



**GESAMP**

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

# FINAL REPORT OF THE 43rd SESSION OF GESAMP

Hosted by UN Environment,  
Nairobi, Kenya

14 to 17 November 2016



IMO



FAO



UNESCO



IOC



WMO



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## EXECUTIVE SUMMARY

**0.1 Introduction:** The Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) held its 43rd session hosted by UN Environment at the UN Headquarters in Kenya, Nairobi, from 14 to 17 November 2016. GESAMP was established in 1969 by a number of United Nations' Organizations as a Joint Group to encourage the independent, interdisciplinary consideration of marine pollution and environmental protection problems with a view to avoiding duplication of efforts within the United Nations system. The main topics considered at this session are described below.

**0.2 Evaluation of the hazards of harmful substances carried by ships (WG 1):** This working group (WG) evaluates, at the request of IMO, the hazards to the environment and human health of bulk liquid chemicals carried by ships, with over 900 hazard profiles currently on record. The hazard profile contains a unique fingerprint of each substance, providing information on 14 separate human health, environmental, and physico-chemical hazard criteria. WG 1 met once since GESAMP 42, evaluating 14 new substances to assign full GESAMP Hazard Profiles. Furthermore, 21 additional substances were re-evaluated. In addition, there is an ongoing review and consolidation of information held in the WG's database that has resulted in a series of updates and amendments to some existing profiles. GESAMP noted the establishment of a WG 1 correspondence group to develop criteria for vapour inhalation hazard ratings in time for the revision of the IBC Code. In addition, a revision of the GESAMP Hazard evaluation Procedure is envisaged.

**0.3 Review of applications for 'active substances' to be used in ballast water management systems (WG 34):** GESAMP noted that the Ballast Water Management Convention will enter into force on 8 September 2017. WG 34 convened twice since GESAMP 42, to discuss and evaluate five ballast water management systems. Of these, one received recommendation for Basic Approval and four received recommendation for Final Approval. GESAMP also agreed that the group's priority should be in focusing its efforts to harmonize Procedure (G9) in relation to the recently concluded review of Guideline (G8). WG 34 also held its seventh stock-taking workshop (STW 7) in September 2015.

**0.4 Atmospheric input of chemicals to the ocean (WG 38):** The WG has published four scientific papers under its new terms of reference, and one more has been submitted, out of seven planned. By the time these papers on atmospheric nitrogen deposition to the ocean are published, a total of 12 peer-reviewed papers will have resulted from the activities of the working group. In 2015, three new WG activities were approved, to: a) investigate the changing acid/basic character of the global atmosphere and ocean; b) investigate the impact of these changes on certain air/sea chemical exchange

processes; and, c) conduct an assessment of the impact of nitrogen on the marine environment as a contribution to the Integrated Nitrogen Management System. GESAMP requested the group to consider producing a summary of his publications arising from the workshop on 'The Atmospheric Deposition of Nitrogen and its Impact on the Marine Biochemistry' and publish it as a GESAMP Reports and Studies series.

**0.5 Establishment of trends in global pollution in coastal environments (WG 39):** The purpose of this WG is to contribute to the reduction of stress in the coastal ecosystem by providing stakeholders, scientists and society with an objective and global assessment of pollution trends over the last century in sensitive coastal ecosystems. The WG has continued its work on the literature survey and compilation of a bibliographic records database. In addition, a pilot web platform has been developed with the aim to host and manage the information contained in the database. A draft substantive report is expected to be prepared for presentation at the 44<sup>th</sup> session of GESAMP in September 2017.

**0.6 Global assessment of (micro)-plastics (WG 40):** The second phase of WG40 was initiated in 2015, with co-sponsorship shared by IOC-UNESCO and UN Environment. Immediately following the 42nd session of GESAMP, an editorial workshop took place at IOC in Paris and a second full workshop was hosted by the Permanent Commission for the South Pacific (CPPS) which took place in the Ore Verde Hotel Guayaquil from 2 to 6 November 2015. The second report of the WG study is expected to be published in late 2016 (GESAMP Reports and Studies No. 93, the first report was published as GESAMP Reports and Studies No. 90). GESAMP noted that further funding will be required to carry out the full agreed work programme following UNEA-2, as the earmarked Norwegian Government support to UN Environment for this activity had expired. The Chairman of WG 40 undertook to further review the ToRs, following the completion of the forthcoming FAO workshop on microplastics and seafood safety, with the intention of these being presented for discussion at the planned ExCom intersessional meeting.

**0.7 Marine geoengineering (WG 41):** This is a newly formed working group which met to discuss how to best build on prior assessments of geoengineering. GESAMP noted that since the last session, new WG had held its inception meeting which took place from 23 to 25 May 2016, at the headquarters of IMO, London, United Kingdom. During the inception meeting, the WG discussed how to best build on prior assessments of geoengineering. The number of metrics that can be used to assess the merits and drawbacks of the various geoengineering approaches has grown, as has an emphasis on a wider more integrated approach to assessment that includes socio-economic, legal and ethical dimensions. Since then, WG 41 had refined the

scoring sheet for assessment criteria and circulated it to the members of the working group to complete. The current knowledge base will permit a robust assessment (with an expanded tenure). GESAMP requested that the UNFCCC is informed of the work of the working group.

**0.8 Contribution to other UN processes:** GESAMP noted the linkages between the work of GESAMP and the priorities identified by UN Environment in relation to the Regional Seas Programme. GESAMP was also informed of other UN processes with respect to environmental protection including the Global Programme of Action for the Protection of the Marine Environment from Land-based Activities, the Sustainable Development Goals, the Regular Process for Global Reporting and Assessment of the State of the Marine Environment including Socio-economic aspects and the recent activities of UN-Oceans.

**0.9 Presentations by observers:** Presentations were given by the Secretariat of the Basel, Rotterdam and Stockholm Conventions and the Nairobi Convention in an effort to explore GESAMP's role at global and regional levels.

**0.10 Side event on 'Environmental aspects of sand mining':** GESAMP and UN Environment organized a special side event. The session, which was attended by approximately 30 people, was intended to showcase the current state of knowledge and identify gaps with respect to the practice of sand mining in coastal and marine environment. GESAMP noted the extensive interest on the issue and agreed to develop a scoping paper in the intersessional period, in collaboration with UN Environment.

**0.12 Identification of new and emerging issues regarding the degradation of the marine environment:** Several potential issues were raised. GESAMP discussed recent developments with respect to emerging pollutants, in particular pharmaceuticals and endocrine disruptors in wastewater effluents. There was concern over the negative impacts these compounds may have on aquatic ecosystems. Consequently, GESAMP agreed to pursue the development of a scoping paper in the intersessional period.

