



GESAMP

Joint Group of Experts on the
Scientific Aspects of Marine
Environmental Protection

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Agenda item 3

REPORT OF THE ADMINISTRATIVE SECRETARY OF GESAMP

Activities and achievements of the Sponsoring Organizations of GESAMP since the 44th session

Introduction

1 The Executive Committee met once by teleconference in the intersessional period, on 2 February 2018 to discuss working group (WG) and correspondence group arrangements, WG funding issues, preparations of reports and additional support for the GESAMP Office. There has been regular communication among the GESAMP Office, the Chair of GESAMP and the members of the Executive Committee for the strengthening of the GESAMP activities. As a result, GESAMP's working groups and correspondence groups have been very active, as will be reported under agenda item 4 and 7.

2 GESAMP 45 will be informed of the outcomes of the next session of the Executive Committee, which will be held on Monday, 17 September 2018.

Activities and achievements of the Sponsoring Organizations of GESAMP

3 The Administrative Secretary of GESAMP traditionally reports on the activities and achievements of the Sponsoring Organizations of GESAMP with the aim to provide GESAMP with an account of their involvement in the protection of the marine environment and their interest in the activities GESAMP undertakes.

4 This document provides a summary of the Organizations' achievements since GESAMP 44 (held from 4 to 7 September 2017) from IMO, IAEA, IOC-UNESCO, FAO, UNDP, WMO and UN DOALOS.

GESAMP Office

5 Since September 2017, the main activities of the GESAMP Office have been the following:

- .1 supporting the activities of the existing working groups and correspondence groups of GESAMP, including the various peer review activities;
- .2 assisting in the publication of two GESAMP reports;
- .3 finalization and maintenance of the new GESAMP website;
- .4 preparation of the current session of GESAMP and the side-event on 'Harmful algal blooms and food security and safety in the context of climate change'; and
- .5 preparation for the 50th anniversary of GESAMP.

INTERNATIONAL MARITIME ORGANIZATION (IMO)

Implementation of the Ballast Water Management Convention

6 The Ballast Water Management (BWM) Convention was adopted in February 2004 and aims to prevent, minimize and ultimately eliminate the transfer of harmful aquatic organisms and pathogens through the control and management of ships' ballast water and sediments. The BWM Convention entered into force on 8 September 2017. The number of Contracting Governments is currently 76, representing 77.08% of the world's merchant fleet tonnage as at 21 August 2018.

Matters directly related to the GESAMP-BWWG

7 In total there are approximately 70 type-approved ballast water management systems (BWMS) available. IMO's Marine Environment Protection Committee (MEPC), at its 72nd session, did not grant Basic or Final Approval to any BWMS that make use of Active Substances, based on the recommendations of the 35th meeting of the GESAMP Ballast Water Working Group (BWWG).

8 Having considered the recommendations of the GESAMP-BWWG, MEPC 72 agreed that the *Procedure for approval of ballast water management systems that make use of Active Substances* (G9) should be revised as a consequence of the revision of the *Guidelines for approval of ballast water management systems* (G8), and that it is not necessary to make Procedure (G9) into a code under the Convention.

9 The 36th meeting of the GESAMP-BWWG was held at IMO Headquarters from 4 to 7 June 2018 to review two proposals for approval of BWMS that make use of Active Substances, one for Basic Approval and one for Final Approval. The Group recommended that approval be granted to both BWMS and the report of this meeting will be considered by MEPC 73.

Other matters

10 A summary of the most important outcomes from MEPC 72 and the 5th session of the Sub-Committee on Pollution Prevention and Response (PPR 5) is provided in this section.

Amendments to regulation B-3 of the BWM Convention

11 MEPC 72 adopted amendments to regulation B-3 of the BWM Convention (resolution MEPC.297(72)), to provide an appropriate timeline for ships to comply with the ballast water performance standard described in regulation D-2 of the Convention, along with a draft MEPC resolution on *Determination of the date referred to in regulation B-3, as amended, of the BWM Convention* (resolution MEPC.298(72)). The amendments to regulation B-3 of the BWM Convention will enter into force in October 2019; however, MEPC 71 had adopted resolution MEPC.287(71) on *Implementation of the BWM Convention* calling for early implementation of these amendments ahead of their formal entry into force, with a view to facilitating their smooth and uniform implementation.

Code for approval of ballast water management systems

12 MEPC 72 adopted the *Code for approval of ballast water management systems* (BWMS Code) (resolution MEPC.300(72)), which will supersede the *2016 Guidelines for approval of ballast water management systems* (G8) (resolution MEPC.279(70)) from October 2019.

13 In addition, MEPC 72 adopted consequential amendments to regulations A-1 and D-3 of the BWM Convention to make the BWMS Code mandatory (resolution MEPC.296(72)). The amendments will enter into force in October 2019 along with the Code.

14 In conjunction with the adoption of the BWMS Code, MEPC 72 also approved consequential amendments (revisions) to the following circulars:

- .1 BWM.2/Circ.33/Rev.1 on revised *Guidance on scaling of ballast water management systems*; and
- .2 BWM.2/Circ.43/Rev.1 on revised *Guidance for Administrations on the type approval process for ballast water management systems in accordance with Guidelines (G8)*.

15 Finally, MEPC 72 approved a *Unified Interpretation of Appendix I (Form of the International Ballast Water Management Certificate) of the BWM Convention* (BWM.2/Circ.66) to provide appropriate clarity on what is meant by the word "installed" with reference to BWMS with applicability to the original Guidelines (G8) (resolution MEPC.174(58)), the 2016 Guidelines (G8) and the BWMS Code.

Survey and certification

16 As instructed by MEPC 71, the Sub-Committee on Implementation of IMO Instruments at its 4th session (III 4) incorporated the *Interim Survey Guidelines for the purpose of the BWM Convention under the Harmonized System of Survey and Certification* (BWM.2/Circ.7) in the latest amendment of the HSSC Guidelines, which was adopted by the IMO Assembly's thirtieth meeting (A 30), including provisions for validating the compliance of individual BWMS with regulation D-2 of the BWM Convention in conjunction with their commissioning. MEPC 72 also agreed that detailed aspects of this validation needed to be addressed and invited interested Member Governments and international organizations to submit comments with a view to the finalization, at MEPC 73, of guidance on this matter. MEPC 72 further invited interested Parties to submit proposals for a relevant amendment to regulation E-1.1.1 of the BWM Convention.

17 Recognizing the complications arising from the fact that there are three different versions of Guidelines (G8) that may be applicable to BWMS installed on board existing and new ships, and different requirements among these versions, MEPC 72 instructed the III Sub-Committee to review the Survey Guidelines under the HSSC in light of the 2016 Guidelines (G8) and BWMS Code.

18 MEPC 72 also adopted amendments to regulations E-1 and E-5 of the BWM Convention, concerning endorsements of additional surveys on the International Ballast Water Management Certificate (resolution MEPC.299(72)). The amendments will come into force in October 2019.

Experience-building phase

19 MEPC 72 approved the *Data gathering and analysis plan for the experience-building phase* (BWM.2/Circ.67). The experience-building phase was established through resolution MEPC.290(71) to enable port States, flag States and other stakeholders to gather, prepare and submit data on various aspects of the implementation of the BWM Convention. Analysis of this data will allow a systematic and evidence-based review of the text of the Convention and the development of a package of amendments to the Convention as appropriate.

20 MEPC 72 also agreed that further consideration on the procedures for collection of treated ballast water samples, as well as on the analytical procedures for sampling and analysis for the experience-building phase, is required at PPR 6.

21 As requested by MEPC 72, the IMO Secretariat has initiated the necessary actions for the implementation of the experience-building phase. This includes the development of a new module

under the Global Integrated Shipping Information System (GISIS) to accommodate the reporting requirements of the data gathering and analysis plan.

System Design Limitations of BWMS

22 Having recognized the need to develop separate guidance on System Design Limitations (SDL) for use in conjunction with the 2016 Guidelines (G8), PPR 5 agreed to the draft *Guidance on System Design Limitations of ballast water management systems and their monitoring*, which is expected to be approved by MEPC 73 for dissemination as a BWM.2 circular.

Future work

23 MEPC 73 (scheduled from 22 to 26 October 2018) is expected to consider issues related to ballast water management, including the following:

- .1 implementation and financial support of the experience-building phase;
- .2 draft guidance on the validation of the compliance of individual BWMS with regulation D-2 of the BWM Convention in conjunction with their commissioning and possible consequential amendment of regulation E-1.1.1; and
- .3 inclusion of contingency measures in the ballast water management plan.

24 MEPC 73 is also expected to approve the *Guidance on System Design Limitations of ballast water management systems and their monitoring* mentioned above, as well as deal with other issues related to ballast water management, including possible proposals for new outputs and the outcome of GESAMP-BWWG 36.

25 PPR 6 (scheduled from 18 to 22 February 2019) is expected to consider issues including guidance on contingency measures and on ports with challenging water quality, as well as procedures for collection of treated ballast water samples and analytical procedures for sampling and analysis, mentioned above.

Amendment of the Anti-fouling Systems Convention

26 The Anti-fouling Systems (AFS) Convention was adopted in October 2001 and aims to prohibit the use of harmful anti-fouling paints used on ships. The Convention entered into force on 17 September 2008 and the number of Parties is currently 80, representing 94.30% of the world's merchant fleet tonnage as at 21 August 2018. The Convention has not been amended since its entry into force.

27 At present, Annex 1 to the AFS Convention prohibits the use of organotin compounds acting as biocides in anti-fouling paints used on ships, and the Convention has a mechanism to prevent the potential future use of other harmful substances in anti-fouling systems. In this context, MEPC 71 and PPR 5 considered an initial proposal to amend Annex 1 to the Convention to include controls on cybutryne, and agreed that cybutryne warrants a more in-depth review. The outcome of the deliberations of PPR 5 will be considered by MEPC 73, which is expected to approve the extension of this output to amend Annex 1 to the AFS Convention to include controls on cybutryne.

Review of the 2011 Biofouling Guidelines

28 The Biofouling Guidelines were adopted in July 2011 and are intended to provide a globally consistent approach to the management of biofouling, which is the accumulation of various aquatic organisms on ships' hulls, in order to minimize the transfer of invasive aquatic species. Biofouling management can also be an effective tool in enhancing energy efficiency and reducing air emissions from ships.

29 As scientific and technological advances are made, the Biofouling Guidelines may be refined to enable the risk to be more adequately addressed. In support of this review process, IMO has prepared guidance for evaluating the Guidelines (MEPC.1/Circ.811). MEPC 72 considered a proposal to conduct a review of the Guidelines and agreed to a new output for the PPR Sub-Committee to review the Biofouling Guidelines, which will be based on the principles of the above-mentioned guidance.

30 The IMO Secretariat is also embarking on a new major project titled "Building Partnerships to Assist Developing Countries Minimize the Impacts from Aquatic Biofouling" (GloFouling Partnerships), which was approved by the Global Environment Facility (GEF) through UNDP. The full project document was recently approved by the GEF and project implementation is planned from September 2018 for a period of five years. This project aims to build capacity in developing countries to implement the Biofouling Guidelines and will also inform the review of the Guidelines.

Protecting the Arctic from heavy fuel oil

31 MEPC 72 considered the development of measures to reduce risks of use and carriage of heavy fuel oil as fuel by ships in Arctic waters and agreed the scope of work for the Sub-committee on Pollution Prevention and Response (PPR), which would meet for 6th session PPR 6 in February 2019.

32 PPR 6 was tasked to develop a definition of HFO; prepare a set of guidelines on mitigation measures to reduce risks of use and carriage of heavy fuel oil as fuel by ships in Arctic waters; and on the basis of an assessment of the impacts, develop a ban on HFO for use and carriage as fuel by ships in Arctic waters, on an appropriate timescale.

33 The Committee requested countries to submit proposals on an appropriate impact assessment methodology process for consideration at MEPC 73 in October, with a view to facilitating the work to be undertaken by PPR Sub-Committee.

34 The use and carriage of heavy fuel oil is banned in Antarctic waters under MARPOL Annex I and the Polar Code recommends that Member States follow the same practice in the Arctic.

Marine litter and microplastics

35 MEPC 72 agreed to include a new output on its agenda, to address the issue of marine plastic litter from shipping in the context of 2030 Sustainable Development Goal 14 (SDG 14).

36 Member Governments and international organizations were invited to submit concrete proposals to MEPC 73 on the development of an action plan. The Food and Agriculture Organization (FAO) and other international organizations were invited to keep the Committee updated on their work related to addressing marine plastic litter. MEPC noted that the FAO Voluntary Guidelines on the Marking of Fishing Gear would be submitted to the 33rd session of FAO's Committee on Fisheries (COFI) 9-13 July 2018, for approval.

Hull scrapings and marine coatings as a source of microplastics in the ocean

37 Recent studies have indicated that hull scrapings and marine coatings are possible pathways contributing to the presence of microplastics in the ocean, through activities such as hull cleaning, replacement of hull coatings, and the normal wear of anti-fouling coatings during ship operations. However, there is insufficient knowledge concerning both the qualitative and quantitative contributions of plastic pollution from these sources, especially from the perspective of IMO's mandate (including the AFS Convention and Biofouling Guidelines, as well as the London Convention and Protocol).

38 Under the Global Partnership on Marine Litter (GPML), IMO, using funding from the UN Environment, conducted a scoping study on the contribution of hull scrapings and marine coatings to ocean microplastics. The study, which was completed in July 2018, provided useful information on the current international state of knowledge on microplastic release from hull scrapings and marine coatings, identified key data gaps and recommended areas of research to close these gaps.

Ship recycling

39 Following the adoption of the Hong Kong International Convention for the Safe and Environmentally Sound Recycling of Ships, in May 2009, the MEPC has finalized and adopted all six guidelines required under the terms of the Convention to facilitate the global implementation of its requirements in a uniform and effective manner. Thus the whole package for Member Governments to ratify the Convention is in place. To date, six States, i.e. Belgium, Denmark, the Congo, France, Norway and Panama have ratified or acceded to the Convention, whose combined merchant fleets constitute 20.32% of the gross tonnage of the world's merchant fleet, and whose combined ship recycling volumes constitute 112,161 gross tonnage.

Review of MARPOL Annex V (Garbage)

40 The revised MARPOL Annex V was adopted by resolution MEPC.201(62) and entered into force on 1 January 2013, thus establishing a prohibition on the discharge of all types of garbage into the sea except in the cases explicitly permitted under the Annex.

41 MEPC 70 adopted further amendments to MARPOL Annex V (resolution MEPC.277(70)) related to substances that are harmful to the marine environment (HME) and Form of Garbage Record Book, which entered into force on 1 March 2018. The amendments provide criteria for the classification of solid bulk cargoes as harmful to the marine environment and are aimed at ensuring that such substances are classified and declared by the shipper as to whether or not they are harmful to the marine environment, and, if they are classified as HME substances, they shall not be discharged into the sea.

42 MEPC 71 adopted the *2017 Guidelines for the implementation of MARPOL Annex V* (resolution MEPC.295(71)), revoking its 2012 Guidelines. The main purposes of these Guidelines are to assist: (1) governments in developing and enacting domestic laws which implement Annex V; (2) shipowners, ship operators, ships' crews, cargo owners and equipment manufacturers in complying with requirements set forth in Annex V and relevant domestic laws; and (3) port and terminal operators in assessing the need for, and providing, adequate reception facilities for garbage generated on all types of ships.

Issues related to MARPOL Annex II and IBC Code

Revision of the IBC Code – Chapters 17, 18, 19 and 21

43 PPR 5 approved draft amendments to the IBC Code, comprising of the full text of draft revised chapters 17 (Summary of minimum requirements), 18 (List of products to which the Code does not apply), 19 (Index of Products Carried in Bulk) and 21 (Criteria for assigning carriage requirements for products subject to the IBC Code), as well as draft new paragraph 15.15 (Hydrogen sulphide (H₂S) detection equipment for bulk liquids), for submission to MEPC 73 and MSC 100 for approval, with a view to subsequent adoption.

Review of MARPOL Annex II requirements that have an impact on cargo residues and tank washings of high-viscosity and persistent floating products

44 The Sub-Committee also approved draft amendments to MARPOL Annex II and consequential draft amendments to the IBC and BCH Codes, to address issues related to the

discharge of persistent floating substances with a high viscosity (equal to or greater than 50 mPa•s at 20°C) and/or a high melting point (equal to or greater than 0°C), with a view to approval and subsequent adoption by MEPC and MSC, as appropriate.

Guidance and amendments relating to the certificates of fitness under the gas and chemical codes

45 MEPC 71 and MSC 98 approved MSC-MEPC.5/Circ.14 on *Guidance on completing the Certificate of Fitness under the IBC, BCH, IGC, GC and EGC Codes*, which addresses how Certificates of Fitness should be completed for ships that do not yet have to comply with the requirements for an approved stability instrument. Subsequently, MEPC 72 adopted amendments to the IBC and BCH Codes concerning the Model form of the International Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk (resolutions MEPC.302(72) and MEPC.303(72), respectively).

OSV Chemical Code

46 The IMO Assembly adopted the *Code for the Transport and Handling of Hazardous and Noxious Liquid Substances in Bulk on Offshore Support Vessels (OSV Chemical Code)* (resolution A.1122(30)), which entered into force on 1 July 2018. The OSV Chemical Code aims to provide a consistent regulatory framework for the transport and handling of hazardous and noxious liquid substances in bulk on offshore support vessels with a single certification scheme, taking into account the complex and continued evolution of the offshore industry as well as the unique design features and service characteristics of these vessels. The Code covers the design, construction and operation of offshore support vessels which transport hazardous and noxious liquid substances in bulk for the servicing and resupplying of offshore platforms, mobile offshore drilling units and other offshore installations, including those employed in the search for and recovery of hydrocarbons from the sea-bed.

MARPOL Annex VI (Prevention of air pollution from ships)

Consistent implementation of regulation 14.1.3 of MARPOL Annex VI

47 MEPC 70 decided that the 0.50% sulphur content limit for fuel oil in regulation 14.1.3 of MARPOL Annex VI shall become effective on 1 January 2020.

48 MEPC 72 approved, with a view to adoption at MEPC 73 for entry into force on 1 March 2020, draft amendments to MARPOL Annex VI to prohibit the carriage of non-compliant fuel oil for combustion purposes for propulsion or operation on board a ship without an approved equivalent arrangement.

49 An intersessional meeting under the PPR Sub-Committee will meet from 9 to 13 July to develop guidelines to support consistent implementation of regulation 14.1.3 of MARPOL Annex VI. These guidelines include guidance on ship implementation planning for 2020.

Fuel oil quality

50 MEPC 67, following a discussion on fuel oil quality, established a correspondence group to develop draft guidance on quality-assurance for fuel oil delivered for use on board ships and to consider the adequacy of the current legal framework in MARPOL Annex VI in relation to fuel oil quality. MEPC 72 approved *Guidance on best practice for fuel oil purchasers/users for assuring the quality of fuel oil used on board ships*.

51 The correspondence group established by MEPC is also further developing draft best practice for Member States/coastal States and has been instructed to submit a report to MEPC 73.

EEDI review

52 Amendments to MARPOL Annex VI, regulations for the prevention of air pollution from ships, adding a new chapter 4 to Annex VI on regulations on energy efficiency for ships to make mandatory the Energy Efficiency Design Index (EEDI), for new ships, and the Ship Energy Efficiency Management Plan (SEEMP) for all ships entered into force on 1 January 2013.

53 Regulation 21.6 of MARPOL Annex VI requires, at the beginning of phase 1 (1 January 2015), the Organization to “review the status of technological developments and, if proven necessary, amend the time periods, the EEDI reference line parameters for relevant ship types and reduction rates set out in this regulation”. MEPC 67 established a correspondence group to review the status of technological developments relevant to implementing phase 2 of the EEDI regulatory framework which begins in January 2020.

54 MEPC 70 considered a final report of the correspondence group and, following consideration, agreed to retain the current reduction rates, time periods and the EEDI reference line parameters of EEDI phase 2 requirements for ship types other than ro-ro cargo ships and ro-ro passenger ships. MEPC 70 further agreed that it would be necessary to start a thorough review of EEDI phase 3 requirements (1 January 2025 and onwards), including discussion on its earlier implementation and the possibility of establishing a phase 4. In this respect, the correspondence group on review of the EEDI beyond phase 2 established at MEPC 71 is expected to make an interim report to MEPC 73 with a final report to MEPC 74 (Spring 2019). Currently, phase 3 requirements provide that new ships be built to be 30% more energy efficient compared to the baseline.

55 Finally, MEPC 72 adopted amendments to regulation 21 of MARPOL Annex VI regarding EEDI requirements for ro-ro cargo and ro-ro passenger ships.

