic enabling frameworks and strategies are missing in many parts of the world.

32. The recommendations to address these gaps include:

- Enhance the current level of funding for ocean science.
- Establish continuous collection of internationally comparable data on investments in ocean science.
- Facilitate co-design of ocean science by involving ocean science information users and producers.

- Promote multistakeholder partnerships in ocean science and operationalize transfer of marine technology.
- Move towards ocean science capacity development with the equal participation of all countries, genders and ages, embracing local and indigenous knowledge.
- Develop strategies and implementation plans to support the career needs of women and young scientists.
- Find solutions to remove barriers for open access to ocean data.

3.3 CD Needs Assessment Surveys

33. In pursuant to decision IOC-XXX/11.1 of the IOC Assembly in June 2019, IOC issued Circular Letter 2803 on the 1st September 2020 to invite the IOC Groupe of Experts on CD to continue its work on regularly assessing the capacity development requirements of Member States and launched the second CD Needs Assessment Survey. This CD Needs Assessment Survey was prepared by the IOC GE-CD and was designed to assess the capacity development requirements of member countries, specifically, but not only, SIDS and LDCs, in order to contribute to the implementation plan and reviewing of the IOC CD Strategy, 2015–2021 (http://www.ioc-cd.org/cdstrategy). This survey was open to a broad range of stakeholders in ocean research, observation, data/information management, coastal area-based management and policy including the private sector.

34. The survey received 1004 responses, from 118 countries, as of February 1st, 2021. Most of the respondents answered the survey on personal capacity (72%) while 21% were official representatives; 4% were IOC Focal Points, 1% CD Focal Points and 2% others. As for the stakeholder groups breakdown, 30% of the respondents were ocean researchers and research service providers, 23% were Higher Education Institutions and Learning Service Providers academic staff (24%), 16% national government officials, and 10% students, while the rest of the groups were below 10%. Detailed results are provided as annex document in IOC/INF-1313. Full details of the responses are available online (https://surveys.ioc-cd.org/index.php/2020-survey).

35. What can be drawn from the survey results analysis is the strong expression of a need for capacity enhancement all across the board, as indicated by the few scores given below a weighted average of 4.0. Due to the relatively small sample size, especially IOC Focal Points and CD Focal Points group, care must be taken when interpreting results and making assumptions based on the weighted average.

36. In terms of the most critical capacity development needs to build ocean science capacity, the results differ across regions. In Africa for example, the top CD needs point to ‘ocean science sampling equipment and instrumentation’, in LAC was ‘access to high power computing’, in the Others group was funding and investment, while ‘legal frameworks, regulation and enforcement’ was ranked top in WESTPAC. It can be observed that the CD Focal Points group also shares pretty much similar CD needs with the ranking by IOC Focal Points group. For the personal group, however, it is worth noting that their ranking, somehow differs from those of the ‘official focal points group’, as their top ranking was concentrated in ‘funding and investment’, similar to representatives of organization group, followed by ‘ocean observation equipment (buoys, AUVs, tide-gauges etc.).

37. In terms of other specific support to be provided by IOC global and regional programmes (GOOS, IODE, MPR, tsunami, etc.) to contribute to addressing CD requirements of Member States, the responses highlighted the following:

- Wide dissemination of CD-related events.
- More engagement with partners and stakeholders for data mining.
- Ocean Observing national programmes.

- Support to the installation of sea level monitoring equipment and address the need to attend more training, workshop and meetings concerning tsunami and other coastal science.
- Raising global profile of need and delivery of marine science and marine resource data at UN Conventions and agreements (SDGs, CBD, UNFCCC, IPBES, etc.), to convince national governments of the need to support marine science, especially applied marine science at the national level.
- Ocean Policy. Some countries still lack an Ocean Policy, on the eve of the Ocean Decade of Ocean Science for Sustainable Development that started on 1 January 2021.
- Other socio-economic ills and the current COVID-19 pandemic do not place ocean science or the Ocean Decade in the government's top agenda.
- Need for own CD Strategy, inspired by the IOC CD Strategy, and an overall Implementation Plan.