**0.13 Scoping issues:** GESAMP considered proposals for issues that had already been identified as new or emerging issues to be explored in the intersessional period. The following subjects were identified to be developed as scoping papers: the environmental impact of disinfection by-products; the impacts of residues of chronic oil spills; the causes and impacts of massive outbreaks of Sargassum seaweed in the Caribbean, Brazil and West Africa; and the impact of pharmaceutical and other novel chemicals in wastewater .

0.14 GESAMP also continued its discussion on the impact of mine tailings in coastal and marine environments, and agreed to establish Working

Group 42 on the environment impacts of wastes from mining operations disposed at sea (WG 42), under the co-lead of UN Environment and IMO. GESAMP agreed that the WG would start its work focusing on the first term of reference, with a view to providing a first report to the next annual session in 2017.



## 1 INTRODUCTION

1.1 The Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) held its 43rd session from 14 to 17 November 2016, in Nairobi, Kenya, hosted by UN Environment. The session was held under the Chairmanship of Dr. Peter Kershaw, with Dr. Manmohan Sarin as Vice-Chair. The session was preceded by the GESAMP Executive Committee (ExCom) meeting and GESAMP Members' informal meeting both held on 14 November 2016.

### Adoption of the agenda

1.2 The meeting approved the provisional agenda, which is attached as annex 1 to this report. The list of documents submitted to this session is shown in annex 2 to this report and the list of participants in annex 3.

1.3 Ms. Mette Wilkie, Director, Ecosystems Division, UN Environment, welcomed GESAMP to Nairobi and the 43rd session of GESAMP. In her welcoming remarks, Ms. Wilkie highlighted the many areas of collaboration between GESAMP and UN Environment over the years, and pointed to several opportunities for further work in the near future. Welcoming remarks were also provided by Dr. Stefan Micallef, Administrative Secretary of GESAMP, and Mr. Alexander Caldas, officer in charge, Science Division, UN Environment.

1.4 The Chairman expressed GESAMP's gratitude to UN Environment for hosting the session, and for the excellent arrangements made in preparation for the meeting.

## 2 REPORT OF THE CHAIRMAN OF GESAMP

2.1 The main focus of GESAMP, since the 42nd session, had been on the planned activities of the Working Groups. The Chairman noted that continuing support from the UN Sponsoring Organizations, supplemented with funding from other sources, was essential to allow this core work to continue and deliver high quality outputs that were appreciated by the target audience and a much wider user-group. The support from the UN Sponsoring Organizations is greatly appreciated and GESAMP urges that this level of support should be maintained and, if at all possible, increased. The independence, credibility and cost-effectiveness of the GESAMP model are well recognised.

2.2 In recent years inter-sessional correspondence groups have addressed several important issues, to help evaluate whether these are areas GESAMP may wish to develop further. Currently these include:

- .1 bio-magnification of contaminants and potential effects on ecosystem and human health;
- .2 the potential impact of disinfection by-products (DBP) in the marine environment;
- .3 the impacts of mine tailings in the marine environment;
- .4 the impacts of residues of chronic oil spills; and
- .5 *Sargassum* accumulations in the western and eastern mid-Atlantic.

2.3 These are further discussed under section 7.

2.4 GESAMP acknowledged the continuing efficient and enthusiastic support of the GESAMP Office, including the contribution of Mrs. Chrysanthe Kolia as the GESAMP Administrative Coordinator, to provide support for the GESAMP Office. This has provided an opportunity to improve communication and maintenance of the website. The Office continues to receive ad hoc requests for GESAMP advice or support, and it is encouraging to see that GESAMP is seen as a source of reliable information and advice.

2.5 As stated at the 42nd session, GESAMP risks losing the momentum of setting up the Pool of Experts (PoE). Until recently, there has been a lack of resources to maintain the website and the PoE application process. GESAMP needs to decide on whether the present model of maintaining a PoE is appropriate. The Office is open to suggestions as to how the PoE application process and communication with registered experts might be improved.

### GESAMP and the wider international community

2.6 The 17<sup>th</sup> Annual Large Marine Ecosystem (LME) Consultative meeting took place at IOC-UNESCO in Paris (29 September to 2 October 2015). The Chairman took part and contributed to a Panel Discussion on emerging issues in ocean health. It proved a good opportunity to strengthen links with a number of LME and other regional organisations.

2.7 The Chairman received invitations to represent GESAMP at several meetings with a regional focus, including: PICES (North Pacific Marine Science Association); HELCOM (The Baltic Marine Environmental Protection Commission); ROPME (Regional Organisation for Protection of the Marine Environment, the Kuwait Convention); and, the Ny-Ålesund symposium on sustainable development in the Arctic.

2.8 GESAMP has observer status on the PICES Marine Environmental Quality Committee (MEQ), which covers a wide range of marine environment protection issues. MEQ have set up a Study Group on emerging issues, which complements

GESAMP's Emerging Issues programme. The 2015 PICES Annual Science Conference (ASC) took place in Qingdao, eastern China (15 to 23 October). There is growing interest in the work of GESAMP in the PICES community (Canada, China, the Japan, Republic of Korea, the Russian Federation, the United States) and the GESAMP Chairman was invited to give a presentation to the PICES Science Board as well as MEQ. There were several sessions of direct relevance to GESAMP and these have been reported separately. A number of China-based scientists were identified as potential contributors to GESAMP and its working groups. The 2016 PICES ASC would take place after the 43rd session of GESAMP. GESAMP had agreed to co-sponsor a special session on hydrocarbon contamination, but circumstances were likely to rule out GESAMP participation this year.

2.9 The Chairman attended a Stakeholder Conference on marine litter, organised and supported by HELCOM (Helsinki, March 2016). This provided an opportunity to describe the findings of GESAMP WG 40 on microplastics.

2.10 The Chairman took advantage of his attendance at the 2nd United Nations Environment Assembly (UNEA-2, Nairobi, May 2016), and the preceding Science-Policy Forum, to take part in a number of workshops relevant to current GESAMP activities, including marine litter and Sargassum outbreaks. It also presented an opportunity to make or renew contacts with several key international and regional partner organisations, NGOs and national environment ministries. These included a representative of the Basel, Rotterdam and Stockholm Conventions (BRS). Closer ties with the BRS, and equivalent organisations, are most welcome.

2.11 Following UNEA-2, the Chairman was invited to attend the 17<sup>th</sup> meeting of the United Nations Open-ended Consultative Process on Oceans and the Law of the Sea. The topic was 'Marine debris, plastics and micro-plastics'. The Chairman gave a presentation on microplastics, via teleconference, partly based on the outcome of Working Group 40.

2.12 The Chairman is a member of the Steering Committee of the Global Partnership on Marine Litter (GPML), advising UN Environment on its implementation and the potential contribution of GESAMP.

2.13 GESAMP noted the planned UN Conference on Oceans in 2017, to support the implementation of Sustainable Development Goal 14 (SDG 14), as part of the 2030 Agenda for Sustainable Development. GESAMP had been asked to be part of the Advisory Group to the co-hosts of the conference, Fiji and Sweden. The Chairman had attended one meeting by teleconference and was contributing to one of seven informal preparatory working groups preparing background information

to aid the planned partnership dialogue at the Oceans conference. The informal preparatory working group covered pollution (SDG 14.1) and held its first meeting (by teleconference) in early November 2016.