Further technical and operational measures to enhance energy efficiency

56 MEPC 68 agreed that the development of a data collection system for ships should follow a three-step approach, consisting of data collection and data analysis, followed by decision making on what further measures, if any, are required. This approach was reaffirmed by MEPC 69 and led to the approval of draft amendments to chapter 4 of MARPOL Annex VI to introduce a mandatory data collection system for fuel oil consumption of ships.

57 MEPC 70 adopted amendments to Chapter 4 of MARPOL Annex VI including a new regulation 22A on a mandatory data collection system for fuel oil consumption. Under the amendments, by 1 January 2019, ships of 5,000 gross tonnage and above will be required to collect consumption data for each type of fuel oil they use, as well as other, additional, specified data including proxies for transport work. The aggregated data will be reported to the flag State after the end of each calendar year and the flag State, having determined that the data has been reported in accordance with the requirements, will issue a Statement of Compliance to the ship. Flag States will be required to subsequently transfer this data to an IMO Ship Fuel Oil Consumption Database. IMO Secretariat will be required to produce an annual report to the MEPC, summarizing the data collected.

58 MEPC 72 was updated on the status of the development of the IMO Ship Fuel Oil Consumption Database which was launched in March 2018. The Committee also approved the *Sample format for the Confirmation of compliance, early submission of the SEEMP part II on the ship fuel oil consumption data collection plan and its timely verification pursuant to regulation 5.4.5 of MARPOL Annex VI*. The confirmation of compliance should confirm that the methodology and processes are in place for the ship to report the data required under the regulations.

Reduction of GHG emissions from ships

59 MEPC 70 approved a Roadmap for developing a Comprehensive IMO strategy on reduction of GHG emissions from ships, which foresaw an initial GHG reduction strategy to be adopted in 2018.

60 In April 2018, following three intersessional meetings, MEPC 72 adopted resolution MEPC.304(72) on *Initial IMO Strategy on reduction of GHG emissions from ships*. The Initial Strategy represents a framework for Member States, setting out the future vision for international shipping, the levels of ambition to reduce GHG emissions and guiding principles; and includes candidate short-, mid- and long-term further measures with possible timelines and their impacts on States. The strategy also identifies barriers and supportive measures including capacity building, technical cooperation and research and development (R&D).

61 The Vision set out in the Initial Strategy confirms that IMO remains committed to reducing GHG emissions from international shipping and, as a matter of urgency, aims to phase them out as soon as possible in this century.

62 More specifically, under the identified “levels of ambition”, the Initial Strategy envisages for the first time a reduction in total GHG emissions from international shipping which, it says, should peak as soon as possible and to reduce the total annual GHG emissions by at least 50% by 2050 compared to 2008, while, at the same time, pursuing efforts towards phasing them out as called for in the Vision. The strategy includes a specific reference to “a pathway of CO₂ emissions reduction consistent with the Paris Agreement temperature goals”.

63 Continuing the momentum of work on this important issue, MEPC 72 agreed to hold a fourth meeting of the Intersessional Working Group on Reduction of GHG emissions from ships (ISWG-GHG 4) later in 2018, subject to the endorsement of Council 120. This working group has been tasked with developing a programme of follow-up actions to the Initial Strategy; further consider how to progress reduction of GHG emissions from ships; and report to the next session of the MEPC (MEPC 73), which will meet in London, 22-26 October 2018.

Oil pollution preparedness and response

64 The final part of the revised IMO Dispersant Guidelines dealing specifically with Sub-Sea dispersant application was considered by the PPR 5 Sub-Committee in February 2018. It was subsequently agreed for submission to MEPC 73 in October 2018, when it is expected to be approved for publication along with the revised parts of the Guidelines dealing with the surface application of dispersants, which have been already approved by MEPC. These Guidelines take into account the experience gained from the Deepwater Horizon incident and others, as well as the subsequent scientific studies and technical developments initiated by the public sector and the industry.

65 PPR 5 also considered the development of a “Guide on practical methods for the implementation of the OPRC Convention and OPRC-HNS Protocol”, significant progress was made in the development of this Guide due to the submission by Norway of a draft Guide to use as a basis. A Correspondence Group, led by Norway, was established to further progress this work and a finalized draft of the Guide is expected to be submitted to PPR 6 for its consideration.

London Convention and Protocol (LC/LP)

66 Since its 44th session, the following developments may be of interest to the Group. The Scientific Groups of the LC/LP met for their joint annual session (LC 41/LP 13) from 30 April to 4 May 2018 at the Maritime Training and Education Centre (CIMAR) of the Chilean Maritime Authority (DIRECTEMAR), in Valparaiso, Chile.

Disposal of fibreglass vessels

67 The Scientific Groups considered a draft report on the current state of knowledge regarding the end of life management of fibre-reinforced plastic (e.g. fibreglass) vessels, and on alternatives to disposal at sea, commissioned by the Secretariat. The Groups adopted a statement of concern on the disposal of fibre-reinforced plastic (fibreglass) vessels and noted that knowledge gaps exist in relation to the scale of the issue, its impacts in the marine environment, and alternatives to disposal at sea. There is currently not enough information to make a determination as to what are the most appropriate options for the end-of-life management of fibre-reinforced plastic vessels.

Specific guidelines for assessment of platforms or other man-made structures at sea

68 The Groups noted the progress of the Correspondence Group on the revision of the Specific guidelines for assessment of platforms or other man-made structures at sea, under the lead of Norway, with assistance from Canada and established a working group to resolve issues highlighted for further discussion in the first draft of the revised Guidelines. The target dated for completion of the revision is 2019.

Disposal of wastes and other matter in the marine environment from mining operations, including marine mineral mining

69 The Scientific Groups noted the progress made by GESAMP Working Group on the disposal of wastes and other matter in the marine environment from mining operations, including marine mineral mining (WG 42) under the co-lead of IMO and UN Environment. The target completion date for this activity had been changed to 2019 and a draft working group report had been circulated to members in March 2018 for comment and review.

Marine litter and microplastics

70 The Scientific Groups held further discussions, considered several informative submissions on marine litter and microplastics, and established a Correspondence Group on the topic, under the lead of Nigeria, and with the support of Chile, to: establish an inventory of the work carried out by the LC/LP bodies on the issue of marine litter and microplastics; identify the relevant aspects of the LC/LP regulatory framework in relation to marine litter and microplastics and: provide an overview of possible source control options to reduce the presence of marine litter in LC/LP waste streams.

Science Day 2018

71 As part of the joint session, Science Day 2018 was held as one-day symposium devoted to the topic of "Plastics and microplastics in the marine environment, including impacts on aquaculture activities". The aim of the symposium was to improve the understanding of plastics and microplastics in the marine environment, in particular in relation to the waste streams under the LC/LP, and to identify possible further solutions and actions to address this problem. The Groups noted the interest in this topic from stakeholders outside the LC/LP community and requested the proceedings to be published, as had been done for the 2015 Science Day on marine geoenvironment.

Deposition of materials jettisoned during the launch of space vehicles

72 In 2017 the governing bodies of the LC/LP noted that the deposition of materials jettisoned during the launch of space vehicles was an issue that may gain more interest due to the proliferation of space vehicle launch facilities around the world. The governing bodies, therefore requested the Scientific Groups to prepare an overview, with a view to identifying those with the potential for deposition of jettisoned components at sea during routine launches.

73 In 2018, the Scientific Groups, following an initial review, established an intersessional correspondence group under the lead of the United Kingdom, to collect further information on the issue, with a view to assessing the impacts of these activities in the marine environment, and provide a report to the next joint session of the Scientific Groups in 2019.

Joint session of the Scientific Groups

74 The next meeting of the governing bodies of the LC/LP will be held from 5 to 9 November, at IMO Headquarters. The next joint session of the LC/LP Scientific Groups is tentatively scheduled for late March/early April 2019.

INTERNATIONAL ATOMIC ENERGY AGENCY (IAEA)

75 IAEA Environment Laboratories (NAEL) report on activities at its three marine profile laboratories: Marine Environmental Studies Laboratory (MESL), Radioecology Laboratories (REL) and Radiometrics Laboratory (RML).

Marine Environmental Studies Laboratory (MESL) Activities

Production of Certified Reference Materials and Interlaboratory Comparison exercises

76 IAEA's CRMs are produced to assist Member States improving the quality of measurement results in the analysis of trace elements, Methyl Mercury and persistent organic pollutants in marine environmental samples, in view of assessing pollution levels and trends and enhancing seafood safety. One Certified Reference Material (CRM) for trace elements and methyl mercury in fish was produced - CRM IAEA-476. Two new sediment CRMs i) IAEA-475 for trace elements and ii) IAEA-477 for polycyclic aromatic hydrocarbons is under the production process. The production of both CRMs is financed by a donation of the Australian Government. Two publications, describing the certification processes for trace elements in marine biota sample and organic contaminants in sediment sample were published in peer reviewed journals.

77 NAEL participated in the proficiency tests for trace elements and organic pollutants in marine samples organised by Quasimeme. NAEL participated also in the GEOTRACES inter-laboratory comparison for the determination of ultra-low levels of mercury and methylmercury in the open ocean and in the 12th Round Robin test organised by the Bonn OSINet Group for the identification of oil spill within the Bonn-OSINet expert group (Round Robin oil spill 2017-2018).

78 A worldwide interlaboratory comparison on determination of trace elements and methyl mercury in marine biota sample IAEA-MESL-ILC-TE-BIOTA-2017 was finalised. In total 49 laboratories from 32 countries reported results back to the organizers.

Strengthening data quality assurance of Regional Seas laboratories participating in marine monitoring programmes

79 NAEL provided technical support for strengthening the capability of Mediterranean laboratories to accurately analyse contaminants in marine samples in the framework of the MEDPOL programme. MEDPOL is the Programme for the Assessment and Control of Pollution in the Mediterranean Region of the UNEP/Mediterranean Action Plan. Designated national monitoring laboratories in Mediterranean countries benefit by being able to use the analytical support of NAEL in the development in their quality assurance programs for the determination of trace elements and organic contaminants in the marine environment.

80 NAEL organised two Proficiency Tests to assist Member States strengthening data quality assurance in laboratories participating in marine pollution monitoring programmes. In total 60 laboratories from 16 Member States participated in these exercises:

1. Analytical Performance Study for MEDPOL: Determination of trace elements in marine sediment sample: 21 laboratories from 11 Mediterranean Member States (Croatia, France, Greece, Israel, Italy, Lebanon, Montenegro, Morocco, Slovenia, Tunisia, Turkey); and
2. Analytical Performance Study for MEDPOL: Determination of chlorinated pesticides, PCBs and petroleum hydrocarbon in marine biota sample: 31 laboratories from 14 Mediterranean Member States (Bosnia and Herzegovina, Croatia, Cyprus, Egypt, France, Greece, Italy, Lebanon, Montenegro, Morocco, Slovenia, Spain, Tunisia, Turkey).

81 NAEL organised two training courses on the analysis of contaminants in marine samples:

1. Training workshop on the analysis of Trace Elements in marine samples for laboratory practitioners in MEDPOL countries, 30/10-10/11/2017 (4 trainees from 4 Mediterranean Member States: Croatia, Morocco, Tunisia, Turkey); and
2. Training workshop on the analysis of Organic Contaminants in marine samples for laboratory practitioners in MEDPOL countries, 30/10-10/11/2017 (5 trainees from 4 Mediterranean Member States: Croatia, Morocco, Tunisia, Turkey).

82 One scientist from the University of Belize visited NAEL and was trained on the analysis of chlorinated pesticides and PCBs in marine samples. The training was provided in the framework of the IAEA's Technical Cooperation Project BZE70002 (Strengthening National Capacity for Measuring and Monitoring Marine Pollution and Studying the Effects of Ocean Acidification on Marine Ecosystems). Within the IAEA TC project SRL7005 "Establishment of National Center for Marine Pollution Control in Sri Lanka", NAEL analyzed stable isotopes and chemical markers in sediment cores to understand the history of Negombo Lagoon, in Sri Lanka. One scientist from the National Institute of Metrology, LNE France made scientific visits to NAEL in the frame of EU project "Traceability of mercury measurements". One scientist from Polish Geological Institute visited NAEL to take part in the latest developments related to the analysis of trace elements and rare earth elements in the marine environment, using ICP-MS and GC-AFS techniques respectively.

83 A new agreement between IAEA/NAEL and UNEP/MAP to continue the collaboration on strengthening data quality assurance in marine pollution monitoring in the Mediterranean region is under final discussion. Already two Proficiency Tests and two Training Courses are under preparation. The project is on-going and will be completed within 2018.

Developing tools for assisting Member States to analyse contaminants and long-lived radionuclides in marine samples and to identify their sources

84 NAEL continued the development and validation of monitoring methods, which were published in peer reviewed journals and presented in International Conferences: i) method for uranium isotopic ratios in seawater samples; iii) method for lead isotope ratios in marine samples; ii) reference method for toxic elements in biota samples, based on isotope dilution inductively coupled plasma mass spectrometry.

85 Analytical methodologies developed in NAEL for emerging and regulated contaminants and for the determination of isotope ratios in the marine environment were promoted via 8 publications in peer review journals/books and 18 presentations at scientific conferences.

86 To help in the implementation of the Minamata Convention NAEL continued the development, validation and dissemination of recommended analytical methods for monitoring mercury and methyl mercury in the marine environment. Several methods dealing with the

determination of mercury and methylmercury in seawater by application of different analytical techniques have been recently validated. NAEL participated in the collaborative study on mercury and methylmercury quantification in fish samples from the German Environmental Specimen Bank, conducted in the frame of EU project "Traceability of mercury measurements".

Radioecology Laboratory (REL) activities

Strengthening capabilities for biotoxin monitoring in seafood through research and development, training and cooperation

87 The receptor binding assay (RBA) for harmful algal blooms (HABs) toxin detection continues in full operation at NAEL for research and development applications and for technology transfer and capacity building. NAEL laboratory performance is assessed through successful participation to Quasimeme proficiency testing (PT) exercises for paralytic shellfish poisoning. The RBA method is also being used to study biotoxin food web transfer and metabolism. It has been optimized for application to the emerging ciguatera toxins and its verification and validation is being processed for regulatory application. The RBA method put in operation in 2017 in Morocco and tested on a large set of samples and was identified in 2018 as a potential replacement of the mouse bioassay currently in use for regulatory purposes.

88 NAEL provides technical and scientific support to over 40 Member States (MSs) in Latin America, Asia-Pacific and Africa to build capacity in HABs management through 12 national and regional technical cooperation projects. NAEL continues to host fellowships and internships to transfer the RBA technology to IAEA MSs (total of 11 individuals over the last 3 years from Indonesia, Philippines, Morocco, Tunisia, Cuba, and France, for periods varying between one to 6 months). NAEL is joining efforts with other national and international organisations (IOC-UNESCO, FAO, WHO, US-NOAA, Malarde Institute in French Polynesia, IFREMER France, IRTA Spain) to improve knowledge and enhance capabilities in HABs management and participates actively at the International Panel on HABs.

89 Member State participants (Cuba, Thailand, Brazil, France, and Spain) of the Coordinated Research Project (CRP) on the application of the RBA techniques for improving coastal management met at IRTA Spain in 2017. A major achievement included i) the sampling and screening of over 60 fish for the preparation of a reference fish matrix material, ii) the establishment of first culture of toxic benthic HABs from Cuba, iii) findings of high diversity of benthic toxic genera of *Ostreopsis* associated with a mass mortality of sea-urchin and iv) raising risk for ciguatera poisoning with the findings of Gambierdiscus species in North and South-East coast of Brazil. CRP project findings were communicated through five presentations at international conferences.

90 IAEA led an international workshop on Monitoring and Management Strategies for Benthic HABs. Organized in the framework of joint activity involving Asia-Pacific, Africa and Latin America and the Caribbean, the workshop was attended by 60 participants from 30 countries, 15 international experts and representative of 3 other UN agencies, FAO, WHO, and IOC-UNESCO.

91 The Philippine Nuclear Research Institute, re-designated in 2016 as an IAEA collaborating centre to work on HABs in the context of environmental and global change, continues to collaborate with the IAEA to expand use of nuclear techniques for HAB management, in particular PNRI assessed the performance of the CTX-RBA using a brevetoxin as standard and assess performance and uncertainty budget of the PSP-RBA.

92 With the support of a PUI project (funded by the United States) on "Capacity building for the detection and quantification of PSP and CFP toxins in seafood for the management and the mitigation of HABs impacts Phase II", a field sampling mission was organized in 2018 in collaboration with the Marshall Islands Marine Resources Authority (MIMRA) at Ailinglaplap coral

atoll in the Marshall Islands in view of preparing fish matrix reference material for Pacific Ciguatoxins.

93 NAEL held a Technical Meeting for the development of an Inter-Agency Global Ciguatera Strategy (occurred during April, 2018).

94 Research findings and IAEA activities on HABs were communicated in scientific journals, international conference proceedings, technical reports or online news articles and student theses.

95 NAEL is in an ongoing partnership with the Collaborative Research Centre, SPB 754, at the University of Kiel, Germany. SFB 754 addresses the threat of ocean deoxygenation and its consequences on the global climate-biogeochemistry system. Originally, the low oxygen content of oxygen minimum zones (OMZ) is due to a natural process of enhanced oxygen consumption related to the remineralization of sinking organic matter produced in the nutrient rich surface waters. Some of the richest fisheries in the world supported by these nutrient rich surface waters are predicted to be highly impacted by the oxygen decline.

96 After three intensive field work campaigns in upwelling areas off the coast of Peru and Mauritania, NAEL participated in February 2018 in the SFB 754 science retreat to exchange and discuss recent results. NAEL will continue the collaboration with scientists involved in SFB754, to further contribute with more detailed data on carbon fluxes to the ongoing studies of the climate-biogeochemistry system.

Research and development of nuclear applications for studying contaminants and essential elements in marine biota

97 NAEL continued to use radiotracers to investigate bioaccumulation of contaminants and essential elements in diverse marine organisms and to assess seafood safety concerns of IAEA Member States. The focus for this period was on (1) factors affecting accumulation of trace metals in select marine organisms, (2) effects of multiple stressors (ocean acidification, hypoxia, temperature in parallel with metals, toxins and radionuclides contamination) on fish and marine invertebrates, (3) the calcification rate of corals under changing environmental conditions (e.g. pH or hypoxia) and (4) effect of microplastics on physiology of marine organisms or their role as vector of contaminants to fish and shellfish. NAEL has also been investigating for the last 5 years the exposure of different marine species through various exposure pathways to better understand the fate of accidental releases of radiocaesium into the marine environment, and to be able to address the following key questions: How is caesium bioaccumulated? What is the major pathway and what is the transfer mechanism through the food chain? What is the overall environmental risk? The results of these studies will help to better understand, for example, the high levels found in the tissue samples of some species in Fukushima using laboratory experiments and modelling.

98 Additionally, through a collaboration with the Oceanographic Observatory of Villefranche-sur-Mer (part of the Université Pierre et Marie Curie, Paris VI) and with support from CNRS and the National Commission of the Coastal Fleet, NAEL collects monthly and seasonal seawater samples from the time-series site DYFAMED in the Mediterranean Sea. Using nuclear techniques, these samples are analysed to investigate aspects of the marine carbon cycle including carbon flux, remineralization, and microbial carbon uptake under changing climate conditions.

Activities of IAEA NAEL's "Ocean Acidification International Coordination Centre (OA-ICC)"

99 Through a vigorous program of support and collaboration, the IAEA NAEL OA-ICC continues to advance international activities in ocean acidification science, capacity building and communication. The OA-ICC works with international partners to foster a strong ocean acidification research community across the globe, providing access to data, training,

standardized methodology, resources and opportunities for regional and international networking and collaboration. Activities continued to ramp up in 2017, in particular in response to a heightened demand from Member States to build capacity to report on Target 3 of the UN Sustainable Development Goal 14, that specifically addresses Ocean Acidification. The coordination work, activities and resources offered by the OA-ICC are directly relevant to helping Member States address this target.

100 The impacts of ocean acidification on marine ecosystems take place in the context of other concurrent perturbations (e.g. ocean warming, loss of nutrients and loss of oxygen). New research methodologies and recommendations on how to best study the effects of ocean acidification in a multiple stressor context are much needed, and is the task of the trans-disciplinary SCOR Working Group 149. The OA-ICC co-organized a Technical Meeting of this Working Group at the IAEA in Monaco, 12-14 June 2017, which focused on the development of best practices for complex multiple-stressor experiments. The group took a three-tiered approach to develop a web-based resource which will be made available to the global community and which includes: (1) a decision support tool to navigate this complex research topic via flow charts and questionnaires; (2) a «Virtual Marine Scientist» experimental design tutorial to assist researchers with the selection and refinement of the most suitable design for their research questions; and (3) a series of webinars to assist researchers to further develop their experimental designs and reply to frequently asked questions. A course book that provides links between each of these three strands, along with other information, will also be available. These resources are planned to be available online by summer 2018, and a training course based on them is planned for October 2018 in Monaco.