38. Suggestions to include other CD efforts and support:

- A paragraph dedicated to traditional knowledge.
- The availability of on-ship training delivered in country using national and NGO oceangoing vessels to train marine scientists while undertaking surveys of their waters.
- Despite the great job done so far by the IOC, this needs to be complemented by a national effort towards deriving the maximum benefit from the assistance and training received, to enable reaching full autonomy.
- History of the IOC and IOC CD Best Practice in international cooperation: strengthen the Best Practices concept in CD activities at national level.
- Since ocean observation is very expensive, successful collaboration need be introduced particularly showing the successful indicator for supporting the collaboration. Concerning changes to be made to the IOC CD Strategy for the period 2022–2026 (or 2030), the responses included the following:
- Alignment with the objectives, challenges, and societal outcomes of the Ocean Decade, with special regards to social sciences and traditional knowledge.
- Clearer links between CD and global reporting needs that would enable developing countries gain access to necessary resources and training.
- Develop in all aspects the recommendations of the current strategy, to detect changes and reflect them in the strategy by 2026 or 2030, including the development of an Implementation Plan.
- Develop the cooperation research for marine science and increase partnerships and enlightenment.
- Synchronize and harmonize with the Ocean Decade, without discarding current outcomes and activities that are still relevant.

3.4 Other Global and Regional Programmes, UN Specialized Agencies, non-UN IGOs, Global and Regional Projects, NGOs, Private Sectors, etc.

39. As agreed in the Task Team’s first meeting, email requests were sent to global and regional programmes as well as other UN specialized agencies, non-UN IGOs, Global and Regional organizations, programmes and projects, NGOs and private sector partners, taking into account their CD strategies and programmes through a set of questions that may inform the GE-CD Task Team of the possible gaps, potential addition/removal of elements and other considerations in the revision of the IOC CD strategy.

40. Out of 12 consultations emails sent, six global and regional programmes sent their responses while out of 35 consultation emails sent, ten specialized agencies, non-UN IGOs, Global and Regional organizations, programmes and projects, NGOs and private sector partners sent their responses.

41. Comments and suggestions from global and regional programmes, UN specialized agencies, NGOs, etc. include a long list of references to specific CD initiatives that are to some extent related to the IOC CD Strategy and to the Ocean Decade. Full details of the responses are available as Annex II and Annex III in IOC/INF-1396.

General Comments

42. As a general principle, it is important to highlight long-term CD sustained strategies. CD benefits from coordinated and merging initiatives that are able to allocate financial resources in the long-term and with coherent, integrated objectives. In essence, dispersed short-time efforts, although valuable, are considered much less efficient. This perspective strikes at the necessity for long-term funding frameworks, which are particularly difficult to implement.

43. Another cross-cutting comment is the need to develop mechanisms for monitoring, evaluation and learning to assess the quality and impact of the capacity development activities. This includes also mapping out present CD activities and identifying gaps that need to be addressed (e.g., in polar regions). These mechanisms would benefit from coordinated approaches between different organizations (see below).

44. It is also emphasized that CD strategies and initiatives must strengthen existing national and regional resources and networks for capacity development. They must work with and make use of national training institutes and universities, fostering the adaptation of new knowledge into existing curricula and avoid creating new, external initiatives, which although valuable, may compromise existing national CD capacities.

45. CD will also be better achieved through partnerships between developed and SIDS and LDCs, for instance, to redress infrastructural gaps and to realize the socio-economic benefits of ocean observing systems at global and regional scales.

46. As it is clearly stated in the Ocean Decade IP, the integration of natural sciences and societal disciplines into a holistic assessment of the marine environment must also be a general principle in CD strategies and initiatives. Sustainable resource management requires an understanding of the seas and our use of them via an integrated system which merges the natural and human aspects. Therefore, conceptual frameworks that integrate human and social sciences into holistic assessments of the marine environment are required.