2.14 The Chairman represented GESAMP as an invited speaker at a G7 workshop in (25 to 26 October 2016, Bremen, Germany), hosted by the German Environment Ministry for Environment (BMUB), on '*Widening the scope of the G7 Action Plan to combat marine litter*'. The Chairman gave the opening two presentations. The first was on the UNEA-2 study and the second on advances in scientific knowledge, partly based on the output of WG 40.

### **Action by GESAMP**

2.15 GESAMP continues to be recognised as a source of reliable and impartial science assessment and advice. This accolade can only be maintained if there is sufficient support and financial backing to provide a vibrant programme, providing a cost-effective service for the Agencies and responding to requests from external bodies to contribute GESAMP experience and expertise. There appear to be two components to ensuring GESAMP can thrive: i) for the Sponsoring Organizations to commit to supporting GESAMP both in terms of sponsoring Members to attend the annual Session and offering financial support for working group and other ad hoc activities; and ii) to pursue partnerships between Sponsoring Organizations and external funding bodies such as industry, foundations, intergovernmental bodies, national governments and NGOs.

## **3 REPORT OF THE ADMINISTRATIVE SECRETARY OF GESAMP**

### **Outcome of the meeting of the Executive Committee of GESAMP (ExCom)**

3.1 GESAMP noted that ExCom had met on Monday, 14 November 2016. The main points of discussion are shown in paragraphs 3.2 to 3.3 below.

#### *Funding*

3.2 ExCom discussed the financial and in-kind support, which the nine Sponsoring Organizations of GESAMP committed to support the activities of GESAMP in 2016-2017. ExCom noted that the Sponsoring Organizations present intended to, as a minimum, continue their support to the level of the previous years. The ExCom also discussed outreach to potential additional new Sponsoring Organizations and the development of a new communications and outreach plan.

### *The GESAMP Office*

3.3 The Administrative Secretary informed the meeting of the latest developments in the GESAMP Office, which was established at IMO as a co-sponsoring arrangement between the current Sponsoring Organizations. GESAMP noted that since July 2015, the GESAMP Office had been strengthened with a full time post, providing administrative support and coordination. Since the last session, the main activities of the GESAMP Office, had been the following:

- .1 supporting the activities of the existing working groups of GESAMP, including the various peer review activities;
- .2 implementation of the GESAMP funding strategy, in co-ordination with the Chair of GESAMP;
- .3 assisting in the publication of several GESAMP reports;
- .4 maintenance of the GESAMP website;
- .5 development of a communications plan; and
- .6 preparation of the current session of GESAMP.

### **Activities and achievements of the Sponsoring Organizations of GESAMP since its last session**

3.4 GESAMP considered the Administrative Secretary's report (GESAMP 43/3). The Administrative Secretary also presented an overview of the activities and achievements of the Sponsoring Organizations of GESAMP since GESAMP 42 in 2015. The highlights of these achievements are reported in detail in annex 4 to this report.

3.5 The Administrative Secretary emphasized that there were several on-going UN-wide processes and mechanisms that involved most, if not all of the Sponsoring Organizations. For example (for further discussion of several of these, see section 5 below):

- .1 the Preparatory Committee Established by the UN General Assembly for the Development of an international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction;
- .2 the Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects (Regular Process) and the First World Ocean Assessment;
- .3 the 2030 Agenda for Sustainable Development and the Sustainable Development Goals;

- .4 the UN Environment Management Group (EMG); and
- .5 UN-Oceans.

## **4 PLANNING OF GESAMP ACTIVITIES**

### **4.1 Evaluation of the hazards of harmful substances carried by ships (WG 1)**

4.1.1 A report of the activities of Working Group 1 (WG 1) was given by Dr. Thomas Höfer, Chairman of the Working Group.

4.1.2 GESAMP noted that since the last meeting of GESAMP, WG 1 had met once. The 53rd session (EHS 53) was held in May 2016. The full report has been circulated as IMO circular PPR.1/Circ.3.

#### *Main use of GESAMP/EHS outputs*

4.1.3 The GESAMP Hazard Profiles (GHP) developed by Working Group 1:

- .1 contain a unique fingerprint for each substance, providing information on fourteen separate human health, environmental and physico-chemical hazard criteria and consist of an alphanumeric notation designed to communicate the hazards;
- .2 are published by IMO annually as the GESAMP Composite List (circulated together with the meeting report as a PPR.1/Circular), which are placed on the IMO website for the use of maritime Administrations, the shipping industry and chemical manufacturers; and
- .3 provide the basis for the pollution categorization of over 900 substances. MARPOL Annex II and the International Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk (IBC Code) utilise these profiles to determine the pollution category, ship type and carriage conditions for each chemical, for the purposes of bulk carriage in ships.

4.1.4 GESAMP noted that Member State Administrations and IMO bodies assign carriage requirements for the transport of bulk liquids based on these GESAMP hazard ratings. The use of the GESAMP Hazard Profiles (GHP) has increased. This is not limited to pollution hazards, but now also covers ship safety and occupational health aspects. It was also noted that historically there has been no direct reference to GHP ratings in Chapter 21 of the IBC Code, which sets out the criteria for assigning carriage conditions for bulk liquid transport. However, the latest draft version of the Chapter 21 of the IBC Code makes direct reference to GHP ratings for all carriage conditions requiring an evaluation of hazards to human and environmental

health. It is expected that the amendments to the IBC Code, with these new references to the hazard ratings, will be adopted next year and will enter into force by 2020.

#### *Guidance on evaluation and hazard rating*

4.1.5 The updated criteria and guidance for undertaking the hazard evaluations and assigning hazard profiles was published in 2015 as the 2nd Edition of GESAMP Reports and Studies No.64 "Revised GESAMP Hazard Evaluation Procedure for Chemical Substances Carried by Ships". This is now used globally for assigning carriage requirements for bulk liquid cargoes transported by ship.

4.1.6 The ongoing work on revising Chapter 21 of the IBC Code, which updates the hazard classification criteria used for assigning carriage requirements, presents new challenges for the GESAMP Hazard Evaluation Procedure. The new Code of Safe Practice for the Carriage of Cargoes and Persons by Offshore Supply Vessels (OSV Code), which is currently under review and will become a mandatory requirement, once finalized, includes direct reference to the IBC Code, including the GESAMP Hazard Profile. Whereas the IBC Code asks for a more sophisticated evaluation of the inhalation hazard, the offshore supply regulation relies heavily on a realistic scientific evaluation of mineral slurries.