101 The OA-ICC also facilitated the second meeting of the “Ocean Solutions Initiative”, Monaco, 18–20 April 2017. The goal of this initiative is to assess 13 ocean-based measures to reduce the risks of climate change and ocean acidification on key marine ecosystems and ecosystem services. A review article entitled “Ocean solutions to address climate change and its effects on marine ecosystems” is now in preparation.

102 As part of OA-ICC’s intercomparison activities, a pilot study looking at methods to assess calcification in corals was initiated over the past few months at the IAEA Environment Laboratories in Monaco. Designed by researchers from the IAEA, the Villefranche Oceanography Laboratory in France, the Scientific Centre of Monaco, the Centro de Estudios Ambientales de Cienfuegos in Cuba, and Xiamen University in China, the study measured rates of calcification in the tropical coral *Stylophora pistillata* using four different techniques: the alkalinity anomaly method, the calcium anomaly method, the Ca-45 incorporation technique and the C-13 incorporation technique. Preliminary results indicate solid agreement between methods, and this laboratory exercise may be extended to include other coral species; other methods, and pelagic systems in collaboration with other institutes and partners.

103 Another key effort of the OA-ICC is to ensure the sustained archival and quality control of data on the biological response to ocean acidification, and to promote easy access to the data for all users. To this end, a portal to improve the search experience of data sets included in the OA-ICC Data Compilation, maintained in cooperation with Xiamen University and hosted at the Germany-based data centre Pangaea, is in development. Building on community input that was received during the 2016 Ocean in a High-CO₂ World Symposium in Hobart, Australia, where a demonstration of the draft portal was shown, a set of keywords was established in collaboration with experts in the field. The keywords were designed to ensure that users would be able to search and extract the datasets they are interested in, ultimately facilitating data comparison and synthesis. The data portal is expected to be ready in the fall of 2018.

104 An IAEA consultancy was initiated by the OA-ICC to implement use of the new oceanographic standards (TEOS-10) for temperature and salinity (conservative temperature and absolute salinity) in four public software packages that are used widely by the community to compute carbonate chemistry. These packages (seacarb, mocsy, CO2SYS-Matlab, and

CO2SYS-Excel) have now been extended to optionally use the new TEOS-10 standard. The former standard (EOS-80: practical salinity and in situ temperature) remains as the default.

105 The OA-ICC co-organized the Fourth Edition in a series of International Workshops on the Socio-Economic Impacts of Ocean Acidification launched by the Scientific Centre of Monaco (CSM) and the IAEA in 2010. This 4th workshop, organized from 15-17 October 2017, focused on the impact of ocean acidification on ecosystem services and coral reefs. With sixty participants from twenty-two countries including HSH Prince Albert II of Monaco it aimed to bring the global discussion from sciences to solutions. More information can be found at: <https://www.iaea.org/newscenter/news/high-level-workshop-discusses-ocean-acidification-and-coral-reefs>.

106 The OA-ICC continued to work closely with partners throughout the year to provide state-of-the-art ocean acidification training to several Member States and to support the development and needs of emerging regional ocean acidification networks in Latin America and Africa. For example, the OA-ICC worked with Future Earth Coasts and other partners to organize a regional training and networking workshop on ocean acidification in support of the OA-Africa network in Dakar, Senegal, 13-16 February 2017. The OA-ICC supported 21 young scientists from 13 IAEA Member States (Algeria, Benin, Cameroon, Cote d'Ivoire, Egypt, Gabon, Ghana, Madagascar, Morocco, Nigeria, Togo, Tunisia and the United Republic of Tanzania) to attend the event, which was looking to provide the participants with the skills required to set up coherent and relevant ocean acidification experiments and monitoring in the context of socio-economic impacts, and provide a forum to discuss future collaboration and coordination for the OA-Africa network.

107 The OA-ICC supported the First International Science Symposium of the Latin American Ocean Acidification Network LAOCA, held in Buenos Aires, Argentina, 24-26 October 2017. The participation of 19 LAOCA members from 5 Member States (Brazil, Chile, Colombia, Mexico and Peru) was hereby facilitated by the OA-ICC. The OA-ICC also collaborated and financially supported a training course in Suva, Fiji, 30 October to 10 November, organized by The Ocean Foundation, the US Department of State, The Swedish International Development Agency, and other partners. The OA-ICC supported the participation of five participants from Fiji, Papua New Guinea, Palau and Vanuatu to attend this basic-to-intermediate-level training course focused on observing ocean acidification in the coastal waters of the Pacific Small Islands Developing States (SIDS).

108 The OA-ICC also supported a capacity building workshop of the Western Indian Ocean Marine Science Association (WIOMSA) and the Nairobi Convention Secretariat in Dar Es Salaam, Tanzania, 24-25 October 2017. The goal of the workshop, organized with support from the OA-ICC, Future Earth Coasts, IOC-UNESCO the Global Ocean Acidification Observing Network (GOA-ON), the University of Washington, and the Institut de Ciència i Tecnologia Ambientals of the Universitat Autònoma de Barcelona (ICTA-UAB), was to develop regional capacity for ocean acidification observations in the Western Indian Ocean in support of the Sustainable Development Goal 14.

109 The OA-ICC continued to inform stakeholders about ocean acidification at several high-level international conferences in 2017, such as the UN Conference to Support the Implementation of Sustainable Development Goal 14, New York, 5-9 June 2017, the Our Ocean conference in Malta, 5-6 October 2017, and the UNFCCC COP23 in Bonn, November 2017.

110 Finally, work on the news stream and the other online OA-ICC resources (web site, bibliography, and data base) continued on a day-to-day basis, with the Bibliographic database now containing more than 4500 references, and the OA-ICC Data Compilation on the Biological Response to Ocean Acidification offering access to data sets from 870 scientific articles. The Ocean Acidification News Stream passed the 1,000,000 hits mark in July 2017. Overall, it has welcomed more than 160,000 visitors from nearly 180 countries and published over 10,000 posts, since its launch in 2006 (39,000 visitors from 185 countries in 2017).

Radiometrics Laboratory (RML) activities

IAEA's project for "Marine Monitoring: Confidence Building and Data Quality Assurance"

111 With a view to assisting the Government of Japan in its objective of making the Sea Area Monitoring Plan comprehensive, credible and transparent, the IAEA, through its Environment Laboratories, is helping to ensure the high quality of data and to prove the comparability of the results. A 3-year project 'Marine Monitoring: Confidence Building and Data Quality Assurance' (2014–2016) was initiated as a follow-up activity to recommendations made on marine radioactivity monitoring in a report issued by the IAEA in 2013 which reviewed Japan's efforts to plan and implement the decommissioning of the Fukushima Daiichi Nuclear Power Station. Six sampling missions and interlaboratory comparisons (ILCs) and three proficiency tests (PTs) were organized during this project. The project was concluded with a report published in 2017 showing that Japan's sample collection procedures follow the appropriate methodological standards required to obtain representative samples. The results obtained in ILCs demonstrate a high level of accuracy and competence on the part of the Japanese laboratories involved in the analyses of radionuclides in marine samples for the Sea Area Monitoring programme, corroborating the conclusions of the PTs. The project was extended for a period of 4 years. One sampling mission and ILC and one PT were organized during the first year (2017) of the extended project. As before, both exercises demonstrated a high level of accuracy and competence on the part of the Japanese laboratories.

IAEA Regional Technical Cooperation project RCA RAS/07/028 (Asia-Pacific) "Enhancing Regional Capabilities for Marine Radioactivity Monitoring and Assessment of the Potential Impact of Radioactive Releases from Nuclear Facilities in Asia-Pacific Marine Ecosystems"

112 This IAEA Regional Technical Cooperation Project is running in the Asia-Pacific region under the "Regional Cooperative Agreement for Research, Development and Training Related to Nuclear Science and Technology for Asia and the Pacific" (RCA) aiming to improve the integrated regional quality-assured capabilities for marine radioactivity monitoring and for impact assessment of routine and accidental releases of radioactivity into the marine environment. The project, extending between 2017-2020, is training scientists and laboratory staff from the region in analytical and assessment techniques for radioactivity in seawater, sediment and biota.

IAEA Regional Technical Cooperation project RAF7015 (Africa) "Strengthening Regional Capacities for Marine Risk Assessment Using Nuclear and Related Techniques"

113 Due to the transboundary nature of marine pollution this project aims at assisting Member States to determine the sources of contaminants on a national and regional scale and to strengthen their capacities to analyse radionuclides, organic and inorganic pollutants in marine samples for assessing marine pollution and risk for humans. The objectives of the project are to complement and strengthen the regional capacities for monitoring marine pollution and for risk assessment using nuclear and related techniques to address trans-boundary pollution for sustainable use of marine ecosystem services and enhance socio-economic benefits and to generate national and regional databases for decision makers. Twenty-one Member States are strongly cooperating in employing an integrated regional approach for effective marine monitoring. NAEL technically supports the implementation of the project by providing expertise in radionuclides measurement, QA/ QC aspects, trace elements contamination in marine organisms and seafood safety issues A proposal for the continuation of the project in the cycle 2020-2023 has been submitted to the IAEA. (Project supported jointly by Radioecology and Radiometrics Laboratories)

IAEA Regional Technical Cooperation project RAF7017 (Africa) “Promoting Technical Cooperation among Radio-Analytical Laboratories for the Measurement of Environmental Radioactivity”

114 The project is aiming to enhance the competency of the Member States in the monitoring and assessment of the environmental impact of nuclear and NORM industries. Specific objectives of the project are to establish an integrated regional quality-assured capability for the radioactivity analysis of environmental samples and to improve the competency of laboratories for the analysis of environmental samples via increased collaboration between the members of the ALMERA-Africa regional group of the world-wide network of Analytical Laboratories for the Measurement of Environmental Radioactivity (ALMERA) and mentorship by advanced laboratories in the ALMERA network. Thirty-two Member States are involved in a wide range of project activities related to radioanalytical techniques and quality management. NAEL technically supports the implementation of the project by providing expertise in radionuclides measurement and QA/ QC aspects.

IAEA Technical Cooperation project MHL7001 “Developing a National Radioactivity Monitoring Capacity in the Marshall Islands”

115 This project has been designed to build capacity in the Marshall Islands to enable local scientists to undertake environmental radioactivity monitoring and to provide advice on radiation exposure and subsequent health consequences. The radioactive source of most concern in the Marshall Islands is the residual contamination resulting from the use of some of the islands in the 1940s and 1950s by the USA as atmospheric nuclear weapons test sites. An important objective of the project is to assist the Marshall Islands’ technical personnel in addressing concerns and a current lack of understanding by the public regarding the nuclear weapons testing-related legacy issues. Therefore, there will be a strong emphasis on public engagement. The IAEA Environment Laboratories conducted an expert mission to the atoll in December 2016 to review existing sampling and laboratory capabilities and protocols and to help define the requirements for establishing a national radioactivity monitoring capability. Fellowship training of key RMI scientists and an expert mission focussing on sampling and pre-treatment techniques and basic gamma-ray spectrometry were undertaken in 2017 and early 2108. A national training course in radiation protection and environmental radioactivity has also been provided. Provision of required radiometric equipment is continuing. The initial project was completed in December 2017 and a follow-up project, which will run from 2018 to 2021 and aims to continue to develop this capacity, is currently being implemented.

Analytical quality services

116 Production of Certified Reference Materials for radionuclides in marine samples: A new IAEA reference material is in the final phases of the certification process and will be available late 2018 or early 2019: IAEA-465 Radionuclides in Baltic Sea sediment. Other candidate reference materials are currently being considered for certification in 2019.

117 Proficiency Testing: After finalising 6 PTs between 2012 and 2017, the IAEA will organise in 2018 a seventh PT exercise with seawater samples spiked with H-3, Sr-90, Co-60, Ba-133, Cs-134 and Cs-137. Approximately eighty participants will take part in the 2018 proficiency test.

MARIS database

118 The IAEA’s MARine information System (MARiS) is an open-access global database for marine radioactivity measurements that is accessible online at maris.iaea.org. The last 12 months have seen the laying of groundwork for the development and update of the database and website. MARiS is forming a central part of the data collection effort of IAEA’s Coordinated Research Project (CRP) K41017 “Behaviour and Effects of Natural and Anthropogenic Radionuclides in the

Marine Environment and their Use as Tracers for Oceanography Studies”. To meet the requirements of CRP K41017, the templates, tools, and workflow for capturing and parsing data into the MARiS database have been reviewed and updated. Developments include new data submission templates, the use of new software for data handling, and a review with the Agency’s IT department regarding the underlying computing infrastructure in view of its upgrade. In response to the increasing need to educate the wider general audience on the topic of marine radioactivity and the issues surrounding marine radioactivity, a new FAQ page will soon be published to the MARiS website. MARiS outreach activities include engagement with the RiO5 working group (Radioactivity in the Oceans, 5 Decades Later) which is supported by SCOR (Scientific Committee on Oceanic Research); a poster presentation at the Goldschmidt 2017 conference in Paris; and an article in the March 2018 edition of the Access to Infrastructures for Radiation Protection Research (AIR²) newsletter.

IAEA CRP K41015: “Radioanalytical and isotopic studies of climate trends and variability in marine paleo-records”

119 This 4 years CRP was initiated in 2017, following the recommendations of an experts’ meeting held in 2016 at the IAEA. The project aims to use paleo proxy records to study trends and variability in past climate. It will build upon the previous CRP “Nuclear and isotopic studies of the El Niño phenomenon in the ocean”, which used nuclear and isotopic tool to study the El Niño effect in the Pacific Ocean. This new CRP will expand and take a broader temporal and spatial scope to include the study of other lower-frequency climate phenomena found in different ocean regions. The CRP will focus on the second part of the Holocene (0–5000 yBP) with emphasis on the more recent time period (0-1500 yBP), and there is scope to link this time period to more recent samples that overlap the instrumental record for the purposes of calibration, comparison and application to present day climate issues (1950 is the established reference date for 0 yBP (years before present)). The first Research Coordination Meeting (RCM) was held at the Environment Laboratories in Monaco in March 2017, and the second RCM is planned to be held in Sri Lanka and will be supplemented with an effort to collect samples to study the monsoonal pattern in the Indian Ocean.

IAEA CRP K41016 project “Study of temporal trends of pollution in selected coastal areas by the application of isotopic and nuclear tools”

120 GESAMP suggested that the IAEA supports the development and implementation of nuclear applications to coastal pollution studies. A CRP proposed in 2008 as an unfunded activity, was finally initiated in 2016. The main aim of the CRP is to develop new insights on the application of isotopic and nuclear tools in the study of temporal trends of pollution in coastal areas. The overall objective of the CRP is to provide Member States with improved and harmonised environmental archive dating tools to evaluate sources and temporal trends of pollutants, which will enable them to sustainably manage their coastal marine environment. Specific research objectives are to establish a scientific platform to improve the radiometric dating methods for defining time-trends of pollution, to verify the improved and harmonized common approach on a broad range of case studies in selected coastal areas with high sedimentation rates and to appraise pollution sources using stable- and radio- isotopes. After a 4 years period it is expected to achieve a streamlined, harmonised and validated methodology for sediment dating which will assure reliable, high quality, comparable data on temporal trends of pollutants from coastal areas in different geographical regions. A mid-term research coordination meeting was organised back to back with technical meeting and hosted 35 participants from 27 Member States. The main objective of the technical meeting was to complement and expand on the work currently being performed within the framework of the CRP.

IAEA CRP K41017: “Behaviour and Effects of Natural and Anthropogenic Radionuclides in the Marine Environment and their Use as Tracers for Oceanography Studies”

121 This CRP aims to develop and apply methods combining advanced and rigorous data treatment and modelling approaches for determination of spatial and temporal patterns, behaviour and effects of radionuclides in the marine environment in order to provide Member States with methodological guidance, data and information on levels, trends, effects of radionuclides and their applications to oceanographic process studies. The expected outcomes of this CRP include improved guidance for IAEA Member States for assessing marine radioactivity according to harmonized, best practice methodologies; an updated, comprehensive understanding of the behaviour and effects of natural and anthropogenic radionuclides in the global marine environment and of processes affecting their distributions and increased capacity for the application of radiotracer techniques to oceanographic research. The CRP started in 2017 and is due for completion in 2022. A comprehensive data compilation of global marine radioactivity measurements covering approximately the last decade is currently being developed as part of the CRP. This is due for completion in early 2019 and will provide the data required for the assessment phase of the CRP. It will also be made publicly available and will constitute a comprehensive and reliable baseline against which any future changes can be compared.

Collaboration with regional conventions

122 The IAEA collaborates with HELCOM (Helsinki Commission), being part of the HELCOM MORS EG, the Group of Experts for Monitoring Radioactive Substances in the Baltic Sea, on database development and analytical quality support. In the same area of expertise the IAEA also collaborates with OSPAR (Oslo Paris Convention), through RSC, its Radioactive Substances Committee.

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (IOC of UNESCO) Global Ocean Science Report (GOSR)

Global Ocean Science Report (GOSR)

123 The first Global Ocean Science report (GOSR-I), was launched on 8 June 2017, and assessed for the first time the status and trends in ocean science capacity around the world. The GOSR-I offered a global record of how, where, and by whom ocean science is conducted. The GOSR-I is about generating knowledge, helping to protect ocean health, and empowering society to support sustainable ocean management in the framework of the United Nations 2030 Agenda.

124 The GOSR-I identified and quantified the key elements of ocean science at the national, regional and global scales, including workforce, infrastructure and publications. It represents the first collective attempt to systematically highlight opportunities as well as capacity gaps to advance international collaboration in ocean science and technology. The GOSR-I is a resource for policy-makers, academics and other stakeholders seeking to harness the potential of ocean science to address global challenges.

125 As acknowledged by the Inter-agency Expert Group on SDG Indicators of the UN Statistical Commission (IAEG-SDG), part of the information provided in the GOSR contains the data needed to report towards SDG Target 14.A (14.A.1 indicator: Proportion of total research budget allocated to research in the field of marine technology), which deals with increasing scientific knowledge, developing research capacity and the transfer of marine technology. The IAEG-SDG at its sixth session in November 2017 further approved that the related indicator 14.A.1 methodology is tested and upgraded it from Tier III¹ to Tier II² (see also [IOC/EC-LI/2 Annex 6](#)).

126 In Decision IOC-XXIX/5.1, the IOC Assembly requested the IOC Executive Secretary to present a proposed implementation plan for conducting the second edition of the GOSR to the

¹ Tier III: No internationally established methodology or standards are yet available for the indicator, but methodology/standards are being (or will be) developed or tested.

² Tier II: Indicator is conceptually clear, has an internationally established methodology and standards are available, but data are not regularly produced by countries.

Executive Council at the 51st session (Paris 3–6 July 2018) and to invite Member States through a Circular Letter to convey their views on lessons learnt from the implementation of the first GOSR, including areas where the process could be improved.

127 The GOSR-II will be published in concomitance with the second United Nations Ocean Conference in 2020. The IOC Secretariat aims to expand the national and regional information assessed, analysed and supported by an online questionnaire and data portal.

128 Moreover, the GOSR-II should be part of a transformative process to provide the needed capacity in ocean science. It is expected to be framed around and to feed into the United Nations Decade of Ocean Science for Sustainable Development (2021-2030), the 2030 Agenda at large, and the Sustainable Development Goal (SDG) 14 in particular.

UN Decade of Ocean Science for Sustainable Development

129 Building on the efforts of IOC Member States and the IOC Secretariat, the UN General Assembly proclaimed in December 2017 the UN Decade of Ocean Science for Sustainable Development from 2021 to 2030. The period 2018–2020 will focus on the preparation of the Implementation Plan for the Decade, which will encompass both a *Science Plan* as well as an *Engagement Plan*. The IOC was tasked by UNGA at its 72nd session with the preparation of the Implementation Plan in “*consultation with Member States, specialized agencies, funds, programmes and bodies of the United Nations, as well as other intergovernmental organizations, non-governmental organizations and relevant stakeholders.*” The strategic approach to the Decade will be transformative. The ocean science community should be willing to think beyond “business as usual” and to aspire for real change, whether in relation to the depth of knowledge related to the ocean, or in the way cooperation and partnerships are leveraged in support of sustainable development and healthy ocean. The IOC Secretariat, supported by the IOC Officers, developed the first draft ‘Roadmap’ document (IOC-INF-1353 prov.) which provides an initial guide for the steps and processes needed to develop an *Implementation Plan* for the Decade. It also proposed governance and structural arrangements in the form of a *Planning Group* to be established by the IOC Executive Council at its 51st session. The roadmap was circulated to IOC Member States in February 2018 and was widely disseminated to institutional partners of the Commission. In this context, IOC also invited relevant UN bodies with a focus on the ocean to contribute to the development of the implementation plan. IOC hosted the meeting of UN-Oceans, the UN inter-agency mechanism on ocean affairs, at UNESCO Headquarters on 26–28 March 2018 to discuss contributions of the UN wide-system to the Decade. The *Planning Group* foreseen in the Roadmap, once formally established by IOC, will take over the overall responsibility of preparing the *Implementation Plan*.