47. Finally, it must be ensured that global challenges such as climate change, biodiversity and habitat loss, and their impact on marine resources and services need to be central in CD strategies and initiatives.

48. Also, there is a need to remove barriers to full gender and geographic diversity, and guarantee equitable access to ocean knowledge, ocean-related education, training, and transfer of marine technology.

Capacity Development in Policies and Decision-Making

49. CD oriented towards policymakers must be a priority, being a first step to enable the further development of general CD strategies. CD guidelines must refer to the need for long-term sustained strategies in capacity development, both at national level and for international coordination. The lack of long-term sustained strategies, not only funding, is understood as a main factor hindering the success of capacity development. Although funding is important, other aspects such as the high

rotation in personnel representing or responsible for the coordination at national level (e.g. Tsunami National Contacts) frequently hamper the effectiveness of capacity development actions.

50. Further, the policy-science interface is essential for the development and implementation of legal and institutional ocean governance frameworks in which science is a central component. Policy-oriented CD must incorporate a clear awareness of the socio-economic benefits derived from products and services provided by the ocean. Marine Spatial Planning, integrated coastal zone management schemes, marine protected areas, and ocean management in general must be based on scientific knowledge. It is therefore crucial that policymakers have a clear understanding of this dependency as a first step to develop robust CD strategies at national level.

51. CD for policymakers must help to support Member States in their implementation of the SDGs and other key UN processes that will rely on sound marine science to inform decision making in the next Decade (e.g. BBNJ, CBD post-2020 global biodiversity framework).

SIDS, LDCs and LLDCs

52. Although SIDS, LDCs, and LLDCs are already a priority in the IOC CD Strategy, this role has to be more specific and reinforced by strengthening the science-policy interface through the development and/or delivery of decision-making support tools and inclusive stakeholder's engagement processes for evidence-based policy and trade-offs development, consensus building and integrated solutions.

53. Policies should also be encouraged to promote technological upgrading; strengthening science and technology and increasing investment in basic and related research facilities / institutions are central and priorities for the future sustainability of these countries.

54. The key role of marine science should be strengthened and highlighted as essential to deliver the tools needed to tackle the root causes of existing vulnerabilities and to identify climate and ocean environment-related security risks faced in in coastal areas, in particular by SIDS.

55. Synergies should be promoted between various programmes such as the UN Decade of Ocean Science for Sustainable Development and the UN Decade for Ecosystem Restoration. Ocean science informs coastal ecosystem restorations, and in that context, the unique vulnerabilities of SIDS should be recognized.

Cooperation and Merging with CD Strategies in Other UN Organizations, Regional and National Institutions

56. Science is an integral part of legal and institutional ocean affairs at all scales of governance. Therefore, other UN organizations, regional and national institutions that have general or specific interests in the ocean, frequently include ocean science in their CD strategies.

57. Consequently, it is extremely important to establish a high degree of coordination between CD strategies of UN organizations, supported by broader participation of Member States, to avoid duplications and ensure synergies of activities, partnerships and resources, including expertise and infrastructures.

58. Furthermore, this coordination must be carried out, not only at the global level, but also, and very importantly, between the regional programmes, sub-commissions or regional committees and activities and down to the national level. This coordination should evolve to strategic partnerships in capacity CD to ensure robust, long-term CD strategies and programmes and must include the large variety of issues already considered in the IOC CD Strategy and the ones suggested in this document (data management and data access, scientific methodologies, ocean observation, policy-maker oriented CD, SIDS and LDCs priority, gender, traditional and indigenous knowledge, etc.).

59. Examples of this coordination already exist (e.g. JBC, between IOC and WMO, LOA between OBIS, GOOS and MBON), but have to be reinforced (e.g. WMO and IOC developing core packages for regional needs) and extended to other programmes focused on marine science in different organizations (e.g. IMO-GESAMP working groups).