4.1.7 GESAMP noted that a scientific evaluation of the flammability hazard within the GESAMP Hazard Profile would be a useful addition, for use by the IMO Working Group on the Evaluation of Safety and Pollution Hazards of Chemicals (ESPH). Although the GESAMP/EHS Working Group evaluates the scientific data, no flammability rating is included as part of the GHP, as of today.

4.1.8 Similar challenges resulting from the use of the GESAMP Hazard Profile for spill response were already noted in recent years and were reported to GESAMP 42 in document GESAMP 42/4.

4.1.9 Taking these issues into account, it was noted that WG 1 had initiated discussions on possible future amendments to the existing guidance to cover these issues:

- .1 inhalation toxicity: In essence, the future IBC Code will ask for separate evaluations and ratings for aerosols/mists and vapours/gases. One option considered was to divide the existing C3 column, which at present only covers aerosol toxicity, into sub-categories to provide ratings for exposure to both vapours and mists. The criteria for assessing such hazards would have to be in line with the revised IBC Code criteria and the criteria set out in the United Nations Globally Harmonized System of Classification and Labelling of Chemicals (GHS).

- .2 flammability hazard: The group considered the possibility of adding a hazard rating column to capture information on flammability. In discussing a possible way forward, the group noted that there were a number of properties associated with flammability, such as flashpoint, auto-ignition temperature and explosive/flammability range, and agreed that more dialogue was needed to determine the most suitable way to include such information in the hazard profile.

- .3 inorganic substances and slurries: Today, there is no standardized international approach for the classification of minerals with respect to bioaccumulation / biomagnification nor any substitute defined for biodegradation. This type of evaluation is particularly challenging for the aquatic marine environment. The group noted that any amendment in this area will need more discussion to scope out the issue.

4.1.10 WG 1 had agreed to consider the first two matters in more detail intersessionally via correspondence and to revisit the topic at EHS 54. The group agreed to place the third matter in abeyance for the time being and revisit the topic at a future meeting.

4.1.11 GESAMP noted that the IMO ESPH Working Group of the Sub-Committee on Pollution Prevention and Response (PPR) published its report PPR 4/3 requesting the WG 1 to address the amendment to the methodology concerning the vapour inhalation hazard as a matter of priority – noting the timeline of the revision of the IBC Code by IMO. The first new hazard evaluations and hazard ratings should therefore be already available by late 2018.

#### *Evaluation of new substances*

4.1.12 As part of the routine work of WG 1, fourteen new substances were reviewed and full GESAMP Hazard Profiles assigned, accordingly. Based on correspondence with industry, 21 additional substances were re-evaluated, with either modification or reconfirmation of the existing GHPs, based on consideration of new data.

#### *Mineral oils*

4.1.13 GESAMP was informed that, in general, it does not evaluate products that are covered under MARPOL Annex I, notably petroleum products. However, it has, on occasion, generated GESAMP Hazard Profiles for some petroleum products, at the request of the ESPH working group, in particular for Gasoline/Petrol and Diesel (automotive). These were published in the report of GESAMP/EHS 47 (BLG.1/ Circ.30), but were not included in the GESAMP Composite List. The group noted, however, that the GESAMP Composite List did contain GESAMP Hazard Profiles for some petroleum products, such as Pyrolysis gasoline and White Spirit, which are oil distillation fractions, like gasoline and diesel oil.

4.1.14 WG 1, having noted the request made by ESPH at PPR 3 to review the mineral oils for the purposes of the mixture calculation, considered how to undertake this work. Mineral oils are often included as a component in mixtures that are classified and shipped under MARPOL Annex II, which regulates the transport of bulk liquid chemicals. Currently, the assignment of carriage requirements for mixtures is determined using a mixture calculation and, when these include mineral oil, a set component factor (according to guidance by MEPC.1/Circ.512) is assigned to the mineral oil component for the purposes of the calculation under the IMO regulation. This factor, however, is not based on a scientific evaluation of the specific type of “mineral oil”.

4.1.15 In considering the request by ESPH to review mineral oils for the purposes of the mixture calculation, WG 1 had noted that “mineral oils” represented a large number of substances with widely differing characteristics (variable toxicity, properties and behavior) and that a review of such substances would require significant time and effort. Based on an informal thought starter paper by the chairman, the group suggested that the CONCAWE categorization of mineral oils may be a helpful reference for identifying the specific mineral oils to be considered.

#### *Paraffins*

4.1.16 Because of the high number of routine evaluations of new products, WG 1 could only discuss some fundamental issues concerning the review of the family of alkanes which had been started during EHS 52 (see GESAMP 42/4). The group had already noted that in particular high-viscosity paraffins transported as pure chemicals and as crude products from the mineral oil refinery process will need detailed hazard assessments.

4.1.17 Having considered the information on various paraffins, WG 1 noted that the naming of the paraffin products set out in the Composite List and in the IBC Code were not consistent with the names used by the industry. In addition, it was observed that the technical data available from industry for paraffins were not always consistent with the ratings assigned by the group, set out in the Composite List. Based on the information considered, the group concluded that there were four possible groupings for paraffins that could be correlated with the CONCAWE categories.

4.1.18 Having concurred that further work was needed, WG 1 agreed to revisit the topic at EHS 54 in 2017. The group also instructed the Chairman to prepare a paper for submission to ESPH 22 clarifying the issue, noting the work of ESPH on amendments to MARPOL Annex II related to the discharge of high-viscosity solidifying and persistent floating products. This document, submitted by the IMO Secretariat (document ESPH 22/2) was well

received by the ESPH WG which took on board the proposal from WG 1. The report of the ESPH WG requested the industry to submit information accordingly.

#### *Membership issues*

4.1.19 GESAMP noted that WG 1 had welcomed an additional toxicologist as a guest with a view to joining the group.

#### *Funding issues*

4.1.20 GESAMP recalled that funding of WG 1 was based on a fixed fee, which is charged for each new product evaluation. It was noted, however, that to date no additional fees were applied for cases where some follow-up action was needed on a specific issue, for example, to clarify study methodology details or where the GESAMP/EHS experts had questioned particular test results.

4.1.21 Following discussion at GESAMP 42, GESAMP noted that it was important that the WG remains on a solid and self-sustaining financial footing in order to ensure no interruptions in the regulatory flow of which WG 1 is a pivotal part, and that IMO may wish to consider that the system of fees is kept under review to reflect the workload.

4.1.22 The Working Group on the Evaluation of Safety and Pollution Hazards of Chemicals (ESPH 21) was of the view that it was premature to initiate any action and therefore agreed to request WG1 to continue monitoring this issue and report back to ESPH, as appropriate. PPR noted this outcome.

#### **Action by GESAMP**

4.1.23 GESAMP noted the challenges concerning the introduction of additional hazard criteria for assessing the hazards of human vapour exposure. As the experts in WG1 are already evaluating these inhalation toxicity data without assigning a rating, any additional capacity would not be needed for the Working Group. GESAMP also noted that members of WG 1 established a correspondence group, which is in the process of developing criteria for assigning vapour inhalation hazard ratings and an associated guidance document. The chairman of the WG 1 is planning to finalize that work as a matter of priority at the next meeting in May 2017, endeavouring with the timeline of the revision of the IBC Code as requested by IMO.