Main activities foreseen for the period 2018-2020

130 Support governance arrangements and specifically the activities and meetings of the Planning Group; The establishment of a Planning Group with the delegated responsibility for developing the Implementation Plan is expected. The Terms of Reference of the Planning Group will be adopted by the 51st IOC Executive Council in July 2018. The Secretariat will guide the work of the planning group which will meet twice in the course of the preparation phase. A Stakeholder Forum consisting of institutional members will be established following a call for expressions of interest and subsequent invitation from the IOC Executive Secretary. It is expected that UN bodies, non-UN bodies, NGOs, science focused organisations, donors/foundation and representatives from industry will be included. Membership will be open ended. It is expected that the Stakeholder Forum will meet twice in the course of the preparation phase and will also work through electronic communication.

131 Support engagement and consultation with the ocean community, including targeted regional and global topical workshops and participation in selected other fora and meetings that are aligned with the Decade strategy.

132 Several regional workshops are foreseen to take place from the second half of 2018 to the second half of 2019. These meetings will be an integral part of the Decade design process. The Executive Planning Group will provide guidance in the organisation and structure of these workshops, and the IOC Secretariat will lead the organisation of each workshops. Ideally, as a minimum, five regional workshops would be needed to cover the main ocean basins. Two Global Planning Meetings are envisioned to be organised in early 2019 and early 2020. The first meeting will aim to assess the status of ocean research vis-a vis the 2030 Agenda requirements and scope the development of an outline of research programme(s) to be conducted under the Decade. The second meeting would aim at consolidating inputs from various consultations, including regional workshops referred to above, into a draft Implementation Plan.

133 Preparation of the Resource, Science, Capacity Development, Communication/Engagement and over-arching Implementation Plan; The preparation of the implementation plan will be a complex exercise, requiring the integration of several inputs from the regional and global consultation workshops, it will also require the development of specific components, for example on capacity development where a longer-term strategy to facilitate improved scientific knowledge transfer to wider segments of society and regional/national governments, will be required. External assistance and expertise will be required, as well as the possible formation of targeted expert groups.

134 Engagement and consultation within the UN system and, in particular, reporting to the UNGA; During the next two years, IOC will need to actively engage with several UN constituencies that may benefit and contribute to the Decade. These will include, FAO on fisheries aspects, IMO on shipping and related environmental issues, the ISA in relation to seabed mining, UN Environment with regards to marine policies, and regional governance, amongst others. To do so, a number of information session, events, workshops will be organised in various UN fora (for eg FAO, IMO, Ocean Obs Conference, 'Our Ocean Conferences, etc.). In addition, information sessions are foreseen to brief UN Member States on the progress with the Decade, on a regular basis.

135 Support communication activities such as the website, networking with scientists and production of outreach materials. Digital marketing activities will also be initiated to communicate about the Decade using digital supports (Facebook, Twitter); A Dedicated Decade website will be established to inform the different stakeholders about the Decade and its preparatory process. This communication campaign will be organised to inform member states, potential partners and other stakeholders of the preparatory phase underway, with the aim of inviting contributions, as well as to communicate the purpose and expected results of the Decade.

136 Finally, the IOC Executive Secretary formally wrote to the Chair of GESAMP to invite GESAMP to join forces with many partners and contribute to the UN Decade planning. GESAMP may contribute by:

- .1 identifying suitable candidates for possible nomination to the **Planning Group** keeping in mind that these will serve in their personal capacity, capitalizing on their professional experience and knowledge;
- .2 contributing through the planned **Regional Consultation Workshops** to be organised in all major ocean basins, these will communicate the purpose and expected results of the Decade to all stakeholders but also engage and consult with the ocean community concerning the implementation plan for the Decade, and the design of transformative projects;
- .3 contributing to the 2 **Global planning meetings** foreseen in 2019 and 2020; these meetings will assess the status of ocean research *vis-a-vis* the requirements of 2030

Agenda, scope and eventually validate the research plan of the Decade, building on thematic and regional workshops inputs; and

- .4 participating in the **Stakeholder forum which** is expected to be established as a mechanism to capture institutional inputs from providers and end-beneficiaries of the Decade.

137 Link to UN Decade Roadmap

http://ioc-unesco.org/index.php?option=com_oe&task=viewDocumentRecord&docID=21944

Ocean acidification

138 In view of the growing urgency and recognition of ocean acidification as one of the major stressors for the marine environment, improved observation and research are needed to help scientists and governments in implementing related mitigation and adaptation measures. Leading experts from the Global Ocean Acidification Observing Network (GOA-ON) Executive Council met in Sopot, Poland for their 5th Annual Meeting from 28 to 30 May 2018, supported by the UNESCO's Intergovernmental Oceanographic Commission (IOC).

139 During the meeting, the methodology for the Sustainable Development Goal (SDG) target indicator 14.3.1, "average marine acidity measured at an agreed suite of representative sampling stations" – of which IOC is the custodian agency – was discussed and finalised. An expert group meeting, hosted by IOC, 16-18 January 2018, provided the required background documentation for this.

140 This methodology entails detailed guidance to scientists and countries in terms of how to carry out measurements following the best practices established by the ocean acidification community, as well as how to report the collected information in a manner that ensures it is transparent, traceable and can be utilised in a global comparison of pH measurements. In this way, GOA-ON expertise directly contributes to the achievement of SDG Target 14.3, which calls to "minimize and address the impacts of ocean acidification, including through enhanced scientific cooperation at all levels".

141 Additionally, the GOA-ON Executive Council discussed capacity building workshops – which are being held worldwide as part of its UN Ocean Conference voluntary commitment (#OceanAction16542) to increase global ocean acidification observing capacity – received updates from the regional hubs and their activities and welcomed the new GOA-ON Secretariat. IOC participated and co-organized several side events related to ocean acidification at the Preparatory committee of the UN Ocean Conference in February 2017 and at the conference in June 2017 itself. IOC is highly involved and partners in several voluntary commitments related to ocean acidification –e.g., #OceanAction15274; #OceanAction16542, #OceanAction15798.

142 GOA-ON has now more than 430 members, from over 70 countries (2015: 150 scientists, 31 countries) and is constantly growing. New members, especially from Africa, joined the network.

143 IOC further contributed and co-organized an ocean acidification workshop in Tanzania (October 2017), hosted by WIOMSA,. For the first time African countries from the Western Indian Ocean region had the possibility to discuss and ocean acidification projects in that region.

144 IOC also supported several side events during the UNFCCC COP23, in November 2017, focussing on the impacts of ocean acidification for environmental and human health and how to address these.

145 IOC is also the part and co-organizing the UN Community of Ocean Action on Ocean Acidification, a newly established reporting mechanism to measure the progress made by

countries and organizations, which submitted Voluntary Commitment to the UN Oceans Conference in June 2017.

146 The IOC-WESTPAC Ocean Acidification Observing Working Group in the Western Pacific also met again in December 2017, in order to improve and adapt guidelines for measuring the chemical and biological impacts of ocean acidification. Chemical and biological observation to observe the impacts of ocean acidification on coral reefs in this region are now in place.

147 All these activities feed into the actions undertaken by IOC to equip countries to fulfil the agenda 2030, SDG 14, to protect the ocean and its resources.

Blue Carbon

148 The Blue Carbon Initiative, established in 2011 by the IOC, the International Union for the Conservation of Nature (IUCN) and Conservation International (CI) works to develop management approaches, financial incentives and policy mechanisms for ensuring the conservation, restoration and sustainable use of coastal blue carbon ecosystems. The IOC is highly involved in the Blue Carbon Scientific Working Group, which provides the scientific foundation for the Blue Carbon Initiative by synthesizing current and emerging science on blue carbon and by providing a robust scientific basis for coastal carbon conservation, management and assessment. The Scientific Working Group research priorities are closely aligned with the Initiative's Policy Working Group.

149 IOC is also one of the coordinating members of the International Blue Carbon Partnership, a unique body which brings together governments, NGOs, IGOs and UN-Agencies. The 2016 annual workshop of the scientific working group of the Blue Carbon Initiative with the support of IOC-UNESCO, took place in Ibiza, Spain in October 2017. The main objective of this meeting was to advance the science in particular with respect to carbon storage of seagrass meadows. IOC co-organized this meeting. In addition, IOC supported the organization of various side events at the UNFCCC COP23 in November 2017. In collaboration with the Blue Carbon Partnership these events gave the opportunity to connect high level representatives and scientists to raise awareness on the central role of these ecosystems for carbon sequestration.

De-oxygenation

150 De-oxygenation is a global problem in coastal and open regions of the ocean, and has led to expanding areas of oxygen minimum zones and coastal hypoxia. In the coastal ocean, the number of reported dead zones has increased exponentially since the 1960s with more than 600 systems now. The recent expansion of hypoxia in coastal ecosystems has been primarily attributed to global warming and enhanced nutrient input from land and atmosphere. The global extent and threat to human health and marine ecosystem services of ocean deoxygenation are just beginning to be appreciated; the social and economic consequences have yet to be determined but are likely to be significant. To create awareness towards the impacts of deoxygenation on the marine environment as well as ocean and human health an IOC expert group – the Global Ocean Oxygen Network- was formed. After the establishment of the Global Ocean Oxygen Network (GO2NE) at the 49th session of the IOC Executive Council a technical brief 'The ocean is losing its breath' was published in July 2018. The annual meeting in 2017 was hosted by MBARI, USA. IOC is currently organizing the annual meeting of the group, which will take place just before the international conference 'Ocean Deoxygenation: Drivers and Consequences – past – present – future, in Kiel, Germany, 3-7 September 2018. This meeting will provide the opportunity to discuss new products and the GO2NE deoxygenation summer school, to be hosted in Xiamen, China in September 2019. Further the group finalized a review paper, which was published in January 2018 in the journal Science.

Time Series

151 Since 2013 the establishment of an interdisciplinary IOC working group, the International Group for Marine Ecological Time Series (IGMETS), has offered the possibility to improve model projections and forecasts needed to understand open ocean and coastal changes. The collected information addresses new scientific questions and serves a well-established community of practice related to ship-based time series. The IGMETS report (IOC Technical Series 129) was published in July 2017. The group is currently outlining the upcoming second report, updating the online compartments.

152 As from 2016 an affiliated group has worked specifically to investigate Climate Change and Global Trends of Phytoplankton in the ocean, in particular the coastal ocean (TrendsPO). The Group continues the comparative analysis and synthesis of long time series data sets compiled by SCOR WG137, and expands the focus not only to the continental shelf and open oceans, but also to estuarine and upstream freshwater ecosystems where perturbations from terrestrial, atmospheric, oceanic sources and human activities converge to cause changes that ramify across local and global scales. The Group examines the land and sea connectivity using long time series of available data.

Harmful Algal Blooms

153 A number of Task Teams, working groups and activities are operating and reporting to the IOC Intergovernmental Panel on HABs (IPHAB). Several of the groups contribute to the development of a '*Global HAB Status Report*' with the aims of compiling an overview of HAB events and their societal impacts; providing a worldwide appraisal of the occurrence of toxin-producing microalgae; and assessing the status and probability of change in HAB frequencies, intensities, and range resulting from environmental changes at the local and global scale. The development of this report is intimately linked with the systematic compilation of HAB data in OBIS and the IOC Harmful Algal Event Data base HAEDAT and is funded by Flanders and cosponsored by the IAEA.

154 Another key activity under IPHAB is on Ciguatera Fish Poisoning (CFP) which the most extensive human illness caused by harmful algae. The IPHAB has initiated the development of a UN Coordinated Ciguatera Strategy involving the Food and Agriculture Organization of the United Nations (FAO), the International Atomic Energy Agency (IAEA), and the World Health Organization (WHO).

155 The long term focus of the IOC Harmful Algal Bloom (HAB) programme is on improved understanding of the factors controlling HAB events and thereby improving management and mitigation options. The scientific key questions have for more than a decade been addressed jointly with the Scientific Committee on Oceanic Research (SCOR) through research programmes. The current decadal IOC-SCOR research programme to meet societal needs in a changing world is entitled GlobalHAB and launched in 2017 its science and implementation plan (www.globalhab.info). Furthermore in late 2017 the IOC launched the first ever guidance manual for operators of desalination plants for managing harmful algal events.

IOC Joint action with ICES and IMO on Ballast and other Ship Vectors

156 The ICES/IOC/IMO Working Group on Ballast and Other Ship Vectors (WGBOSV) reviews and reports on the status of shipping vector research with an emphasis on new developments in ballast water treatment technology, risk assessment, ballast water sampling devices, and selection of ballast water exchange zones consideration of appropriate discharge standards of organisms in ballast water, as well as hull fouling regulations and treatment options to reduce the risk of introducing non-native species. The WG also discusses and evaluates the sampling strategies to ensure that international guidelines are based on accurate scientific information, thereby helping to achieve consensus on difficult and technical issues.

157 WGBOSV submits documents to and participates in meetings at the IMO to ensure that international guidelines are based on accurate scientific information, thereby helping to achieve consensus on difficult and technical issues. The group meets annually and functions through extensive collaboration with expert scientists from all over the world, representing leading knowledge and expertise on this topic.

158 Full reports can be found at <http://www.ices.dk/community/groups/Pages/WGBOSV.aspx>

Nutrient's coastal Impacts research

159 Nutrient over-enrichment of coastal ecosystems is a major global environmental problem, contributing to problems such as harmful algal blooms, dead zone formation and fishery decline. Yet, quantitative relationships between nutrient loading and ecosystem effects are not well defined. The IOC Nutrients and Coastal Impacts Research Programme (N-CIRP) is focussing on integrated coastal research and coastal eutrophication and linking nutrient sources to coastal ecosystem effects and management in particular. A key component in the implementation has been a Global Environment Facility (GEF) Project 'Global foundations for reducing nutrient enrichment and oxygen depletion from land-based pollution' which was launched in March 2012 and completed in April 2018. The project was implemented by UN Environment with the IOC as leading the project research component, this has delivered global and local models for impact of nutrient loading. As part of the implementation strategy for N-CIRP, IOC also actively participates in a UNEP led 'Global Partnership on Nutrient Management' (GPNM) with intergovernmental organizations, non-governmental organizations and governments. GPNM has an online information portal to enable GPNM partners to monitor progress on implementing activities related to the sustainable use of nutrients. The platform provides a knowledge hub, networking opportunities and promotes global discussions on sustainable nutrient management.

Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socio-Economic Aspects – World Ocean Assessment

160 IOC continues to provide scientific and technical support to the World Ocean Assessment process established under the UNGA. A second cycle of assessment (2017–2020) was initiated under the UN Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects, starting with the holding of five regional workshops in 2017 to build capacity, support the development of assessment(s) and facilitate outreach and awareness-raising. Two of these workshops were organised by IOC. The regional workshop covering the North Pacific, was hosted by WESTPAC in partnership with the Government of Thailand (29–30 November 2017), whilst IOCARIBE and the Government of Brazil hosted the workshop for the Wider Caribbean and South Atlantic. These considered: a) how assessments produced by the Regular Process can be structured to help policy-makers most effectively with their tasks and; b) how to improve arrangements for networking among various group of experts and organizations involved in the Regular Process. Both workshops further emphasized the importance of capacity building to achieve the integrated assessment of marine environment. This is possibly an element to pursue as part of the IOC Capacity Development Strategy. Both workshops fed regional inputs to the UNGA Ad Hoc Working Group which is acting as the governing body of the Regular Process, while contributing to the overall outline of the next report to be completed in 2020. IOC will continue to support the work of the WOA Group of Expert through the provision of science outputs, data, reports, and will continue to engage its Regional Subsidiary Bodies in the next round of regional workshops to be held during 2018.

OBIS

161 Since May 2017 (until 9 April 2018), the Ocean Biogeographic Information System (OBIS) grew with 269 new datasets, adding 7,700 new species and 3.1 million observations resulting in a total of 50.9 million records of 118,000 marine species. Two new national OBIS nodes were

established, one in Colombia (hosted by INVEMAR) and one in the UK (hosted by the MBA). The OBIS secretariat is supporting the implementation of the OBIS-ENV-DATA standard through the development of new QC tools, available as webservices and as an R package (<https://github.com/iobis/obistools>).

162 OBIS is undergoing a major reengineering of its platform (OBIS2.0) which is urgently needed to drive new innovations in science and technology, and to meet the increasing demands for services from global drivers (such as GOOS, GEO-BON, CBD, ISA, WOA and IPBES), as well as support the regional focus of several OBIS Nodes (e.g. USA/OBIS, Europe/EMODnet).

163 Through the DIPS-4-Ocean Assessments project (a Flanders' UNESCO Science Trust-Fund project) OBIS supports the development of indicators and data products. During the intersessional period, OBIS has provided biodiversity statistics and maps for the IPBES global and several regional assessments (<http://iobis.org/data/maps/>). Based on data from sources such as OBIS, 9 areas in the Baltic Sea have been described as Ecologically or Biologically Significant Marine Areas (EBSAs) according to the criteria of the Convention on Biological Diversity (CBD workshop, 20–24 February 2018, Helsinki, Finland). An SDG 14 exploration portal, released at the GEO XIV Plenary in October 2017 in Washington DC, uses data from OBIS, and is developed by the Marine Biodiversity Observation Network (MBON) of GEO-BON.

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

164 During the 2017-18 intersessional period, UNDP's [Ocean Governance](#) programme continued implementation and development of a broad portfolio of ocean projects including management of Large Marine Ecosystems, 'greening' the shipping industry, integrated coastal management, sustainable fisheries, and support to SIDS in applying 'ridge to reef' integrated natural resources management approaches.

165 UNDP/GEF ocean projects under implementation included the Caribbean Sea and N. Brazil Shelf LMEs project (CLME+; www.clmeproject.org); GloBallast Partnerships (with IMO, completed its 17 year operational period in June 2017, <http://globallast.imo.org>); PEMSEA (www.pemsea.org); Pacific SIDS Ridge-to-Reef programme (www.pacific-r2r.org); Global Marine Commodities Project; Coastal Fisheries Initiative (LAC Component, www.fao.org/in-action/coastal-fisheries-initiative/en/); Pacific Oceanic Fisheries Management 2 (with FAO, FFA and SPC, www.ffa.int/node/1732); SAPPHERE project (www.thegef.org/project/western-indian-ocean-large-marine-ecosystems-strategic-action-programme-policy-harmonization); Global Maritime Energy Efficiency Project (GloMEEP, with IMO, <http://glomeep.imo.org>); Realizing the inclusive and sustainable development in the BCLME region through the improved ocean governance and the integrated management of ocean use and marine resources (www.benguelacc.org); LME:LEARN (www.marine.iwlearn.net, with IOC/UNESCO); IW:LEARN (www.iwlearn.net); Yellow Sea Large Marine Ecosystem project (<http://yslme.iwlearn.org>).

166 In addition, over the last 12 months, UNDP continued preparation of three GEF-financed ocean and coastal projects of relevance to the work of GESAMP; these include:

- .1 [Reducing Pollution and Preserving Environmental Flows in the East Asian Seas through the Implementation of Integrated River Basin Management in ASEAN Countries](#) (in cooperation with ASEAN and PEMSEA);
- .2 Building Partnerships to Assist Developing Countries Minimize the Impacts from Biofouling - [GloFouling Partnerships](#) (in cooperation with IMO);
- .3 [Catalysing implementation of a Strategic Action Programme for the Sustainable Management of Shared Living Marine Resources in the Humboldt Current System \(HCS\)](#).

167 UNDP also participated in and contributed to a number of global ocean conferences and related meetings and symposia, including: HLPF July 2018 Partnership Exchange & Special Event; Friends of Ocean Action (March & June 2018); UN Oceans Annual meeting (March 2018); 2017 UN High Level Political Forum (oceans/SDG14 side events); World Economic Forum Sustainable Development Impact Summit, Sept 2017; Singapore Future Ready Shipping, Sept 2017; 2017 & 2018 Stockholm World Water Week (SDG6/14 Source-to-Sea sessions); Conference on [Building International Partnerships to Enhance Science-Based Ecosystem Approaches in Support of Regional Ocean Governance](#), Capetown, Dec 2017);

168 UNDP also contributed the following publications and media outputs:

- .1 29 June 2017 [GEF-UNDP-IMO GloMEEP Project launches Global Industry Alliance for Low Carbon Shipping](#);
- .2 15 Aug 2017 SDG Knowledge Hub [GloBallast Concludes as GEF, UNDP and IMO Continue Tackling IAS](#);
- .3 20 April 2018 [Celebrating Optimism on Earth Day](#); and
- .4 7 June 2018 [Container Deposit Laws](#): A Winner for Preventing Ocean Plastic Pollution.