60. Furthermore, taking into account the role of marine science to promote sustainable development, the CD strategy has also to be aligned with initiatives and programmes related with ecosystem management (e.g. with the CBD post-2020 global biodiversity framework, the UN System of Environmental-Economic Accounting Ecosystem Assessment, GeoParks, Biosphere reserves and World Heritage sites), sustainable development (e.g. coordination between UNESCAP and WESTPAC, or alignment of the IOC CD Strategy with the Sustainable Development Cooperation Framework) or by assisting countries in building their ability to collect, manage, analyse, and use data of different sources (e.g. in cooperation with the UN Department of Economic and Social Affairs and National Statistical Offices).

61. Finally, two cross cutting aspects on the coordination of CD strategies involved connecting with the private sector on partnering training opportunities and enabling multi-donor arrangements.

Gender, Traditional Activities, and Indigenous Heritage

62. The role of gender, of traditional and indigenous knowledge and social inclusion, in general, must be reinforced in the IOC CD Strategy.

63. Indigenous peoples should be engaged and incorporate their rights, interests, ocean information needs and valuable traditional knowledge in ocean observation efforts and related policies in ocean governance.

64. Social inclusion should ensure the needs of disadvantaged social groups such as indigenous peoples, persons with disabilities, older persons, youth and women are understood and addressed by removing barriers to full gender, generational, and geographic diversity, and ensure an equitable and accessible ocean for all.

Data Storage, Management and Access

65. Advances in data and information management are a core element of the Ocean Decade. Science knowledge, but also ocean management policies such as Marine Spatial Planning, rely on data. end-users of ocean knowledge (from the scientist themselves to policymakers) must easily find, access, combine, analyse and reuse the data.

66. Data access is generally included in global strategic plans and global policies. However, less attention is devoted to support the creation and maintenance of interoperable maritime datasets at national level and their interoperability at the national context. It is necessary that SIDS and LDCs have open access to data generated by developed countries, but it is as crucial that they are able to appropriately manage the data they produce. This is essential to develop scientific knowledge for their own use, to support the management of their ocean products and services and to downscale the understanding and management of global processes, such as ocean and climate change.

67. CD Strategy must therefore support the creation and maintenance of interoperable maritime datasets in cooperation with other International/Intergovernmental Organizations, and develop interoperable and open-access data platforms and services. Identify and rescue data and information that are not available on digital platforms and therefore may be at risk of being lost.

68. Further, recent developments in ocean observation initiatives are creating a demand for novel means of data management, storage and access, to serve the needs of different audiences, and these need to be incorporated in CD strategies. Development of unmanned and autonomous sensor platforms, for example, will facilitate a huge increase in 24/7 operations worldwide with more sensors

at lower cost, although generating huge amounts of data will require increased big data processing and storage capacity.

COVID-19 and Changes in Communication and CD

69. Since the beginning of 2020, most of the countries of the world, even rural and island areas, have been affected by the Coronavirus pandemic, almost all of which have implemented lockdown and social distancing, leading to the cessation of activities claiming human interactions. As such, the mandatory use of digital technologies and broadband web links are now critical as new ways of working and communication.

70. These technologies have been incorporated to allow CD initiatives to continue during the COVID-19. E-learning will never fully replace on-location education or practice, but it provides opportunities to reach those that otherwise might not be educated at all. On-line technologies and virtual communication need to be incorporated into the next generation of CD strategies and opens the opportunity to explore better ways of training. Developing e-learning capabilities should therefore be part of any CD strategy. The IOC Ocean Teacher Global Academy is already adapting its courses to meet these new challenges.

Other Recommendations

71. Establish a clear connection between national representatives at regional and global programmes (e.g. Tsunami National Contacts) and the National UN Decade of Ocean Science Coordination mechanism.

72. Simplified substantive and financial reporting.

73. Establish hand-in-hand initiatives with national stakeholders and civil society organizations that use data, infrastructure, and science-based approaches to determine where and how to target capacity development measures to have the greatest impact on society.

74. Expanding international development cooperation to ensure that vulnerable countries' economies are able to enhance their healthy response to the overall academic aspect, while maintaining food security and avoiding environmental crises.