4.1.24 Following discussion, GESAMP agreed to the introduction of an additional column in the GESAMP Hazard Profile. When finalized, the amended parts of the hazard evaluation procedure should be published as an IMO circular, providing the reasoning behind the introduction of this new column, scientific guidance and the additional hazard ratings. At a later stage and after finishing the work on further amendments to the methodology

(e.g. concerning the flammability hazard) a revision of the GESAMP Hazard Evaluation Procedure as published in Report and Studies No. 64 should be envisaged.

4.1.25 It was discussed whether a risk based approach including the evaluation of the hazards and the potential exposure could add value to the work. GESAMP agreed to continue the assessment of the hazards of chemical substances only as required by IMO regulations for the transport of bulk liquids. However, it was noted that the group had been requested in the past to include an exposure related rating. GESAMP noted that column E3 of the GESAMP Hazard Profile provides guidance in case of an exposure of the coast following an accidental chemical spill. This data provides information and guidance with respect to closure of beaches in the event of chemical contamination, based on a worst case exposure scenario.

## **4.2 Review of applications for 'active substances' to be used in Ballast Water Management systems (WG 34)**

4.2.1 A report of the activities of WG 34 was given by Mr. Jan Linders, Chairman of the Working Group.

4.2.2 GESAMP noted the Ballast Water Management 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 entry into force conditions of the BWM Convention were met on 8 September 2016 by the accession of Finland and the Convention will therefore enter into force on 8 September 2017. The number of Contracting Governments was, as of 14 November 2016, 53, representing 53.28% of the world's merchant fleet tonnage.

4.2.3 Within this framework, an approval procedure has been set up for those ballast water management systems which make use of an Active Substance or Preparation to comply with the Convention. The procedure consists of a two-step approach for granting Basic Approval and Final Approval. The approval is granted by the Marine Environment Protection Committee (MEPC) based on the advice provided by the Ballast Water Working Group of the GESAMP (WG 34). There is a third step, the type approval, but that is outside the remit of WG 34.

4.2.4 The more general outline, scope and aim of the BWM Convention have been addressed in the report to the GESAMP 35 (see document GESAMP 35/5/1) and will only be referred to here. As the terms of reference of WG 34 have not changed, several parts of this report have been kept unchanged

4.2.5 The report of the Chairman of WG 34 therefore report focused on the main activities of working group, which consist of the evaluation of several ballast water management systems (hereafter BWMS) and the further development of the Methodology of the group, which has been accepted as a 'living' document. This means that the Methodology will be a discussion item at (almost) each meeting of the group and changes and improvements are made, as appropriate (see further below).

### *'Active Substances'*

4.2.6 'Active Substances' are defined by the Convention as "substances or organisms, including a virus or a fungus that have a general or specific action on or against harmful aquatic organisms and pathogens" and the approval of BWMS using such substances is described in resolution MEPC.169(57) adopted in 2008. However, not only 'Active Substances' are evaluated by the WG 34. Also all other substances considered relevant are taken into account in the evaluation report. The Procedure for approval of ballast water management systems that make use of Active Substances (G9) contained in resolution MEPC.169(57) under the BWM Convention distinguishes also 'Relevant Chemicals' and 'Other Chemicals'.

4.2.7 Therefore, WG 34's task is to evaluate the risks for the crew, the ships' safety, the risk for the public at large and the environmental safety of the BWMS. It is furthermore the intention of WG 34 to perform these evaluations in a consequent, consistent and transparent manner, which helps Administrations to prepare a concise dossier, containing all the necessary data. The Methodology, as developed by WG 34 in the course of its work process, serves as guidance in the evaluation.

4.2.8 WG 34 convened two times since GESAMP 42 to evaluate proposed BWMS. Furthermore the WG is holding regular stocktaking workshops to discuss items related to the Methodology; the 7th stocktaking workshop was held the week after GESAMP 42 and therefore will be reported to GESAMP 43 as well. During the two WG 34 meetings five BWMS were discussed and evaluated. Of these BWMS, one received a recommendation for Basic Approval and four received a recommendation for Final Approval. During its meetings in April and October 2016, MEPC agreed with the recommendations of WG 34 in all cases and granted the approvals accordingly.

4.2.9 WG 34 was able to clear the whole stock of BWMS submitted for evaluation before the meeting of MEPC for which the evaluation was requested. The group recognized that the number of BWMS presented to the group have been less than in other reporting periods. It is expected that this has close relation to the ongoing process in IMO to modify

Guidelines (G8) for receiving type approval from Administration (see paragraph 4.2.12)<sup>1</sup>.

#### *Methodology for information gathering and the conduct of work of WG 34*

4.2.10 The evaluation Methodology of WG 34 has been determined to be a living document based on increasing experience in the evaluation of BWMS. During six Stocktaking Workshops WG 34 further developed the Methodology by adding 1) quantitative methods for the evaluation of human risk assessment including exposure assessment for professionals and the general public, 2) quantitative assessment of the environmental effects by using a specific ballast water model, MAMPEC-BW 3.0.1 and 3) finalization of the second version of the database for 41 specific chemicals, including AS and neutralizer frequently used in BWMSs and disinfection byproducts (DBP) frequently observed in which the physico-chemical data, the toxicological data and the environmental fate and effect data are included. For these 41 substances the applicants of BWMS do not have to submit the data mentioned to IMO anymore as the group is of the opinion that all and sufficient, relevant information is already available. All physicochemical data of 41 chemicals has already been included in the MAMPECBW, version 3.0.1.

4.2.11 The group also developed an electronic tool for the calculation of several risk quotients, e.g. for human health and the environment, to support the work of the group. This tool, originally developed in Microsoft Access, has now been transposed to the IMO toolbox GISIS (Global Integrated Shipping Information System) with the intention to make it available for all stakeholders. The group is currently testing the new tool in the new environment.

4.2.12 In 2014, MEPC had started its work to review the Guidelines for approval of ballast water management systems (G8) (resolution MEPC.174(58)), which is used for evaluating biological efficacy and granting type approval by National Administrations. This is the second amendment of Guidelines (G8), which may include the changes of test water conditions (salinity, DOC, POC and TSS), tank holding times (less than 5 days may be accepted) and evaluation of efficacy under extreme conditions. Although, the purpose of the review is to seek more accuracy on the evaluation of biological efficacy in ballast water treated by BWMS, the test water and treated water will be also used for evaluation in accordance with Procedure (G9). Therefore, there is a need to develop a uniform approach across the Guidelines (G8) and the Methodology in several areas. WG 34 has been formally attending the correspondence group for

the review of Guidelines (G8) in order to contribute to achieving such a uniform approach.