169 UNDP joined FAO in support of the Fisheries track of the Communities of Ocean Action launched by SG SE Thomson and DESA in 2018, aimed at catalyzing delivery of 2017 Ocean Conference Voluntary Commitments. In further support of follow-up to the 2017 Ocean Conference, UNDP continued to manage the Ocean Action Hub (www.oceanactionhub.org) which serves as a platform to promote networking, news/info, sharing of best practice and partnership building in support of SDG14 and the Ocean Conference Voluntary Commitments. Most recently, on World Oceans Day 8 June 2018, UNDP launched its [Ocean Action Campaign](#), including a call for Ocean Action Volunteers, in further support of growing the number of Voluntary Commitments, at all levels.

FOOD AND AGRICULTURE ORGANIZATION (FAO)

Marine Litter and Microplastics

170 FAO considers the issue of marine litter and microplastics from the perspectives of i) reducing marine litter that originates from the fishing industry, in particular abandoned, lost or otherwise discarded fishing gear (ALDFG); ii) assessing the ecological impact of microplastics on fisheries resources; iii) assessing the implications of microplastics for aquaculture products, and; iv) assessing food safety risks from marine litter, in particular microplastics, on human health.

171 FAO collaborates with many organisations, including relevant UN Agencies and Programmes, NGOs and academic institutions in addressing and building knowledge on marine litter and microplastics, including; UNEP and the Global Partnership on Marine Litter (GPML), the International Maritime Organization (IMO), the International Council for the Exploration of the Seas (ICES), the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) and the Global Ghost Gear Initiative (GGGI). FAO contributed to the discussions of the UN Environment Ad Hoc Open-Ended Expert Group on Marine Litter and Microplastics, held during 29-31 May 2018 in Nairobi, Kenya.

FAO progress in addressing abandoned, lost or otherwise discarded fishing gear (ALDFG)

172 FAO Members have recognised abandoned, lost or otherwise discarded fishing gear (ALDFG) as a significant component of marine litter and have raised concerns about its impacts

on habitats fish stocks and marine wildlife, particularly through 'ghost fishing', and as a navigational hazard and risk to safety at sea.

173 FAO convened a Technical Consultation on the Marking of Fishing Gear (5-9 February 2018). The Technical Consultation resulted in Voluntary Guidelines for the Marking of Fishing Gear.

174 The Voluntary Guidelines for the Marking of Fishing Gear were recently endorsed by the Thirty-third Session of FAO's Committee on Fisheries (COFI33), held 9-13 July 2018 in Rome. The Voluntary Guidelines are considered an important tool in minimizing the impact of ALDFG and ghost fishing, and in combatting Illegal, Unreported and Unregulated (IUU) fishing.

175 COFI 33 encouraged FAO to conduct further work on quantifying the impacts of ALDFG and developing and documenting best practices for addressing ALDFG, including the recovery and recycling of gear, the use of biodegradable gear to minimize its contribution to marine plastic pollution, as well as the reduction of ghost fishing.

176 COFI 33 further supported the development of a comprehensive global strategy to address ALDFG, and encouraged the involvement of small-scale and artisanal fisheries and relevant RFMO, regional fisheries management arrangements and relevant international bodies.

177 FAO is now planning for the development of a global 'umbrella' programme to support the implementation of the Voluntary Guidelines on the Marking of Fishing Gear and other actions that are required to address ALDFG at a global scale. The programme will comprise a partnership framework with projects tailored to meet the specific needs of countries requiring support. It is expected that the programme will increase the opportunity for FAO to collaborate with partners on the issue of ALDFG and that its implementation will need to be supported by ongoing scientific advice.

Microplastics

178 FAO has organized, with the support from UN Environment and the Government of Norway, a study and an expert workshop on microplastics in fisheries and aquaculture. This workshop built upon the work of the GESAMP Working Group 40 on microplastics and resulted in the publication of a FAO Technical Paper on that reviewed the status of knowledge on microplastics in fisheries and aquaculture, and implications for aquatic organisms and food safety:

[Microplastics in fisheries and aquaculture: status of knowledge on their occurrence and implications for aquatic organisms and food safety. FAO Fisheries and Aquaculture Technical Paper. No. 615. Rome, Italy](#)

179 Moreover, the FAO EAF-Nansen Programme that is supported by a research vessel, the R/V Dr. Fridtjof Nansen, includes a dedicated research theme in its science plan with the objective of assessing the occurrence of microplastics in the surface and in the water column in the areas where the research vessel operates, identify hotspots and study composition and presence of chemicals associated with them. Systematic sampling of microplastics in surface waters has been done off the whole of West Africa and in the Indian Ocean since 2017 and resulting samples/data will be analysed later this year with partner institutions.

180 Other steps for FAO on microplastics include building upon the information compiled in the Technical Paper and using this data to develop appropriate risk profiling tools to assess food safety impacts of microplastic pollution in collaboration with interested partners. FAO would also welcome collaboration on microplastics and aquaculture, as well as on ecological impacts on fisheries resources.

181 FAO hopes that the Ad Hoc Open-Ended Expert Group on Marine Litter and Microplastics will carefully consider sea based sources of marine litter, in particular ALDFG, within the framework of a holistic global response to the overall marine litter issue. FAO also hopes that the work of the ad hoc Expert Group will be able to support efforts to fill knowledge gaps relating to the impacts of microplastics on fisheries resources and aquaculture.

182 COFI33 expressed concern about the effects of pollution, including microplastics, on aquatic resources, and encouraged FAO to continue collecting information on its impacts on aquaculture and fishery resources, and implications for food safety, both in marine and freshwater systems, building on the work of the EAF-Nansen Programme.

Recent developments on methylmercury

183 FAO has been providing scientific advice on mercury related matters based on a risk-benefit exercise carried out during the Joint FAO/WHO Expert Consultation on the Risks and Benefits of Fish Consumption since 2010. Since then, FAO has supported Codex Alimentarius on mercury related issues and has provided scientific advice to the Codex Committee on Fish and Fishery Products and the Codex Committee on Contaminants in Foods (CCCF). The Codex Alimentarius Commission has recently adopted new maximum limits (MLs) for methylmercury in fish, with reservations from several countries that expressed their disagreement with the change from 1 mg/kg for predatory fish to 1.2 mg/kg for all tuna, 1.5 mg/kg for Alfonsino, 1.7 mg/kg for all marlin and 1.6 mg/kg for shark. CCCF had previously agreed to discontinue work on the ML for amberjack and swordfish and to establish an EWG chaired by New Zealand and co-chaired by Canada to prepare a discussion paper on the establishment of MLs for additional fish species. A footnote on the importance on consumer advice was made in the document. CCCF could consider revising the ML for tuna in the light of additional data after three years.

Recent developments on HABs

184 FAO together with IOC-UNESCO, IAEA and WHO will start working together on food safety early warning systems for toxic Harmful Algal Blooms (HABs) and toxins. In the coming months a joint FAO/IAEA/IOC-UNESCO route map will be developed for this purpose.

185 In addition, the FAO collaboration with IAEA, IOC- UNESCO and WHO that started with the interagency meeting on Ciguatera Fish Poisoning (CFP) in December 2015 will continue. After the technical meeting for the development of an Inter-Agency Global Ciguatera Strategy that took place at the IAEA Environment Laboratories in Monaco in April 2018, the four agencies have developed a coordinated strategy to address CFP. The strategy will cover the following elements: (a) improving the detection and monitoring of organisms contaminated with ciguatoxins, as well as risk forecasting; (b) improving the detection of toxins in dinoflagellate cells and fish tissue; and (c) improving epidemiological data collection, reporting and assessments.

Climate change and other environmental matters

186 The 33rd Session of the FAO Committee on Fisheries (COFI33), held 9-13 July 2018 in Rome, acknowledged the work of FAO and its resource partners in promoting the Ecosystem Approach to Fisheries (EAF), the EAF Nansen Programme, the Common Oceans Programme and the Areas Beyond National Jurisdiction Programme.

187 COFI33 commended the comprehensive review of FAO on the impacts of climate change in fisheries and aquaculture and adaptation options, noting that it will be an essential support to Members for the strengthening of their Nationally Determined Contributions and National Adaptation Plans.

188 COFI33 emphasized the vulnerability of fisheries and aquaculture communities to climate change and extreme events, and expressed particular concern for the impacts on small-scale fisheries and SIDS in this regard.

189 COFI33 also recognized that underwater anthropogenic noise is a form of pollution and encouraged FAO to conduct a review of its impact on marine resources, and its socioeconomic consequences.

190 COFI33 had been invited to discuss a document on [Climate change and other environment related matters](#) . This document provides an overview of work carried out by FAO on climate change in relation to fisheries and aquaculture, as well as work on a number of environmental issues, such as biodiversity conservation, bycatch reduction and aquatic pollution. A number of actions are described, in particular the work carried out in relation to the assessment of impacts of climate change globally and regionally, with the Convention on Biological Diversity (CBD) on threatened species in trade, the international negotiations held to agree on standards and best practices on bycatch and on abandoned, lost or otherwise discarded fishing gears (ALDFG), and actions dealing with pollutants.

191 Several related documents might be of interest:

Barange, M., Bahri, T., Beveridge, M., Cochrane, K., Funge-Smith, S. & Poulain, F. eds. 2018. [Impacts of Climate Change on fisheries and aquaculture](#) - Synthesis of current knowledge, adaptation and mitigation options. *Fisheries and Aquaculture Technical Paper*. No. 627. Rome, FAO. 628 pp;

Climate Change and its impact on the work and activities of FAO in fisheries and aquaculture (Biennial Theme);

[Addressing environmental issues during fishing operations: Progressing towards the 2025 reduction of ALDFG](#);

Report of the Technical Consultation on the Marking of Fishing Gear;

[Voluntary Guidelines for the Marking of Fishing Gear](#);

[Microplastics in fisheries and aquaculture: status of knowledge on their occurrence and implications for aquatic organisms and food safety. FAO Fisheries and Aquaculture Technical Paper. No. 615. Rome, Italy](#);

Microplastics in fisheries and aquaculture: A summary of FAO's study;

Biodiversity Mainstreaming in Capture Fisheries and Aquaculture; and

[Bycatch and discards: Global and regional updates](#).

The State of World Fisheries and Aquaculture 2018

192 FAO's flagship publication on fisheries and aquaculture [SOFIA 2018](#) was presented to COFI33 and includes a discussion on ALDFGs and microplastics, see section on selected ocean pollution concerns on pages 154-157. See also [SOFIA in brief booklet](#) and [SOFIA 2018 Flyer](#) .

WORLD METEOROLOGICAL ORGANIZATION (WMO)

193 WMO is the authoritative voice on the state and behaviour of the Earth's atmosphere, its interaction with the oceans, the climate it produces and the resulting distribution of water

resources. WMO contributes to ocean-related issues through the observation of the oceans, the climate and the composition of the atmosphere; Earth and climate system research ; development and delivery of services for disaster risk reduction, including marine hazards; and provision of science-based information and tools for policy makers and the general public, as well as for the assessment of effects on ecosystems, at regional and global levels. Position paper “The ocean and WMO: ocean issues, opportunities and priorities that contribute to the WMO Strategic Plan” articulates the detailed WMO contribution to the global ocean agenda ([EC-70/INF. 12.3](#)).

Marine observations and applications

194 WMO contributes to strengthened observational networks by the implementation of the WMO Integrated Global Observing System (WIGOS) and the WMO Information System (WIS), and observing networks in collaboration with partners. For instance, the IOC-WMO-UNEP-ICSU Global Ocean Observing System (GOOS) continues to improve its capabilities in climate- and ocean-related services, and recognizes the importance of coastal observations and links to products for societal benefits. WMO is also collaborating with partner organizations such as the IOC-UNESCO to further develop, optimize and maintain *in situ* marine meteorological and oceanographic observing networks. These *in situ* observations, complemented by satellite and remote sensing technology, are required for applications such as weather forecasting and operational meteorology, monitoring, understanding and prediction of climate variability and climate change on various time scales, ocean forecasting and marine services activities

195 In face of evolving requirements and advances in observing technology, and in response to GCOS requirements in particular, the WMO and the IOC of UNESCO through the Joint WMO-IOC Commission for Oceanography and Marine Meteorology (JCOMM) whose fifth session was held in Geneva (from 25–29 October 2017)³, are revising observing network implementation targets and addressing the means to reach those targets in the most cost-effective way. WMO also continues its collaboration with IMO and IHO for coordinated and standardized metocean information, forecasts and warning services for safety of life and property at sea, improved marine environment and the sustainable management of natural resources, with due focus on Polar Regions. JCOMM-5 endorsed a draft education and outreach Strategy to Reduce Damage to Ocean Data Buoys from Vandalism, provided by the Data Buoy Cooperation Panel (DBCP) (DBCP Technical Document No. 58).⁴ This recommends that the WMO Executive Council and the IOC Assembly: a) adopt the draft Strategy; b) requests the DBCP to continue to seek further input from relevant national and regional organizations to promote the Strategy; c) raise awareness about the issue of data buoy vandalism and its impacts on forecasting climate, weather, and tsunamis; and d) urges Members to actively engage, support and collaborate in the efforts of the DBCP and its Working Group on Data Buoy Vandalism to collect existing education and outreach materials related to national or regional mitigation of data buoy vandalism efforts.

196 The WMO-IOC JCOMM *in situ* Observing Platform Support Centre (JCOMMOPS)⁵ continued to assist in: a) the implementation and deployment of the observing networks; b) establishing, maintaining and verifying mechanisms for the timely exchange of data and metadata, including the facilitation of quality control and archival functions; and c) developing the consistent set of tools needed to monitor the status of the observing system and data and metadata distribution, with the aim to identify action areas and improve the overall effectiveness and development of the system.

The Global Climate Observing System (GCOS)⁶ has made progress in several areas, in particular through the delivery of the latest version of the report describing GCOS Implementation Needs.⁷ A list of seven global climate indicators has been agreed and promoted to be used to communicate

³ For the full report of JCOMM-5 see

https://www.jcomm.info/components/com_oe/oe.php?task=download&id=38243&version=1.0&lang=1&format=1.

⁴ See <http://www.jcomm.info/DBCP-TD-58>.

⁵ See <http://www.jcommops.org/board>.

⁶ Co-sponsored by WMO, IOC, the International Council for Science (ICSU) and the United Nations Environment Programme (UN Environment).

⁷ See <https://bit.ly/2sjqYHf>.

to the widest community the scope and rate of changes to the climate: global surface temperature, ocean heat, atmospheric carbon dioxide, sea level, ocean acidification, sea ice extent in the Arctic and Antarctic, and glacier change.⁸

197 GCOS and GOOS are taking a strong role in organizing the 3rd Decadal Ocean Observing Conference, OceanObs'19, to shape priorities for sustained observations for the next decade.⁹ They are also establishing a review of the observing system for tracking ocean heat and freshwater content, a forward strategy for air-sea fluxes observations, embracing new technologies; and a project to guide the development of sustained observing systems for boundary currents and their interaction with the shelf.¹⁰ WMO continued providing assistance to Members to improve marine meteorological and coastal area service provision. This is, in part, fulfilling the WMO requirements under the International Convention for the Safety of Life at Sea (SOLAS), including the regular provision of meteorological warnings and forecasts to ships at sea, also for the Polar regions and links to the Polar Code. In this regard, two technical documents have been updated: Manual on Marine Meteorological Services (WMO. No-558) and Guide to Marine Meteorological Services (WMO. No-471).

198 To support the implementation of target (g) of the Sendai Framework for Disaster Risk Reduction 2015-2030, namely to “substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030”, WMO adopted the vision of a Global Multi-hazard Alert System (GMAS),¹¹ as the central aggregator, disseminator and resource for authoritative warnings and information related to high-impact weather, water, ocean and climate events. The system aims to enable global availability and easy access to authoritative information and provision of expert advice to WMO Members as well as to the United Nations and other humanitarian agencies to respond to their immediate needs and requests in anticipation of, during or after hydrometeorological hazard situations. GMAS will use standards such as the Common Alerting Protocol (CAP) and will comprise existing and future regional warning mechanisms including the World Weather Information Service (WWIS),¹² the Severe Weather Information Centre (SWIC),¹³ the MeteoAlarm system of EUMETNET, the MeteoAlert system of Roshydromet, and others, building on the alert hub technology.¹⁴

199 Substantial progress has been made in strengthening climate services in the Arctic. A new Pan-Arctic Climate Outlook Forum (PARCOF) has been launched, which met for the first time in Ottawa, Canada, on 15 and 16 May 2018.¹⁵ The Forum provided a seasonal outlook for the forthcoming summer ice-break up season, in support of climate risk management and climate change adaptation and inform policy and decision-making in climate-sensitive sectors operating in the Arctic environment. The PARCOF predicts that average surface temperatures will continue to be above average for June, July and August, while the sea-ice conditions will be below average for most of the Arctic. Furthermore, a new Arctic Regional Climate Centre Network (ArcRCC-Network)¹⁶ launched its demonstration phase during PARCOF-1 to seek WMO designation.

⁸ GOOS is now finalizing its Strategy for 2030 in the view to have it adopted in mid-2018. Strategy includes 11 Strategic Objectives in the following areas: (a) engagement and impact, (b) integration and delivery, and (c) building for the future.

⁹ See www.oceanobs19.net.

¹⁰ In addition, OOPC is strengthening its relationship with the ocean forecasting programme OceanPredict (GODAE OceanView), noting the developments in Earth system approaches and seamless prediction systems, including coupled numerical weather prediction, will place new demands on the ocean observing system.

¹¹ Decision 3 (EC-69).

¹² See <http://worldweather.wmo.int/en/home.html>.

¹³ See <http://severe.worldweather.org/>.

¹⁴ WMO is also working on the standardized characterization of weather, water, climate, space weather and other related environmental hazard and risk information and on the development of identifiers for systematically cataloguing extreme and high-impact weather, water and climate events.

¹⁵ The meeting was attended by Representatives from Arctic Council Member countries, including experts from National Meteorological and Hydrological Services, major stakeholders and user groups. PARCOF-1 placed a special focus on Arctic commercial shipping users (tourism, re-supply, resource extraction and fishing) and circumpolar indigenous organizations.

¹⁶ See <https://arctic-rcc.org/>.

ArcRCC-Network also coordinates the PARCOF sessions on a regular basis.¹⁷

Climate science and the oceans

200 A significant body of oceanographic research of direct benefit for decision-making in climate related risks is spearheaded and coordinated by the WMO/-IOC/UNESCO-ICSU co-sponsored World Climate Research Programme (WCRP). Through its scientific leadership to consolidate global and regional efforts to understand the dynamics, the interaction and the predictability of the coupled ocean-atmosphere system, significant improvement has been made in understanding climate variability and changes, as well as the benefit for society and the environment in which we live – such as predictive experiments for the future state of the climate system and project how it will evolve under different emission scenarios. The implementation of the Coupled Model Intercomparison Project phase 6¹⁸ (CMIP6) is now well underway with a dedicated Carbon Dioxide Removal Model Intercomparison Project (CDRMIP) which could address ocean fertilization studies in the future.

201 Development of scientific methods for treatment of uncertainty in climate-related decision-making is one of the key subjects of research conducted by WCRP. A WCRP Grand Science Challenge on “Regional Sea Level Change and Coastal Impacts”¹⁹ addresses the imperative need for integrated interdisciplinary approach to establish quantitative understanding of regional to local sea level variability, to foster the development of sea level predictions and projections that are of increasing benefit for coastal zone management. The Grand Challenge on “Carbon feedbacks in the Climate System”²⁰ is investigating land and ocean biogeochemical cycles and feedbacks on CO₂ concentrations and climate in order to better understand its sources and sinks.

Monitoring and mitigating climate change

202 WMO released its *Statement on the state of the global climate in 2017*.²¹ The *Statement* confirmed that 2017 was one of the three warmest years on record and the warmest that was not influenced by an El Niño event. It also examined other long-term indicators of climate change such as increasing CO₂ concentrations, sea level rise, shrinking sea ice, ocean heat content and ocean acidification. Global mean temperatures in 2017 were about 1.1 °C above pre-industrial temperatures.²²

203 Global sea surface temperatures in 2017 were somewhat below the levels of 2015 and 2016, but still ranked as the third warmest on record. Ocean heat content – a measure of the heat in the oceans through their upper layers down to 2,000 meters – reached new record highs in 2017. The *Statement* indicated that the magnitude of almost all individual components of sea level rise has increased in recent years, in particular melting of the polar ice sheets, mostly in Greenland and, to a lesser extent, also Antarctica. The April average Arctic sea ice extent was the second smallest (after 2016) in 39 years.