4.2.13 With respect to aiming at achieving a uniform approach the group identified 2 areas where the further discussion will focus upon:

- .1 tank holding time; according to a decision of MEPC 69, the tank holding time for the evaluation of the biological efficacy may be variable, whilst for the determination of the worst-case concentration of disinfection by-products a storage time of 5 days should be more appropriate.
- .2 safety aspects; WG 34 favours a risk assessment approach for all relevant chemicals that are commonly associated with BWMS, e.g. the chemicals in the GESAMP-BWWG database, referred to under point 9. However, in the most recent proposals of the correspondence group, a hazard approach is preferred if relevant Administrations assess risks on safety. In such an approach the exposure to the chemicals is not considered, only the hazard.

4.2.14 WG 34 held its 7th STW from 7 to 10 September 2015 at IMO Headquarters in London, which was one week after GESAMP 42. The group had to decide based on the heavy agenda at IMO with respect to several meetings that it was not opportune to organise STW8 during 2016 but to postpone it to 2017. A draft agenda was not yet available.

#### *Planning ahead*

4.2.15 The deadline for the submission of proposals for approval of BWMS to MEPC 71 was on 21 October 2016 and 3 applications were received. WG 34 scheduled a meeting to accommodate those applications: BWWG 34 from 5 to 9 December 2016. In addition, due to a number of requests by the MEPC for the Group to consider specific matters urgently and report to MEPC 71, the Group scheduled its 8th Stocktaking Workshop from 6 to 10 February 2017. Both meetings (BWWG 34 and STW8) are foreseen to be held at IMO Headquarters in London.

#### *Acknowledgement*

4.2.16 WG 34 is very thankful to all the members of GESAMP that took the time to critically review the work of WG 34. The quality of the work has been improved as a result from this peer review process and the comments made were brought to the attention of the consultant involved in the drafting of the reports.

<sup>1</sup> Since then, the Convention has met its entry into force criteria, and will enter into force on 8 September 2017

### *Other issues*

4.2.17 GESAMP discussed how potentially sensitive organisms were protected by the risk assessment method used by the WG 34. It was explained that it is not possible to protect all individual organisms potentially exposed. The Chairman of the WG explained that the margin of safety used provide in the worse-case risk approach is to the opinion of the WG sufficient to take care of a reasonable conviction that the discharge of treated ballast water will not have unacceptable effects on the receiving ecosystems.

4.2.18 GESAMP noted that WG 34 had previously lost members due to potential conflict of interest. It was stressed that a common approach by GESAMP would help addressing any such issues, not only in WG 34, but in any future GESAMP working groups as well. A possible means to achieve this was to request working group members to sign a declaration of conflict of interest together with the declaration of confidentiality, as is the case for WG 1.

4.2.19 GESAMP noted a recent letter published in *Nature* (*Nature* 539, 31 (2016)) on the potential effects of discharged ballast water to aquaculture, within the framework of the BWM Convention. In the letter GESAMP was mentioned as a possible forum to advice on the way forward to address such issues. GESAMP concluded that the matters raised in the letter were related to the implementation of the BWM Convention and therefore the issue was not for GESAMP but should be brought to IMO and to MEPC in particular.

### **Action by GESAMP**

4.2.20 Following discussion, GESAMP 43 reiterated the need for the publication of the Methodology of WG 34 in the Reports and Studies series in the near future and preferably before the next session of GESAMP in 2017. However, GESAMP also agreed on the prioritization made by the WG to first focus its efforts to harmonize Procedure (G9), in relation to the recently concluded review of Guideline (G8).

4.2.21 With respect to the issue of possible conflicts of interest by WG members, GESAMP agreed that this was of utmost importance for the independency, credibility and transparency of GESAMP and all its working groups, and that a harmonized approach would be desirable. GESAMP also recognized that the needs and modalities may differ somewhat between the various working groups, depending on the subject matter and working group arrangements. GESAMP therefore requested all Sponsoring Organizations, and in particular those leading working groups, to establish appropriate mechanisms for the identification of possible conflicts of interest, as appropriate for each working group. It was further agreed to revise the template for the development

of terms of reference for new GESAMP working groups to include the identification of possible conflicts of interest, as attached at annex 6 to this report.

### **4.3 Atmospheric input of chemicals to the ocean (WG 38)**

4.3.1 A report of the activities of Working Group 38 was presented by Dr. Alex Baker, Member of GESAMP and the working group. WG 38 was first established in 2008 due to growing concern about the impact of atmospheric deposition of both natural and anthropogenic substances on ocean chemistry, biology, and biogeochemistry as well as climate. The success of this WG in delivering high level assessment and peer-reviewed publications on the atmospheric input of chemicals to the ocean has contributed to the advancement of knowledge and increasing recognition of these impacts.

4.3.2 WG 38 has held meetings at the University of Arizona, Tucson, Arizona, United States, in 2008, at IMO in London in 2010, in Malta in 2011, and at the University of East Anglia, Norwich, United Kingdom in 2013. Sponsors of those WG 38 efforts have included WMO, IMO, SCOR, Sida, the European Commission Joint Research Centre, the University of Arizona, the International Environment Institute at the University of Malta, the University of East Anglia, and the US National Science Foundation. Following the initial terms of reference and the above-mentioned meetings, five scientific papers were published in the peer-reviewed scientific literature. These can be found in <http://www.gesamp.org/work-programme/workgroups/working-group-38/publications>.

4.3.3 During and following GESAMP 39, new terms of reference for the continued work of GESAMP WG 38 were approved to address issues related to the impact of the atmospheric deposition of anthropogenic nitrogen to the ocean. To address these new terms of reference, a workshop on "The Atmospheric Deposition of Nitrogen and its Impact on Marine Biogeochemistry" was held at the University of East Anglia in Norwich, United Kingdom, from 11 to 14 February 2013. As an outcome of the discussions on each task of the new Terms of Reference, seven scientific papers were planned.

4.3.4 Four scientific papers have been published, one has been submitted for publication and two additional papers are still in preparation and will be submitted for publication before the end of 2016. The one paper currently under review is a major summary on our current understanding of the impact of atmospheric nitrogen deposition on marine biogeochemical cycling, led by Prof. Timothy Jickells. One of the papers that will be submitted for publication soon, led by Dr. Alex Baker, has compared observation and model-based estimates of atmospheric nitrogen deposition to the ocean. Dr. Baker presented preliminary results of these two



studies at GESAMP 43. Once the final two papers are published, a total of 12 peer-reviewed papers will have resulted from the activities of GESAMP WG 38.

4.3.5 For the third year in a row, WG 38 organized a session on atmospheric input of chemicals to the ocean for the 2016 EGU meeting, held in Vienna, Austria in April 2016, titled "Air-sea Exchanges: Impacts on Biogeochemistry and Climate". A number of oral and poster papers at this session were presented by a combination of WG 38 members and other scientists. WG 38 member Maria Kanakidou was honored by being awarded the Vilhelm Bjerknes Medal, and she presented the medal lecture as part of this symposium.