204 For the second successive year, above-average sea surface temperatures off the east coast of Australia resulted in a strong coral bleaching of the Great Barrier Reef. The *Statement*

¹⁷ WMO co-sponsored PARCOF-1 along with a meeting of the node leads of ArcRCC-Network through the funds provided by Environment and Climate Change Canada (ECCC) for a new project entitled "Polar Observations, Predictions and Climate Services".

¹⁸ See <https://www.wcrp-climate.org/wgcm-cmip/wgcm-cmip6>

¹⁹ See <http://www.wcrp-climate.org/grand-challenges/gc-sea-level>.

²⁰ See <https://www.wcrp-climate.org/gc-carbon-feedbacks>.

²¹ See https://library.wmo.int/opac/doc_num.php?explnum_id=4453 (March 2018). A provisional release was presented at UNFCCC/COP23 (Bonn, 6–17 November 2017).

²² The five-year average 2013–2017 global temperature is the highest five-year average on record. The world's nine warmest years have all occurred since 2005, and the five warmest since 2010.

contains a special section on ocean acidification from the IOC of UNESCO.²³

205 The Global Atmosphere Watch (GAW) continues to assess the latest trends and atmospheric burdens of the most influential long-lived greenhouse gases (LLGHGs). Results are published in WMO/GAW Annual Greenhouse Gas (GHG) Bulletins. WMO released its *Greenhouse Gas Bulletin 2016*²⁴ in October 2017. The latest analysis of observations from the WMO/GAW network shows that globally averaged concentrations calculated from this in situ network for carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O) reached new highs in 2016, with CO₂ at 403.3 ± 0.1 parts per million (ppm), CH₄ at 1 853 ± 2 parts per billion (ppb) and N₂O at 28.9 ± 0.1 ppb, which corresponds to respectively 145%, 257% and 122% of pre-industrial (before 1750) levels. The record increase in the annual mean CO₂ content from 2015 to 2016 (3.3 ppm) is larger than the previous record increase from 2012 to 2013 and 50% above the average growth rate for the past decade (~2.2 ppm yr⁻¹). The higher growth rate in 2016 and 2015, in comparison with previous years, is partly due to the increased natural emissions of CO₂ related to the most recent El Niño event.

206 In partnership with academic institutions, WMO developed and submitted a proposal related to coordinated observations between atmospheric and ocean greenhouse gas communities to the Prince Albert Foundation.

207 At the 17th World Meteorological Congress, WMO adopted a resolution on the implementation of the Integrated Global Greenhouse Gas Information System (IG³IS)²⁵ with the aim to expand the observational capacity for GHGs, extend it to the regional and urban domains, and develop the information systems and modelling frameworks to provide information about GHG emissions to society. One of the objectives of IG³IS is to provide national and sub-national governments with timely and quantified information to support their assessment of progress towards their mitigation goals. This requires improved knowledge of the carbon cycle, including the ocean sink. The implementation of IG³IS fundamentally relies on the globally harmonized observations of GHGs, including in the oceans, and will require the development of high resolution and complex observing systems, modelling tools and data assimilation techniques. The WMO Executive Council approved IG³IS Science Implementation Plan at its 70th Session in June 2018.

208 At the 17th meeting of UN-Oceans, WMO expressed its support to the idea of the United Nations Decade of Ocean Science and confirmed its commitment to contribute to the goals related to ocean knowledge, ocean-related hazards and ocean observation. WMO also presented an Ocean Position Paper as its initial reflection on its priorities in weather services for maritime safety and coastal protection, sub-seasonal to seasonal forecasting and long-term predictions. The paper builds on the WMO contribution to the Ocean Conference 2017, where it presented four voluntary commitments: 1) Weather and climate services for African, Caribbean and Pacific SIDS;²⁶ 2) Responding to El Niño: improving international coordination for improved early warning;²⁷ 3) The Year of Polar Prediction;²⁸ and 4) International Network of Multi-Hazard Early Warning System and Global Multi-hazard Alert System²⁹ – updates are provided on the respective website of the Ocean Conference. WMO further proposed an intensified period spanning 4 years of ocean observations to support research and marine services. It also offered to co-lead activities related to the goal on ocean-related hazards and host a technical event as a contribution to the Decade.

²³ The Global Climate Observing System (GCOS) has identified ocean acidification as one of 7 global climate indicators, to assist in communicating the rounded picture of our changing climate. The Global Climate Indicators form the basis of the WMO Statement on the state of the global climate. In addition, Ocean Ecosystem Variables, Plankton and Marine Habitat Properties (including Coral Reefs) have been identified as Essential Climate Variables.

²⁴ See https://library.wmo.int/opac/doc_num.php?explnum_id=4022.

²⁵ WMO, 2016. "Integrated Global Greenhouse Gas Information System (IG³IS)". <http://www.wmo.int/pages/prog/arep/gaw/ghg/IG3IS-info.html>

²⁶ See <https://oceanconference.un.org/commitments/?id=15752>.

²⁷ See <https://oceanconference.un.org/commitments/?id=15659>.

²⁸ See <https://oceanconference.un.org/commitments/?id=14082>.

²⁹ See <https://oceanconference.un.org/commitments/?id=23965>.

Atmospheric composition information in support of marine ecosystem research and assessment

209 GAW is the only existing long-term international global programme that coordinates observations and the analysis of atmospheric composition changes, and thereby helps to improve the understanding of interactions between different components of the Earth system, such as the atmosphere, the oceans and the biosphere. The GAW Implementation Plan for 2016-2023 places an increased emphasis on the delivery of added-value and cross-cutting products and services that are relevant to society, including for example climate, weather forecasting, ecosystem sustainability, human health, mega-city development, agricultural productivity and many more.

210 WMO/GAW has been a long-time sponsor of GESAMP's Working Group on The Atmospheric Input of Chemicals to the Ocean (WG 38). WG 38 has published numerous studies related to the impact of atmospheric deposition of anthropogenic nitrogen to the ocean. Following the publication of the papers resulting from the 2013 workshop on the impacts of atmospheric nitrogen deposition to the ocean, WG 38 prepared a synthesis of the results from the scientific papers derived from that workshop. That report was reviewed by GESAMP and published by WMO in early 2018 as GESAMP Reports and Studies No. 97, The Magnitude and Impacts of Anthropogenic Atmospheric Nitrogen Inputs to the Ocean. WG 38 is now focusing on two new activities approved by GESAMP at its 42nd session an investigation: 1) of the changing atmospheric acidity and the oceanic solubility of nutrients; and 2) of the impact of ocean acidification on fluxes of non-CO₂ climate-active species. The WG developed a list of review papers to be completed on these topics at two simultaneous workshops held at the University of East Anglia, UK, 27 February to 2 March, 2017. See the report from the co-chairman of Working Group 38, submitted to GESAMP 45 for details.

Prediction and monitoring on shorter time scales

211 The Polar Prediction Project (PPP³⁰), a joint initiative of the WMO World Weather Research Programme (WWRP) and WCRP aims to improve predictability and services in polar regions, including predictions for sea ice. Besides providing guidance on optimizing polar observing systems, it focuses on improving the representation of key processes of the polar atmosphere, land, ocean and cryosphere and their interactions in numerical models. Under the umbrella of the Polar Prediction Project (2013–2022) and the Year of Polar Prediction (mid-2017 – mid-2019),³¹ WMO is promoting cooperative international research enabling the development of improved weather and environmental prediction services for the polar regions, on time scales from hours to seasonal, and aims to enable a significant improvement in environmental prediction capabilities for the Polar regions and beyond, by coordinating a period of intensive observing, modelling, verification, user-engagement and education activities.³²

212 In order to improve services to society, e.g. support to maritime transportation and safety, WMO is also promoting observations of the cryosphere and the weather by ships sailing in polar regions.³³

DIVISION FOR OCEAN AFFAIRS AND THE LAW OF THE SEA (DOALOS)

³⁰ See <http://www.polarprediction.net>

³¹ See <http://www.polarprediction.net/>.

³² The first special observing period, February to March 2018 in the Arctic, featured the contribution of several countries with several additional radio sounds launched in the Arctic. The second Arctic special observing period, July to September, will see also the deployment of several sea-ice buoys from the Russian sector. On longer time scales WCRP carries out a number of activities in the polar oceans, including its Polar Climate Predictability Initiative (closely linked to the Polar Prediction Project of WWRP) and its Climate and Cryosphere (CliC) (see www.climate-cryosphere.org) core project.

³³ In particular, the WMO Executive Council Panel of Experts on Polar and High-mountain Observations, Research and Services (EC-PHORS), at its 7th meeting (Ushuaia, March 2017) requested its Observations Task Team to collaborate with IMO to effect changes in Polar Code to make cryosphere and weather observations mandatory.

OFFICE OF LEGAL AFFAIRS

Introduction

213 Among its core functions, the Division for Ocean Affairs and the Law of the Sea (DOALOS), Office of Legal Affairs, United Nations, carries out the responsibilities entrusted to the Secretary-General under the 1982 United Nations Convention on the Law of the Sea (UNCLOS) and the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (United Nations Fish Stocks Agreement), and as provided by the General Assembly through its annual resolutions on oceans and the law of the sea and on sustainable fisheries. This section is intended to highlight relevant information on developments related to oceans and the law of the sea issues since September 2017.

Informal Consultative Process

214 The United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea (the Informal Consultative Process) held its 19th meeting from 18 to 22 June 2018 and, pursuant to General Assembly resolutions 71/257 and 72/73, focused its discussions on the topic entitled “Anthropogenic underwater noise”. As in the past, the meeting was organized around panel presentations by experts representing developed and developing countries and reflecting various perspectives and disciplines, followed by interactive discussions.

215 Prior to the 19th meeting of the Informal Consultative Process, the report of the Secretary-General on oceans and the law of the sea was prepared, with a view to facilitating discussions on the topics of focus at that meeting (A/73/68). The report of the Secretary-General, as well as panel presentations and other documents relevant to the nineteenth meeting are available on DOALOS’ website at:

http://www.un.org/depts/los/consultative_process/consultative_process.htm.

Conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction

216 Building on the recommendations of the Preparatory Committee established by General Assembly resolution 69/292, in its [resolution 72/249](#) of 24 December 2017, entitled “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”, the General Assembly decided to convene an Intergovernmental Conference, under the auspices of the United Nations, to consider the recommendations of the [Preparatory Committee](#) on the elements and to elaborate the text of an international legally binding instrument under Convention on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, with a view to developing the instrument as soon as possible.

217 In accordance with resolution 72/249, the Conference will address the topics identified in the package agreed in 2011, namely the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction, in particular, together and as a whole, marine genetic resources, including questions on the sharing of benefits, measures such as area-based management tools, including marine protected areas, environmental impact assessments and capacity-building and the transfer of marine technology.

218 The Conference held a three-day organizational meeting in New York, from 16 to 18 April 2018. It will meet for four sessions, with the first session to be convened from 4 to 17 September 2018. The second and third sessions will take place in 2019, and the fourth session in the first half of 2020.

219 Documents relevant to the work of the Conference are available at its website <https://www.un.org/bbnj/>.

The Regular Process for Global Reporting and Assessment of the State of Marine Environment, including Socioeconomic Aspects

220 The Ad Hoc Working Group of the Whole on the Regular Process held its 10th meeting from 28 February to 1 March 2018, and pursuant to paragraph 330 of General Assembly resolution 72/73, considered, for approval, the outline of the second world ocean assessment. The Working Group also had before it: a) the draft timetable and plan of implementation for the preparation of the second world ocean assessment; b) the draft guidance for contributors, Part II; and c) elements for discussion on guidelines for the second round of regional workshops in 2018.

221 The Working Group took note of the presentations on the outcome of the first round of regional workshops in support of the second cycle of the Regular Process which took place in 2017 in Brazil, New Zealand, Portugal, Thailand and the United Republic of Tanzania, respectively. The aim of these workshops was to raise awareness about and receive feedback on the first World Ocean Assessment, and to inform the scoping and preparation phases of the second World Ocean Assessment.

222 A second round of regional workshops, scheduled to begin in the second half of 2018, is meant to inform the preparation of the Second World Ocean Assessment, and to, inter alia, inform the collection of regional-level information and data for the preparation of that assessment. The first workshop will be held in Koror, Palau from 8 to 9 August 2018.

223 A Multi-stakeholder Dialogue/Capacity-building Partnership Event on the Regular Process will take place in January 2019 at United Nations Headquarters in New York. The event is expected to provide an opportunity to build awareness and collaboration with respect to capacity-building in support of the Regular Process, including building capacity to participate in, and make use of, assessments.

224 Documents relevant to the Regular Process can be found on the website of the Division at http://www.un.org/depts/los/global_reporting/global_reporting.htm.

World Oceans Day

225 Pursuant to General Assembly resolution 63/111, the United Nations celebrated World Oceans Day 2018 with a discussion panel, entitled “Clean our ocean: innovation and youth”, held at United Nations Headquarters on 8 June 2018. This interactive event brought forward examples of visions, innovative approaches and partnerships that support a clean ocean for sustainable development. The panel discussion was opened by the Secretary-General's Envoy on Youth. The event also provided an opportunity for youth mobilization, including their direct participation in the event as panellists and highlighted the important roles of youth and innovation in addressing solutions towards cleaning our oceans. Particular focus was given to innovation across the spectrum of relevant stakeholders represented by the six panellists. Additional information, including on World Oceans Day more broadly, can be found on the United Nations World Oceans Day website www.unworldoceansday.org.

Sustainable fisheries

226 In 2016, the resumed Review Conference on the Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (the “Agreement”) in 2016 recommended that the Informal Consultations of States Parties to the Agreement be dedicated, on an annual basis, to the consideration of specific issues arising from the implementation of the Agreement, with a view to improving understanding, sharing

experiences and identifying best practices for the consideration of States parties, as well as the General Assembly and the Review Conference (A/CONF.210/2016/5, annex, para. 15).

227 The thirteenth round of Informal Consultations of States Parties to the Agreement, held in New York from 22 to 23 May 2018, focused on the topic “Science-policy interface.” The report of the thirteenth round, prepared by the Chair, as well as the presentations made during the discussion panel and other relevant information, are available on the website of the Informal Consultations at:

www.un.org/depts/los/convention_agreements/fish_stocks_agreement_states_parties.htm

UN ENVIRONMENT (United Nations Environment Programme-UNEP)

Marine and Coastal Strategy³⁴

228 The work on the marine and coastal ecosystems at UN Environment is conducted based on the marine and coastal strategy. The work focuses on using sound science to apply ecosystem management to the factors that cause decline of ecosystem services in marine and coastal areas. The strategy covers four major areas: the land-ocean connection, ecosystem services, balancing use and conservation, and vulnerable people and places. The outcomes are achieved by scientific assessment, policy, planning and communications, providing objective science-based information and enhancing users’ capacities. A new strategy is being prepared to replace the previous one after an assessment and need for updates through the United Nations Environment Assembly (UNEA).

229 UN Environment collaborates with UN Agencies such as United Nations Educational Scientific and Cultural Organization – Intergovernmental Oceanographic Commission (UNESCO/IOC), United Nations Development Programme (UNDP), International Maritime Organization (IMO), United Nations Food and Agriculture Organisation (FAO), United Nations Division for Ocean Affairs and the Law of the Sea (UN DOALOS), United Nations Department of Economic and Social Affairs (UN DESA), United Nations Human Settlements Programme (UN-Habitat) and the World Bank. The programme continues to provide technical support and capacity development for integrated management of marine and coastal ecosystems within the framework of its marine and coastal strategy. Support is given to Member States through the platforms of the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA) and the Regional Seas programmes and action plans such as the Abidjan Convention, Barcelona Convention, Cartagena Convention, East Asian Seas Action Plan, Nairobi Convention, and Northwest Pacific Action Plan.

Regional Seas Programme³⁵

230 UN Environment has been coordinating the Regional Seas Programme since 1974. The Regional Seas programmes are among the most important regional mechanisms for the conservation and sustainable use of the marine and coastal environment. There are currently eighteen Regional Seas programmes around the world and more than 143 countries participate in the programmes. UN Environment currently administers seven Regional Seas programmes³⁶.

231 Member States have reiterated the importance of the UN Environment Regional Seas Programme for the sustainable management of the oceans through the resolution 2/10 Oceans and Seas of the Second Session of the United Nations Environment Assembly. The contributions of the Regional Seas programmes in assisting Member States with implementing the ocean-related Sustainable Development Goals (SDGs) were stressed. The 18th Regional Seas meeting

³⁴ http://www.unep.org/esm/Portals/50159/docs/em_water/UNEPs_Marine_Coastal_Strategy_Executive_Summary.pdf

³⁵ <http://www.unep.org/regionalseas/>

³⁶ Abidjan Convention, Barcelona Convention, Cartagena Convention, East Asian Seas Action, Nairobi Convention, Plan, Northwest Pacific Action Plan, and Tehran Convention

held in October 2017 in Korea emphasized the need for regionally coordinated national actions and reporting for the sustainable development goals, particularly Goal 14.

Activities in the regions:

Nairobi Convention³⁷

232 The Nairobi Convention participated in the 4th International Marine Protected Areas Congress (IMPAC4) held on 04-08 September 2017 in Chile. The conference themed 'Marine Protected Areas: Bringing People and Oceans together' discussed the complex nature of relationship between people and oceans as well as the benefits derived by the people from marine protected areas and oceans in general. Nairobi Convention delivered a presentation on the status and progress of marine protected areas in the Western Indian Ocean region and the proposed development of a Transboundary Conservation area between Kenya and Tanzania.

233 The Nairobi Convention in collaboration with the Western Indian Ocean Marine Science Association (WIOMSA) conducted National Leadership training on management of the coastal and marine environment. The training was held on 04-06 October 2017 in Tanzania and brought together senior policy makers from the Government of Tanzania to equip them with skills for better advocacy on the use of integrated approaches to the management of the coastal and marine ecosystems within government, and in partnerships with regional and global stakeholders. The training also equipped the policy makers with skills necessary for the development of informed policies and decision making for ocean management. The training was organized pursuant to Decision CP8/6c of the Eighth Conference of Parties to the Nairobi Convention on support and partnership for implementation of the Strategic Action Programme for the protection of the Western Indian Ocean from land-based sources and activities. The leadership training was part of the process of strengthening governance and awareness in the Western Indian Ocean, which is a key component of the strategic action programme.

234 The Nairobi Convention participated at Fourth Edition of Our Oceans held 05-06 October 2017 in Malta. The meeting held discussions on global commitment to sustainable action and investment in innovative solutions to deal with aspects such as marine pollution, marine protected areas and maritime security. During the meeting, some member states of the Nairobi Convention made commitments on the themes marine pollution, marine protected areas and maritime security.

235 The Nairobi Convention in collaboration with World Wide Fund for Nature – Madagascar, Coastal Oceans Research and Development in the Indian Ocean and the Government of Mozambique organized a regional workshop for the Northern Mozambique Channel from 9-13 October 2018 in Mozambique. The workshop discussed options for delivering on the regional voluntary commitment to attain of Sustainable Development Goal 14 on Ocean, which was made during the Oceans Conference held in June 2017 in New York.

236 A regional training workshop was held 17-20 October 2018 in Tanzania, by the Nairobi Convention in collaboration with United Nations Environment Programme's Post Conflict and Disaster Management Branch, and Oil for Development Programme of the Government of Norway on managing emergency preparedness and response in the oil and gas sector. The training brought together various technical experts from the ministries on environment, energy and maritime transport to strengthen national and regional capacities on oil spill contingency planning. The workshop was a follow up to Decision CP8/7 of the Eighth Conference of Parties to the Nairobi Convention on Environmental Management of the oil and gas sector was part of the implementation of the Regional Oil and Gas Capacity building programme for the Nairobi Convention.

³⁷ <http://www.unep.org/nairobiconvention/>

237 The Nairobi Convention participated in the 10th Symposium of the Western Indian Ocean Marine Science Association (WIOMSA) held on 30th October to 04 November 2017 in Tanzania. The symposium aimed at fostering enhancement of networks and collaboration with Western Indian Ocean Marine Science Association and other partners in bridging the gap between Science and Policy. The Nairobi Convention participated in a Pre-Symposium Workshop on Ocean Acidification for the Western Indian Ocean region. The workshop aimed at developing regional capacity on ocean observations in support of Sustainable Development Goal target 14.3. The Nairobi Convention supported the organizing of a side session 'Bridging the gap between marine research, policy and management-developing new ideas for collaboration'. The session was organized in collaboration with Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and The Federal Ministry of Economic Cooperation and Development (BMZ) of Germany. The session discussed mechanisms for support to capacity building in science-policy, science-management interactions at both national and regional level and opportunities for strengthening of forums between researchers and decisions makers on topical issues at the regional level.

238 The Nairobi Convention partnered with United Nations Environment Programme- World Conservation and Monitoring Centre, Western Indian Ocean Marine Science Association, International Union for Conservation of Nature and intergovernmental Oceanographic Commission of the United Nations Educational Scientific and Cultural Organization to organize a training on Marine Spatial Planning held back to back with a meeting on Area Based Planning Tools for Areas Beyond National Jurisdiction and a meeting on Seamounts and Marine Spatial Atlas for the Western Indian Ocean region. The meetings were held on 13-15 November 2017 and were organized pursuant to Decision CP8/Λc of the Eight Conference of Parties to the Nairobi Convention of support and partnership in the implementation of the strategic action programme for the protection of the Western Indian Ocean from land-based sources and activities.

239 The Nairobi Convention in collaboration with United Nations Development Programme organized the first Project Steering Committee meeting for the project on 'Implementation of the Strategic Action Programme for the Western Indian Ocean from land-based sources and activities (WIOSAP) and the inception workshop for the project on 'Western Indian Ocean Large Marine Ecosystems Strategic Action Programme Policy Harmonization and Institutional Reforms (SAPPHIRE). The two meetings were held on 16-17 November in Seychelles. The Project Steering Committee meeting discussed the workplan and budget for the WIOSAP project while the inception meeting discussed the roles and responsibilities of various partners in implementing SAPPHIRE project.

240 The Nairobi Convention is developing regional outlooks on *Marine Protected Areas and Critical Habitats* for the Western Indian Ocean region as part of implementing the project on 'Implementation of the Strategic Action Programme for the Western Indian Ocean from land-based sources and activities' (WIOSAP). The first meeting for Authors of the outlooks was organized by the Nairobi Convention in collaboration with Western Indian Ocean Marine Science Association on 29 January 2018 to 02 February 2018 in Mombasa Kenya. The meeting discussed the structure and content of the outlooks to be developed. A second meeting for authors of the outlook on Marine Protected Areas was organized from 4-5 April 2018 in Madagascar to further develop the chapters of the outlook on Marine Protected Areas.

241 The Nairobi Convention Secretariat supported in the organization of the meeting for Regional Seas Programmes and Large Marine Ecosystems held on 27-30 November 2017 in South Africa. The meeting brought together regional seas conventions and action plans, regional fisheries agreement and regional fisheries management organizations to discuss the existing collaboration among the bodies and explore how regional institutions and projects could support the 2030 Agenda and the Sustainable Development Goals.

242 A meeting for the Forum for Academic and Research Institutions (FARI) was held on 12-13 December 2017 in Zanzibar. The meeting was organized by Nairobi Convention in collaboration with Western Indian Ocean Marine Science Association and discussed the terms of

reference for FARI, proposed activities for FARI for 2018 in line with implementation of the project on 'Implementation of the Strategic Action Programme for the Western Indian Ocean from land-based sources and activities' (WIOSAP) and mechanisms for strengthening the contribution of FARI to the Science-Policy Dialogue of the Western Indian Ocean region. The FARI meeting was held back to back with the Regional Workshop in support of the second cycle of the Regular Process for Global Reporting and Assessment of the Marine Environment, including Socioeconomic Aspects ('The Regular Process') held 14-15 December in Zanzibar. Nairobi Convention supported in the Regular Process workshop organized by United Nations Division Ocean Affairs and Law of the Sea which discussed the necessary steps that could be taken by the region in the period 2017-2020 to support contribution to the Global Oceans Assessment and the state of the coast reporting in the Western Indian Ocean region.

243 A meeting for Focal Points to the Nairobi Convention was organized on 06-07 April 2018 in Madagascar. The meeting was organized pursuant to the Eighth Conference of Parties to the Nairobi Convention Decision CP8/6 on support to implementation of projects and CP8/14 on strengthening the operational functioning of the secretariat. The meeting discussed the progress in implementation of the Decisions of the Eight Conference of Parties to the Nairobi Convention which was held in June 2015 in Seychelles and key lessons learnt, preparation for the Ninth Conference of Parties to the Nairobi Convention to be held in August in Kenya, and progress in implementation of project executed by Nairobi Convention.

244 In an effort to enhance capacity on marine and coastal management in the Western Indian Ocean region, the Nairobi Convention in collaboration with the Western Indian Ocean Marine Science Association organized a senior leaders' renewal workshop on marine and coastal management in the Western Indian Ocean region. The workshop was held in Seychelles on 11-13 April 2018. The workshop targeted senior government officials from relevant ministries and parastatals in the Western Indian Ocean region. The workshop prepared the way for national activities to further reduce impacts of land-based sources and activities into the coastal and marine environment. The workshop equipped the senior policy makers with leadership skills for better advocacy on use of integrated approaches in management of oceans. The workshop was organized pursuant to Decision CP8/6c of the Eight Conference of Parties to the Nairobi Convention on support and partnership for implementations of the Strategic Action Programme for the protection of the Western Indian Ocean from land-based sources and activities.

245 The Nairobi Convention Secretariat in collaboration with Western Indian Ocean Marine Science Association (WIOMSA) and Indian Ocean Commission (IOC) organized a Science to Policy meeting on 09-11 July 2018 in South Africa. The meeting was held as part of the implementation of the project on 'Implementation of the Strategic Action Programme for the Western Indian Ocean from land-based sources and activities' (WIOSAP) and also in support of the Eighth Conference of Parties to the Nairobi Convention on establishment of a platform for Science to Policy Dialogue. The meeting discussed the role of Forum for Academic and Research Institutions in the Science to Policy platform, policy relevant scientific themes aligned to the Nairobi Convention priorities as identifies in the various Strategic Actions Programmes (SAPs), Convention Work Programme and Climate Change Strategy and recommend proposed policy decisions to the Ninth Conference of Parties to be held in Kenya in August 2018.

Northwest Pacific Action Plan (NOWPAP)³⁸

246 NOWPAP activities are structured around six major thematic areas: regular assessments, integrated coastal and river basin management, pollution prevention and reduction, biodiversity conservation, climate change impacts, and information management. NOWPAP Regional Coordinating Unit and four Regional Activity Centres (RAC) continued to address marine and coastal environmental issues such the development of Ecological Quality Objectives (EQOs), prevention and reduction of pollution from harmful substances and marine litter, and strengthening

³⁸ <http://www.nowpap.org/>

regional cooperation to prepare and respond to oil and NHS spills among key priorities. NOWPAP experts are also implementing projects focusing on major threats to marine and coastal biodiversity: eutrophication, destruction of coastal habitats and introduction of alien invasive species. Other projects are related to sea grass and seaweed habitat mapping and assessment of the status of threatened and endangered marine and coastal species in the region. "Assessment of major pressures on marine biodiversity in the NOWPAP region" and "Feasibility Study Towards Assessment of Seagrass Distribution in the NOWPAP Region" will be published in 2018.

247 In May 2016, NOWPAP focal points agreed on the list of EQOs common to the four NOWPAP countries, including: (1) Biological and habitat diversity have not changed significantly due to anthropogenic pressure; (2) Alien species are at levels that do not adversely alter the ecosystem; (3) Eutrophication adverse effects are absent; (4) Contaminants cause no significant impact on coastal and marine ecosystems and human health; and (5) Marine litter does not adversely affect coastal and marine environments. NOWPAP has published the Regional overview of possible Ecological Quality Objective indicators for the NOWPAP region in 2017. The indicators and targets for each EQO will become a basis for the next NOWPAP Medium Term Strategy 2018-2023.

248 The NOWPAP Regional Action Plan on Marine Litter is also being implemented in cooperation with central and local governments in the NOWPAP member states as well as non-governmental organizations (NGOs) including the organization of highly successful International Coastal Clean-up campaigns in all participating countries. The "Review and analysis of existing prediction models for floating marine litter" and "Oiled wildlife response in the NOWPAP region" have been published in 2018. The Expert Meeting of the NOWPAP special project: "Monitoring and Assessment Methods for Microplastics pollution" was organized in Busan, Korea on 3 June 2018. Participants agreed that the Special Project would use existing microplastics monitoring criteria in NOWPAP countries. Existing eco-toxicological studies of the impact of microplastics on the environment would be used as part of a harmonized regional approach to microplastics ecological risk assessment. NOWPAP is a member of the Global Partnership on Waste Management (GPWM) and has been hosting the NW Pacific regional node of the Global Partnership on Marine Litter (GPML) since 2014.

249 NOWPAP continues developing and strengthening partnerships with the relevant organizations and programmes in the region, including North-East Asian Subregional Programme for Environmental Corporation (NEASPEC), North Pacific Marine Science Organization (PICES), Partnerships in Environmental Management for the Seas of East Asia (PEMSEA), and UNESCO/IOC Sub-Commission for the Western Pacific (WESTPAC), Yellow Sea Large Marine Ecosystem (YSLME) Phase II Project to name a few. NOWPAP contributes to the implementation of the Sustainable Development Strategy for the Seas of East Asia and provides technical expertise to the Convention on Biological Diversity on relevant issues such as description of ecologically or biologically significant marine areas (EBSAs) in the region.

250 NOWPAP member states have adopted a new Medium-term Strategy (MTS) for the period 2018-2023 and the implementation plan to tackle multiple regional challenges and ways to revitalize and expand the NOWPAP partnership in June 2018. The Strategy intends to align future NOWPAP activities with the delivery of Sustainable Development Goals (SDGs). The focus areas of the MTS include: supporting integrated coastal and river basin planning and management, assessing status of the marine and coastal environment, preventing and reducing land- and sea-based pollution and conserving marine and coastal biodiversity.

Coordinating Body on the Seas of East Asia (COBSEA)

251 The Coordinating Body on the Seas of East Asia (COBSEA) is a regional intergovernmental policy forum, recognized as the sole decision-making body for the East Asian Seas Action Plan, supporting participating countries (Cambodia, People's Republic of China,

Indonesia, Republic of Korea, Malaysia, the Philippines, Thailand, Singapore and Vietnam) in the development and protection of the marine environment and coastal areas of East Asian Seas. The COBSEA Secretariat is hosted by Thailand and administered by UN Environment, located at the UN Environment Asia and the Pacific Office in Bangkok, Thailand.

252 COBESA Strategic Directions 2018-2022 were adopted at the Second Extraordinary IGM of COBSEA 25-26 April 2018 in Bangkok, Thailand. Under these Strategic Directions COBSEA will focus on regional governance; addressing land-based marine pollution with a focus on nutrients, sediment, wastewater and marine litter; and marine and coastal planning and management, with a focus on ecosystem-based management approaches, including MPAs and MSP, towards achievement of relevant SDGs and Aichi Targets.

253 COBSEA adopted a Regional Action Plan on Marine Litter in 2008. This remains the only intergovernmentally adopted framework for marine litter in the region. A process to update this is underway. A revised draft has been prepared based on consultation with participating countries, other stakeholders and desk review. Steps towards finalization of the revision were agreed at the Second Extraordinary IGM of COBSEA, 25-26 April 2018. A regional workshop will be convened in the second half of 2018. A regional seminar was also held in association with the GESAMP WG 40 meeting in Bangkok in June 2018.

254 A regional project on reducing marine litter through management of the plastic value chain (US\$ 6.5M) has been developed in collaboration with UN Environment. The project, funded by Sweden, will start with an inception phase in 2018 followed by 4 years of project implementation. COBSEA leads components focusing on the science basis for decision-making including monitoring and reporting, as well as on regional networking, cooperation and sharing. This will support countries implement key provisions of the Regional Action Plan on Marine Litter, and in doing so also facilitate development, planning and implementation of national commitments made towards SDG 14.1 as well as in the context of the global Clean Seas campaign.

255 The US\$ 15M GEF project 'Implementing the Strategic Action Programme for the South China Sea', which addresses the habitat, land-based pollution and regional coordination components of the Strategic Action Programme, is starting in 2018. The US\$ 3M GEF project 'Establishment and Operation of a Regional System of Fisheries Refugia in the South China Sea and Gulf of Thailand', which implements the fisheries component of the Strategic Action Programme, started in 2016, executed by SEAFDEC. COBSEA has an umbrella coordinating role for these projects. Project progress and other matters will be reviewed and shared through COBSEA, and COBSEA will execute activities under component 3 of the project 'Implementing the Strategic Action Programme for the South China Sea' relating to regional policy development.

Caribbean Region (Cartagena Convention Secretariat)

256 Capacity of Marine Protected Areas (MPAs) was strengthened through local training (under the SPAW *Training of Trainers* (ToT) course), regional symposia, and through grants (under the SPAW/Caribbean Marine Protected Areas Managers Network and Forum (CaMPAM) Small Grants Program) for MPAs in 6 Eastern Caribbean countries via the recently concluded collaborative project with support from the Government of Germany entitled "*Climate Resilient Eastern Caribbean Marine Managed Areas Network*" (ECMMAN). The application of Ecosystem Based Management (EBM) approaches and tools continues to be facilitated through the extended project "*Biodiversity for Sustainable Development in the Caribbean through Ecosystem Based Management*" (Caribbean EBM Project) focusing on the Dominican Republic and funded by the Directorate for the Environment within the Ministry of Foreign Affairs of Italy with participation of regional partners, it will be extended to Colombia.

257 For coral reef conservation there was a focus on continued support through the development of a coral reef partnership within the UN Environment, Regional Seas Programme including coordination with the International Coral Reef Initiative towards the reactivation of the

Caribbean Coral Reef Monitoring Network. The use of bio-physical and socio-economic data for coastal management decision-making, and for improved standardized and strategic reporting at the regional level is now being actively promoted to increase capacity for effective integrated coral reef monitoring among Global Coral Reef Monitoring Network-Caribbean countries.

258 Following collaboration between the Cartagena and Abidjan Conventions to raise awareness and share information on the issue of the *Sargassum* influx, the development and dissemination of educational material throughout the respective regions remains a priority. There was the presentation of a draft paper to the Fifth Meeting of the Council of Ministers for Environmental Sustainability (OECS) in July 2018, and a technical session at the 70th Annual Gulf and Caribbean Fisheries Institute (GCFI) Conference at the end of 2017. The sharing of regional data in partnership with GCFI, the University of the West Indies' Centre for Resource Management and Environmental Studies (CERMES) and other relevant institutions is on-going.

259 Collaboration with Regional (and sub-regional) Fisheries Organisations (RFOs) and other partners is underway to enhance governance and sustainable management of living marine resources in the Wider Caribbean, under the framework of the "Catalysing Implementation of the Strategic Action Programme for the Sustainable Management of Shared Living Marine Resources in the Caribbean and North Brazil Shelf Large Marine Ecosystems" (CLME+) project in coordination with IOCARIBE/IOC, FAO/WECAFC, University of the West Indies and member governments. A MoU was recently signed with the Caribbean Regional Fisheries Mechanism (CRFM) (May 2018) to facilitate various elements pertaining to identification and evaluation of marine species for listing on the SPAW Protocol, monitoring and mitigation of marine invasive species in the region including management of *Sargassum* seaweed influx, coral reefs, mangroves and other coastal and marine ecosystems, and capacity building to name a few.

260 The management of sewage was improved through the support to the Global Wastewater Initiative, one of the three partnerships of UNEP's Global Programme of Action (GPA). This has taken place primarily through capacity building activities of the GEF funded Caribbean Regional Fund for Wastewater Management (CReW), implemented by the Inter-American Development Bank and UNEP. The results achieved from the CReW project have enabled the countries - both at regional and national levels - to more effectively manage wastewater discharges into the Caribbean Sea. The main achievements of the CReW have been the establishment of Pilot Financing Mechanisms (PFMs); improved understanding of the need to for innovative financing; increased awareness amongst decision makers, the media and the wider public; policy institutional and legislative reforms for reducing impacts of sewage on the marine environment; training of more than 600 technicians, government officials, and other stakeholders in various aspects of wastewater management; and enhanced regional and national level partnerships including the private sector, UN agencies and development banks. Costa Rica became the 13th country to ratify the Protocol on the Control of Pollution from Land Based Sources and Activities (LBS Protocol) in May 2016. The GEF CReW Project officially closed in 2017.

261 Work has begun on the design of a full-sized project proposal to build upon the outputs of the GEF CReW. The GEF CReW+ Project to be implemented by UN Environment and the Inter-American Development Bank will build on a baseline of technical understanding of wastewater treatment and practical examples of success following the implementation of activities in 13 countries of the region under the GEF CReW project. The new project is expected to identify and implement new innovative funding mechanisms and technological solutions that are replicable and sustainable. The project duration will be 36 months.

262 The full proposal for the GEF funded CReW+ Project entitled '*Upscaling and enhancing the experience of the Caribbean Regional Fund for Wastewater Management to the wider Caribbean promoting through an integrated approach of innovative technical solutions and financing mechanisms (CReW+)*' is being developed for finalization and submission to the GEF Secretariat by March 2019. The project was approved in November 2017 for US\$14,943,938 by the Global Environment Facility (GEF) Trust Fund. Close liaison has begun with all countries to

secure their input, endorsement/validation and co-financing for all proposed activities at national and regional levels.

263 In the area of marine litter, the Secretariat in collaboration with the US Environmental Protection Agency (EPA) launched the *Trash Free Waters Partnership* in Panama and Jamaica in 2016. This partnership focuses on community based activities in collaboration with the US Peace Corps to reduce impacts of marine litter on coastal and marine ecosystems, human health and livelihoods. This serves to assist in the implementation of the Regional Action Plan for Marine Litter Management in the Caribbean which was updated in 2015. Sandals Foundation is coordinating the implementation of pilot project activities in the towns of Bluefields and Whitehouse in Jamaica. A contractual agreement was finalized between UN Environment and Sandals Foundation and signed in May 2018. The project was later launched in the communities of Bluefields and Whitehouse on June 8, 2018. Activities during 2018 include public education and outreach, distribution of garbage bins, livelihood training for recycling with Recycle 360 in Jamaica, separation of Polyethylene terephthalate plastics (PET) into distributed bins and composting.

264 The 20 million USD 5-year GEF-funded project for Integrating Water, Land & Ecosystems Management in Caribbean SIDS (GEF-IWEco) commenced during the second half of 2016. This project will contribute to the preservation of Caribbean ecosystems that are of global significance and the sustainability of livelihoods through the application of existing proven technologies and approaches that are appropriate for small island developing states through improved fresh and coastal water resources management, sustainable land management and sustainable forest management that also seek to enhance resilience of socio-ecological systems to the impacts of climate change. Project Cooperation Agreements (PCAs) were duly signed for three countries: Trinidad & Tobago, St. Lucia and Antigua & Barbuda. PCA was also signed with PCI Media Impact for execution of Component 4 – Enhance knowledge exchange. Project Cooperation Agreements (PCAs) are currently being developed with the remaining project countries and project partners.

265 The IWEco project held a Communications and Capacity Building Workshop from 28-29 March 2017, Havana, Cuba, nine project Focal Points attended. In October 2017, a 'Communication Partnership Group' meeting and capacity building workshop (Regional Communications Workshop, 30 October - 3 November 2017) was held in Saint Lucia, bringing together the various national focal points and the contracted partners related to communications and awareness raising work. During this meeting, a strategy to launch the IWEco Project in the various countries was agreed upon, including funding arrangements. This resulted in successful launches of the IWEco Project in Saint Lucia, Cuba, and in Trinidad & Tobago. A second IWEco Project Steering Committee Meeting was organised and held in Havana, Cuba, 26-28 February 2018, bringing together project countries and co-executing agency representatives and allowing for management decisions with regards to the ongoing execution and progress of the IWEco Project in the region.

266 The development of new CEP Technical Reports, Infographics and Fact Sheets, has enhanced use of social media with targeted training for media professionals, and has facilitated greater knowledge sharing and awareness raising of the general public and other interested persons on coastal and marine issues, including on emerging issues such as ocean acidification and the negative environmental and human health impacts of microplastics.