4.3.6 Robert Duce, as co-chairman of WG 38, participated in the 3rd meeting of WMO's Environmental Pollution and Atmospheric Chemistry Scientific Steering Committee (EPAC SSC), held in Geneva in March, 2016. Tim Jickells, Robert Duce, and Alex Baker represented WG 38 at the WMO/GAW International Workshop on the Nitrogen Cycle in April, 2016, presenting three papers on various WG 38 efforts on nitrogen inputs to the ocean.

4.3.7 At GESAMP's 42nd session held at IOC in Paris in September, 2015, GESAMP members approved two new activities for WG 38 to investigate the changing acid/base character of the global atmosphere and ocean and the impact of these changes on certain air/sea chemical exchange processes. One activity, "Changing Atmospheric Acidity and the Oceanic Solubility of Nutrients", will focus on how the changing atmospheric acidity will affect the solubility, and thus bioavailability, of aerosol-derived nutrients such as iron and phosphorus when they are deposited in the ocean from the atmosphere. The terms of reference are as follows:

- .1 review and synthesize the current scientific information on the solubility of aerosol-associated key biogeochemical elements, the biogeochemical controls on aerosol solubility, and the pH sensitivity of those controls;
- .2 consider the likely changes in solubility of key species into the future and the potential biogeochemical consequences of such changes;
- .3 identify the key future research needs to reduce uncertainties in predictive capability in this area;
- .4 publish the results of this activity in the open peer-reviewed scientific literature; and;
- .5 interact with, and provide information to, leading relevant international groups including the Future Earth core projects SOLAS, IGAC and IMBER; SCOR, particularly its GEOTRACES program; and WMO programs such as GAW.

4.3.8 The second activity, "Impact of Ocean Acidification on Fluxes of non-CO<sub>2</sub> Climate-Active Species", will focus on the impacts of ocean acidification on the oceanic sources of a range of non-CO<sub>2</sub> gaseous species, as well as aerosol precursors that are influential in regulating radiative forcing, atmospheric oxidizing capacity and atmospheric chemistry. The terms of reference are as follows:

- .1 review and synthesize the current science on the direct impacts of ocean acidification on marine emissions to the atmosphere of key species important for climate, and atmospheric chemistry;
- .2 identify the primary needs for new research to improve process understanding and to quantify the impact of ocean acidification on these marine fluxes (i.e., provide recommendations on the specific laboratory process studies, field measurements and model analyses needed to support targeted research activities on this topic);
- .3 publish the results of this activity in the open peer-reviewed scientific literature; and;
- .4 provide input to and interact with national and international research programs on ocean acidification (e.g., UKOA, NOAA-OAP) and with relevant WMO programs (e.g., Global Atmosphere Watch (GAW)) to build on their recent relevant activity in achieving the above objectives.

4.3.9 These two activities will be largely implemented via two workshops to be held simultaneously at the University of East Anglia (UEA) in Norwich, United Kingdom from 27 February through 2 March, 2017. The group noted potential synergies between these two workshops, and individuals will have the opportunity to attend some sessions of both workshops. The group had obtained financial support for these workshops from WMO, IMO, SCOR, the US National Science Foundation (NSF), UEA. SOLAS is also sponsoring these workshops. The group expected a total of about 30 people to attend these by-invitation-only workshops, and detailed plans have been developed and participants invited.

4.3.10 A third upcoming activity of WG 38, also approved at GESAMP's 42nd session, is an assessment of the impact of nitrogen on the marine environment as a contribution to the Integrated Nitrogen Management System (INMS). INMS is a global targeted research project with the aim to provide clear scientific evidence to inform future international nitrogen policy development. WG 38 is in an excellent position to bring together observational scientists and atmospheric modelling groups to address these issues. Funding for this effort would come from the INMS.

4.3.11 The work of WG 38 is strongly linked to that of WMO's Global Atmosphere Watch Programme (GAW). In 2017, GAW's Scientific Advisory Group on Total Atmospheric Deposition will hold a workshop titled "Measurement-Model Fusion for Global Total Atmospheric Deposition" (28 February to 2 March, Geneva). The goal of the workshop is to review the state-of-the-science and establish a project on measurement-model fusion approaches for the purpose of generating global maps of total atmospheric deposition, as well as ambient gases and particles. GAW's workshop will be held during the same week as WG 38's workshops, however, WG 38 will participate remotely.

#### **Action by GESAMP**

4.3.12 The Chairman of GESAMP expressed appreciation for the high-level output and academic excellence of WG 38.

4.3.13 GESAMP requested WG 38 to consider producing a summary of the working groups publications arising from the "The Atmospheric Deposition of Nitrogen and its Impact on Marine Biogeochemistry" workshop, and to publish it as in the GESAMP Reports and Studies series.

#### **4.4 Establishment of trends in global pollution in coastal environments (WG 39)**

4.4.1 A report of Working Group 39 (WG 39) was given by Dr. Michail Angelidis, IAEA Technical Secretary for GESAMP. He recalled that the purpose of WG 39 is to contribute to the reduction of stress in coastal ecosystems by providing stakeholders, scientists and society with an objective and global assessment of pollution trends during the last century in sensitive coastal ecosystems. At the request of IAEA, the WG 39 looks at the establishment of trends in global pollution in coastal environments.

4.4.2 GESAMP recalled that in the third quarter of 2015, IAEA and the GESAMP Office provided funds to support the digitization work of WG 39. Currently UNINMAR-UNAM has completed the analysis of the available literature within the current total of 66 LMEs (328 articles from 50 LMEs; 16 LMEs do not have any study report available), the digitization of the graphs (871 sediment cores) and the compilation a total of 58,006 geo-chrono-referenced data. The information available for each sediment core includes the metadata corresponding to the bibliographic source, sampling location and contaminant (family and contaminant type) and the contaminant concentrations in relationship with the sediment dating. The information is now available in the UNINMAR-UNAM database for data analysis and preparation of the final report by the members of WG 39.

#### **Action by GESAMP**

4.4.3 Having reviewed the road map for the finalization of the work of WG 39, which was prepared by the WG 39 Chair, GESAMP requested that a draft substantive report be prepared for presentation at GESAMP 44 (4 to 8 September 2017), containing the results of the study. It was noted that both the GESAMP Chairman and Vice-Chairman have expertise in this area of science and that they were willing to assist with the report preparation.