267 The Secretariat also initiated the development of the first *State of Convention Area (Marine Environment Report)* for the Wider Caribbean Region. The report captures and presents key information on the state of coastal and marine ecosystems within the WCR in terms of their current condition; the pressures and the drivers of those pressures; and an assessment of current environmental management initiatives. It is expected to serve as an operational tool that the Parties and other partner organizations can use to determine baseline conditions and priorities to be addressed in the region and to set targets for region-wide action. The development of the SOCAR starts the reporting process that will occur in 4-year cycles. It is also expected to

complement the development of a State of Habitat Report coordinated through the SPAW Protocol. Through the institutionalization of an integrated reporting mechanism on the "State of the Marine Environment and Associated Economies" in the region ("CLME+ SOME"), this provided an opportunity to develop the Driver Pressure State Impact Response Methodology (DPSIR) which is being used as the methodology for the SOCAR and the State of the Marine Environment (SOME) Report under the UNDP/GEF CLME+ project. The Pre-Technical Workshop was held on 17 July 2018 immediately preceding the 4th LBS STAC and further reviewed the progress on SOCAR and included recommendations for consideration by the 4th LBS STAC

268 The Strengthening Ecosystem Based Management (EBM) Frameworks and Ocean Governance in the North Brazil Shelf Large Marine Ecosystem (NBSLME) project developed by the Cartagena Convention Secretariat's AMEP and SPAW Sub-Programmes in partnership with the Caribbean Large Marine Ecosystem Project aims to develop and test various governance arrangements to enable effective ecosystem-based management (EBM) of mangroves and wetlands. The project will implement at least one (1) mangrove restoration/rehabilitation/protection and pollution abatement/prevention project in each of four (4) countries of the NBSLME: Trinidad and Tobago, Guyana, Suriname and Brazil. This project will support national and regional coastal management programmes, assist participating countries in implementation of the SPAW (Specially Protected Areas and Wildlife) and LBS (Land Based Sources of marine Pollution) Protocols, and meet their international obligations with regards to RAMSAR and CBD (Convention on Biological Diversity).

Abidjan Convention

269 The Convention for Cooperation on the Protection, Management and Development of the Marine Environment and the coastal zones of the Atlantic Coast of the West, Central and Southern Africa Region - Abidjan Convention - has for over 6 years accelerated the process of developing regional cooperation instruments. These cooperation agreements include the additional protocols to the Abidjan Convention on: Pollution from land-based sources and activities -LBSA; Environmental norms and standards related to offshore oil and gas activities; Integrated coastal zone management -GIZC- and Sustainable mangrove management.

270 LBSA: The Protocol on Cooperation in Pollution Control in Emergency Situations was signed in June 2012. In addition, a Regional Emergency Plan to organize cooperation in the event of pollution incidents has been adopted and a Regional Emergency Centre established.

271 Environmental norms and standards: The establishment of a regulatory framework for monitoring and surveillance of offshore oil and gas activities follows COP 9, COP 10 and CoP 11. The Secretariat organized the Dakar meeting which outlined the main line of action of the additional protocol and the roadmap for the adoption of the present protocol under preparation. The meeting of Malabo has amended and adopted the preliminary draft protocol and initiated the idea of beginning national consultations to share the document with all national stakeholders concerned by the offshore oil and gas issue who did not have the opportunity to take part in the regional process. The last meeting, which took place in Praia, made it possible to adopt, subject to reservations, the annexes to this additional protocol and to draw up a roadmap for national consultations.

272 Sustainable mangrove management: In accordance with Decision - CP 11/1. d) COP. 10/7: Sustainable management of mangrove ecosystems in the area of influence of the Abidjan Convention "which encourages the transformation of the Charter for the sustainable management of mangrove resources signed in 2010 by the Gambia, Guinea, Guinea-Bissau, Mauritania, Senegal and Sierra Leone into an additional protocol to the Abidjan Convention, in accordance with recommendation No. 2 adopted at the 7th Regional Coastal and Marine Forum, held in Dakar in 2013, the Secretariat of the Abidjan Convention initiated the development process of the said protocol. To this end, it organized three panels of experts. The first, held in Abidjan in November

2014, transformed the mangrove charter into a protocol and validated the draft version. The second meeting held in August 2015 in Calabar-Nigeria made it possible to improve the provisional version, to initiate the development of an action plan based on the protocol and to launch the process of developing the annexes. The third panel that met in Bissau in May 2016 validated the draft version of the Protocol, reviewed and validated subject to the annexes to the Protocol and developed a roadmap for national consultations.

273 Integrated Coastal Zone Management: Marine and coastal areas are home to many human activities such as deforestation for various purposes, maritime transport, fishing and aquaculture, renewable energy production, extraction of raw materials, water sports and tourism. Experts have been warning for several years about the threats these activities pose to the marine and coastal environment. Strengthening their supervision has gradually become a major objective for the States Parties to the Abidjan Convention. The Parties consider that the drafting of a protocol on ICZM would contribute to more effective management of coastal zones and the marine environment. To this end, the Abidjan Convention Secretariat has already organized the first meeting of the Abidjan Convention Expert Panel on the elaboration of an additional protocol on integrated coastal zone management in West, Central and Southern Africa. It was held in Accra, Ghana, from 16 to 18 June 2015 and led to the establishment of a working group and the adoption of the outlines of the protocol. Following this meeting, the second meeting of experts was held in Lomé, Togo, from 24 to 26 May 2016. The latter adopted a new version of the preliminary draft protocol; adopted, subject to the guidelines of the four annexes to this protocol and finally set out the road map for the national consultations held between July and September.

274 In sum, all the above-mentioned protocols have been the subject of national consultations with the aim of reflecting national concerns as far as possible in the protocols. To this end, the Convention Secretariat has set up 3 teams of experts who travelled across West and Central Africa between July and October 2016 to conduct these national consultations. At least 50 participants per country took part in these consultations and they come from diverse backgrounds: Technical services of the ministries concerned, Policy makers, Private sector, Civil society organizations, Research, etc.

275 The participants' profiles are also varied: environmentalists, oceanographers, biologists, hydrologists, soil scientists, mining engineers, lawyers, communicators, etc. The areas of expertise sought included: mining, environmental assessments, pollution, marine and coastal biodiversity, fisheries, environmental law, etc.

276 The workshops took place over an average of 3 days during which all the articles are discussed. At the end of the work, annotations in mode followed by modification are attached to the country report. In October 2016, the Secretariat invited the members of the Committee on Science and Technology to take note of the comments, observations and recommendations of the Parties. The results of all the national consultations and meetings of the Abidjan Convention's Committee on Science and Technology were presented in the form of a guidance note attached to the draft decision. These are the consolidated versions resulting from a long participatory and iterative process that were presented and adopted by the Parties at the twelfth Conference held in Abidjan in March 2017.

277 To date, the Secretariat is actively preparing the meeting of plenipotentiaries, which will probably be held at the beginning of the last quarter of 2018. This involves considering the amendments made to the protocol by the Contact Group set up at CoP12. To this end, the CST, the body authorized in this area, met from 23 to 27 May 2017 to take these amendments into account. The final versions considered the comments of the contact group. To define a post-signature roadmap for the protocols, the Abidjan Convention Secretariat is organizing a scoping workshop from 23 to 25 July. The aim is to have an action plan for the implementation of each protocol and the process of transposing the protocols into national laws. The meeting will also define the lines of communication needed to raise awareness among all stakeholders on the

implications of the protocols and the role of each. The agenda below provides further details on the framework of the working methodology.

The Regular Process for reporting and assessment of the state of the marine environment including socioeconomic aspects.

278 UN Environment continues to provide scientific and technical support to the Group of Experts, the bureau and the secretariat in the implementation of the second phase of the World Oceans assessment. The second phase of the WOA was launched in January 2016. Support to the second cycle of the process is being focused on awareness raising, resource mobilization, identification of additional experts for the Pool of Experts, technical and scientific support to the Bureau and the Group of Experts, hosting workshops and meetings of the writing teams, capacity-building and the scoping process for the assessment(s) of the second cycle.

279 UN Environment through its Nairobi Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Western Indian Ocean hosted and supported the Indian Ocean, the Arabian Sea, the Red Sea and Gulf of Aden and the ROPME/RECOFI area Regional Workshop in Zanzibar, United Republic of Tanzania, from 14 to 15 December 2017. The workshop provided an opportunity to present the main conclusions of the First Global Integrated Marine Assessment – World Ocean Assessment I; it enabled participants to put forward their views on the scope and structure that should be adopted for the assessment or assessments to be prepared in the second cycle of the Regular Process, and aimed at promoting capacity-building within the region so as to assist in creating the abilities to contribute from the region to the production of the assessment.

280 The draft outline for the second world oceans assessment has been approved by the tenth meeting of the Ad Hoc Working Group of the Whole on the Regular Process which met from 28 February to 1 March 2018. The second round of capacity building workshops (2018) are being organized by the secretariat as follows:

- .1 The North Pacific- Valletta, Malta, from 27 to 28 August 2018;
- .2 The South Pacific - Koror, Palau, from 8 to 9 August 2018;
- .3 The Indian Ocean (including the Arabian Sea and the Bay of Bengal), the Red Sea and Gulf of Aden and the ROPME/RECOFI area;
- .4 The North Atlantic, the Baltic Sea, the Mediterranean Sea and the Black Sea; and
- .5 The South Atlantic (between the African and American coasts) and the wider Caribbean

UN Environment following a request to nominate additional experts to the Pool of Expert for the Regular Process has nominated over 30 experts through the Regional Seas to the secretariat for consideration.

The GEF Transboundary Waters Assessment Programme (TWAP)

281 The TWAP Full Size Project which commenced in April 2013 and envisioned to fill two major objectives: (1) to undertake the first global assessment of transboundary water systems that will assist GEF and other international organizations improve the setting of priorities for funding; and (2) to formalise the partnership with key institutions so that transboundary considerations are incorporated in regular assessment programmes has been completed. The project which was completed in 2017 and has undergone a terminal evaluation which report is

available online at the following web address: <http://geftwap.org/publications/terminal-evaluation-report>

282 All TWAP publications are available at www.geftwap.org. Other products include a TWAP Comparative Analysis of Governance Report and the Transboundary Water Profile-Global Baseline Folio. To provide access to the quantitative data that underpin the assessments, a central data portal can be explored at <http://www.geftwap.org/data-portal>. For water category-specific data and water-system factsheets, links to partner websites are also provided from the central data portal webpage.

283 The execution of the TWAP has been coordinated by UN ENVIRONMENT (Science Division as executing unit and the Ecosystem Division as implementing unit, project-wide) and involves many partners already engaged in assessment efforts. Lead organizations at the project component scale are: Transboundary aquifers and SIDS groundwater systems: UNESCO's International Hydrological Programme (IHP); Transboundary lake/reservoirs basins: International Lake Environment Committee (ILEC); Transboundary river basins: UN ENVIRONMENT-DHI Centre for Water and Environment (lead); Large marine ecosystems: Intergovernmental Oceanographic Commission of UNESCO (IOC of UNESCO); Open ocean: IOC of UNESCO; Crosscutting Analysis: UN ENVIRONMENT-Science Division; and Data and information management: UN ENVIRONMENT/Science Division/Global Resources Information Database (GRID-Geneva).

Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA)

284 The GPA continues to focus its efforts mainly on the three pollution source categories of nutrients, wastewater, and marine litter, through establishment and management of global partnerships, in response to the Manila Declaration. The Global Programme of Action for the Protection of the Marine Environment from Land-based Activities will hold its 4th Intergovernmental review Meeting in Bali in October 2018 having been postponed from the same period last year due to threatening volcanic activity in proximity to the meeting location. The main goal of the Intergovernmental Review Meeting is to secure additional commitments from a full range of partners to further the implementation of the Global Programme of Action in addressing the priorities and needs of countries. This meeting will also focus on strategic directions for the programme into the future with particular reference to the resolutions adopted by countries at the third session of the UN Environment Assembly (UNEA3) that strengthened the mandate to address land-based pollution in resolutions on water, marine, soil and air pollution.

285 UN Environment through the GPA/Wastewater is providing support to the Tanzanian government in developing guidelines and standards for decentralized wastewater management systems. An expert meeting was held in Tanzania in January 2018 for selected sector experts to revise and provide input to the Guidelines for Decentralized Wastewater Treatment Systems. This activity is part of a project implemented by UN Environment together with the Bremen Overseas Research and Development Association (BORDA), who is also a member of the Global Wastewater Initiative (GW2I) and UN-Habitat. The project aims to support the scaling-up of decentralized sanitation solutions throughout Tanzania. Inputs gathered have been compiled into one final document which will then be presented to relevant ministries and used as a basis for developing standards on decentralized wastewater treatment systems for Tanzania and other potential countries.

286 UN Environment, through the GPA/Wastewater, has developed, and almost completed the implementation of the activities of phase two of a community-based project for biodiversity conservation and local community development through tree planting supported by Korea Forest Service (KFS) in Benin, Ethiopia, Ghana, and Morocco.

287 A Policy Brief on SDG6 has been developed by the Science Division of UN Environment, in collaboration with the Freshwater Unit and the GPA/Wastewater. The Sustainable Development Goals Policy Briefs highlight a hotspot of environmental concern. The evidence provided builds on the scientific data and information hosted on the online platform Environment Live and is complemented by stories from around the world.

288 A Sanitation and Wastewater Story Map has been developed under the ongoing “Wastewater Management and Sanitation Provision in Africa Project,” which is a partnership between UN Environment and the GPA, the African Development Bank (AfDB) and GRID-Arendal. The story map has won the first place in the Infrastructure, Planning and Government category of the “Storytelling with Maps” contest run by ESRI. This Story Map illustrates challenges associated with the inadequate infrastructure for sanitation provision and wastewater management in Africa at a time when volumes are increasing due to population growth, and expansion in industry and agriculture. Case studies are given from Kenya and from across Africa. Link:<https://gridarendal.maps.arcgis.com/apps/Cascade/index.html?appid=caf411c40c3442b782406de631bddb2f>. A draft version on the Sanitation and Wastewater Atlas has also been developed and deliberated upon during a workshop held in Rwanda in April 2018.

289 A Science-to-Policy Brief on managing wastewater to support the health and resilience of coral reefs and titled “Wastewater Pollution on Coral Reefs” has been developed by the GPA and the Coral Reef Unit of UN Environment. This brief provides policy and management recommendations for addressing and reducing the impacts of wastewater on coral reefs, based on current scientific knowledge. It promotes integrated planning and management, awareness-raising, capacity-building and other efforts to improve monitoring of wastewater loading and its impacts, among key stakeholder groups. It is primarily aimed at national and state policymakers.

290 UN Environment through the GPA/Wastewater continues to provide support in the implementation of the UNEA3 resolutions. Inputs on the ongoing activities in support of the implementation of the UNEA3 resolutions related to wastewater were recently shared during a multi-stakeholder brainstorming session on the UNEA3 implementation plan in Paris, 13-14 June 2018.

291 A Massive Open Online Course (MOOC) titled “From Source to Sea to Sustainability. Integrated Cycle in Wastewater and Nutrient Management” was developed by UN Environment/GPA, Concordia University and the Loyola Sustainability Research Centre to raise awareness and build capacity on the two pollution streams.

292 UN Environment, through the GPA/Wastewater and the Global Wastewater Initiative (GW²I) is organizing a series of webinars to enhance the understanding and recognition of wastewater as a resource as well as to expand knowledge generation, awareness raising and outreach on crucial issues related to sustainable wastewater management. The webinars also serve as an opportunity for the members of the Global Wastewater Initiative to share their expertise and experiences regarding critical issues related to sustainable wastewater management. The first webinar titled “The need for innovative financial mechanisms for sustainable wastewater management,” hosted by UN Environment was held on 30 April 2018. A second webinar titled “The impact of land-based pollution on coral reefs: focus on nutrients, plastics and wastewater” was hosted by UN Environment on 24 May 2018.

293 The GPA/Wastewater organized a mini-workshop on the “polluter pays” principle in March 2018. The mini-workshop explored the “polluter pays” principle from different perspectives, which triggered discussions around the benefits and challenges of implementing the principle as well as some possible undertakings for UN Environment.

294 Under the nutrient pollution portfolio, the Secretariat continues to support the Global Partnership on Nutrient Management (GPNM) within UN Environment’s Programme of Work. The GPNM, in collaboration with the GW²I supported through the GPA, delivered a Massive Open

Online Course (MOOC) on nutrients and wastewater management over the first quarter of 2018 to assist in the outreach and availability of web-based resources. Concordia University of Montreal, Canada developed the MOOC sourcebook and online platform, and administered the MOOC roll-out which had an uptake of just over 1,080 registrants from 170 countries.

295 Under the GEF-funded Global Nutrient Cycling (GEF-GNC) Project that is nearing completion, a significant body of knowledge related to quantitative modelling approaches (based on tools such as Global NEWS model), on coastal nutrient enrichment has been generated with several published scientific journal articles available on the topic. Key collaborators to this work included IOC-UNESCO along with University of Utrecht, Washington State University and University of the Philippines. The nutrient load data is fully integrated in a Global Nutrient Management Toolbox that has also been developed under the project, along with a comprehensive suite of best field and policy management practices which is accessible through the Nutrientchallenge.org website. The watershed-based nutrient flux modelling for the Manila Bay watershed led by the Marine Science institute of the University of the Philippines is complete. The work supported the design of watershed BMPs and strategies for addressing nutrient loading into the receiving environment. Specific deliverables included the Environmental Atlas of Manila Bay, the Laguna de Bay ecosystem health report card (Philippines), the Management plan for the Manila Bay and State of Coast reports for provinces surrounding Manila Bay. Under project the Chilika Lake ecosystem health report card (India) was also developed.

296 A collaboration has been established with the World Resource Institute to prepare experience notes on the implementation highlights of the project and market the nutrient management toolbox to global users. GRID-Arendal is being engaged to translate the key scientific outputs from the project to a suite of information products for wider audiences and decision makers in the formats that include information graphics, a map atlas and a story-map that focuses on Manila Bay. The work under the GEF-GNC Project is now being extended to support the development of the SDG 14.1 target indicator on nutrient pollution of the marine environment in collaboration with IOC-UNESCO and other partners under the guide of UN Environment's Science Division.

297 The Global Programme of Action under the nutrient pollution portfolio, in co-operation with the South Asia Cooperative Environment Programme (SACEP), commenced a project in Sri Lanka on reducing the risk of degradation of coral reef ecosystems by addressing nutrient, wastewater and other land-based sources of marine pollution. The project will contribute to strengthening local and regional enabling environments to foster the uptake and adoption of innovative approaches in reducing threats to coral reefs from land-based pollution. This initiative will be contributory to the UNEA2 resolution on the protection of coral reefs and feeds into activities under the 2018 International Year of the Coral Reef.

298 The GEF-funded International Nitrogen Management System (INMS) Project commenced implementation at the start of 2017. The project is a science-policy support process that seeks to develop and merge best policy practice and regional demonstration across the global regions, as a basis to support governments and others in improving nitrogen management and reducing adverse environmental outcomes. Implementation and planning workshops with key technical specialists and country representatives continue, with scenarios modelling approaches taking account of marine impacts of nitrogen influxes.

299 The concern over the impact of climate change related to ocean temperatures and influences on the proliferation and persistence of harmful algal blooms will continue to be tracked under the nutrient management portfolio of the GPA. Efforts will continue toward improving the understanding of the phenomenon through research, while bolstering national measures to reduce nutrient loading (agricultural discharges, municipal wastewater) to the environment require continued, and in some areas, stepped-up attention. The sargassum proliferation events in the Caribbean and West Africa in recent years have been suggested by researchers to be potentially linked to this phenomenon. In the Caribbean, there is collaboration under the Caribbean Large

Marine Ecosystem Project to develop a nutrient management strategy and in the West Africa region under the Abidjan Convention, an alien invasive species response strategy that includes sargassum management has been developed.

300 One of the main focuses of the GPA during the period under review was continued development of the Global Partnership on Marine Litter (GPML) which is a voluntary open-ended partnership for international agencies, governments, businesses, academia, local authorities, and civil society. As well as supporting the Global Partnership on Waste Management, GPML seeks to protect human health and the global environment through several specific objectives, with reduction and management of marine litter as its main goal. UN ENVIRONMENT provides the Secretariat for the GPML in line with the mandate received in the “*Manila Declaration on Furthering the Implementation of the GPA*”, and leads on the focal area on land-based sources of marine litter. FAO and IMO lead the focal area on sea-based sources of marine litter. Much support has been provided to various organizations, including Regional Seas Conventions and Action Plans. Regional nodes for the GPML have been established in the Northwest Pacific, co-hosted by the Northwest Pacific Environmental Cooperation Center and the NOWPAP Secretariat, and the Wider Caribbean Region, hosted by the Gulf and Caribbean Fisheries Institute and the Cartagena Convention Secretariat.

301 The first meeting of the Ad Hoc Open Ended Expert Group was held in United Nations, Nairobi, Kenya from 29 to 31 May 2018. It was attended by 266 participants, representing 72 member States, 9 intergovernmental organizations and 28 observers representing major groups and stakeholders accredited to the United Nations Environment Assembly of the United Nations Environment Programme. The Ad Hoc Open Ended Expert Group was established in response to UNEP/EA.3/Res.7 Marine Litter and Microplastics.

302 As a follow up to the United Nations Environment Assembly (UNEA-1, 2014) resolution 1/6 on Marine plastic debris and microplastics study, which was presented to the Second Session of UNEA (UNEA-2), recommendations for the most urgent of the GESAMP Working Group 40 study focused on to provide guidelines for a harmonised approach for assessment and monitoring of marine plastics and microplastics. The report will be published before the end of the year. These methodologies will be useful for monitoring on SDG 14.1.1.