#### **4.5 Sources, fate and effects of microplastics in the environment: a global assessment (WG 40)**

4.5.1 A report of the activities of WG 40 was given by Dr. Peter Kershaw, Co-chair of the Working Group. The WG has 10 ToRs to be addressed in two phases. The second phase was initiated in 2015, with co-sponsorship shared by IOC-UNESCO and UN Environment. Immediately following the 42nd session of GESAMP, an editorial workshop took place at IOC in Paris and a second full workshop was hosted by the Permanent Commission for the South Pacific (CPPS) and took place in the Ore Verde Hotel Guayaquil from 2 to 6 November 2015. WG 40 includes 28 WG members from sixteen countries, spreading over six continents and covering a wide range of natural science and social science disciplines, including psychology and economics. The second report of the WG study is expected to be published in late 2016 (GESAMP Reports and Studies No. 93, the first report was published as GESAMP Reports and Studies No. 90). The work done for this second volume contributed to the study on marine plastics and microplastics prepared for the UNEA-2, with support from Norway via UNEP.

4.5.2 GESAMP noted that in terms of social science aspects, there is a lack of information about the level of knowledge that the general public, the many sectors involved, international bodies and policymakers, have about microplastics. There is also a lack of knowledge about the level of understanding of risk in general by the public and microplastics in particular. The core knowledge gap as regards economics is the difficulty in estimating the costs of impacts of microplastics with the current level of (lack of) knowledge on the health and ecosystem impacts of microplastics. Also, at present there is a lack an adequate understanding of the costs of marine litter, the cost-effectiveness of actions, motivations for action and hence the potential of measures to tackle marine litter.

4.5.3 FAO informed the meeting that, with the support of UN Environment, a technical paper on "Microplastics in Fisheries and Aquaculture: Occurrences and Impacts" is under preparation. The publication will focus on the microplastics exposure of fish, fishery and aquaculture resources and fish

consumers. The draft will be discussed during a workshop to be held in Rome from 5 to 8 December 2016. The participating experts will contribute to discussions on ecological effects on fish and fishery and aquaculture resources, as well as the elaboration of a risk profiling for selected seafood species. Sampling techniques and protocols of relevance for the fisheries and aquaculture sector will also be discussed. Finally, the workshop will elaborate a set of recommendations and best practices to manage the possible impact of microplastics in fish products.

4.5.4 Although the FAO technical paper expands on chapter 5 of GESAMP Reports and Studies No. 90, it was noted that it is not meant to be a duplication of the most recent GESAMP report. In addition, it should be recognized that there is a strong geographical unbalance among the invited experts, due to the difficulty in finding experts on these matters in developing countries. Moreover, regional information on microplastics hotspots and concentration (in particular to determine exposure of fishery and aquaculture resources) would be a valuable contribution to the work FAO is trying to achieve. The meeting was invited to provide any suggestion or contact that could facilitate FAO's work. FAO extended their thanks GESAMP and in particular WG 40 for their efforts and advice.

4.5.5 GESAMP acknowledged the value, coordination and complementarity of the FAO effort and also encouraged sponsoring agencies ideally to strengthen GESAMP activities by injecting their resources into the GESAMP mechanism rather than as parallel activities, all with the view to for GESAMP to deliver as complete and substantial products to its Sponsoring Organizations as possible.

4.5.6 GESAMP reviewed the ToRs for the second phase which prioritizes the individual ToRs with respect to what can be achieved by the current expertise in the WG and the current funding commitment.

4.5.7 GESAMP was briefed about the discussions of the Parties to the LP/LC on the issue of fiberglass vessels and their destiny when no longer in use. These vessels are often left abandoned or sunk and therefore eventually disintegrates and become a type of macro and microplastic in the ocean, in particular in areas with no possibilities for recycling or other means of waste management, such as SIDS. GESAMP noted that this issue might be addressed under WG 40 ToR Number 4 when identifying hot spots as the problem with glass fibre vessels is specific to certain regions where no facilities for disposal/destruction exist.

4.5.8 GESAMP discussed and recognized the need for harmonized data sampling on microplastic/marine litter. Countries need to meet standards (e.g. EU) and there is already in such for a demand for harmonized methodologies. It is included in the

revised ToRs to review current practices and give guidelines on good practice GESAMP considered if, for example, IOC Manual & Guides Series would be a potential appropriate mechanism to publish and disseminate such Guidelines. The WG was invited to explore this and similar relevant possibilities for publication and dissemination.

4.5.9 GESAMP recognized that better definition of microplastic (size definition) is in the ToRs of WG40 and continues to be so as there has been a priority focus during first phase to answer the specific request and deliver a report on this to UNEA-2.

4.5.10 GESAMP agreed to a continued focus on health impacts and cost aspects, but noted that WG40 is primarily advising on research priorities whereas the report to UNEA focused more on the management aspects. GESAMP concluded that microplastics cannot be removed from the ocean – prevention is the key. The revised WG40 ToRs reflect that the WG in its second phase may go beyond the requests of UNEA to include reviewing methodologies for sampling to e.g. developing risk profiles and that the WG40 membership can be adapted to address the expanded issues. However, this is provided the sponsoring agencies will be able to provide sufficient support.

4.5.11 GESAMP noted that, in recent correspondence with the GESAMP Chairman, IMarEST was in the process of setting up a Special Interest Group (SIG) on marine pollution, which was expected to cover several areas of mutual interest. IMarEST had also expressed interest in setting up an additional SIG on microplastics in support of WG 40.

### **Action by GESAMP**

4.5.12 GESAMP welcomed the progress made by the WG and noted the continued strong interest in and commitment to the WG by lead agencies IOC and UN Environment. However, further funding will be required to carry out the full agreed work programme following UNEA-2, as the earmarked Norwegian Government support to UN Environment for this activity had expired. The Chairman of WG 40 undertook to further review the ToRs, following the completion of the forthcoming FAO workshop on microplastics and seafood safety, with the intention of these being presented for discussion at the planned ExCom intersessional meeting.

### **4.6 Marine geoengineering (WG 41)**

4.6.1 A report of the activities of the working group on marine geoengineering (WG 41) was given by Dr. Philip Boyd, Co-Chairman of the working group.

4.6.2 GESAMP noted that since the last session, new WG had held its inception meeting which took place from 23 to 25 May 2016, at the headquarters of IMO, London, United Kingdom.

4.6.3 During the inception meeting, the WG discussed how to best build on prior assessments of geoengineering (such as the 2009 United Kingdom Royal Society report and the 2015 US NRC reports). The number of metrics that can be used to assess the merits and drawbacks of the various geoengineering approaches has grown, as has an emphasis on a wider more integrated approach to assessment that includes socio-economic, legal and ethical dimensions. Two key advances were identified by the WG, namely the development of new metrics (in particular the knowledge available on a specific approach), and secondly the role of modelling to advance the geoengineering debate.

4.6.4 Desirable metrics that were identified included: economics – welfare endpoints; biodiversity – ecological integrity (linked to welfare endpoints via ecosystem services); modelling (to provide Earth system metrics) and knowledge (specifically, the need to provide sufficient information to meet a threshold for inclusion in a scientific assessment). These metrics were then included in a discussion that centred on which metrics to include in the development of a scoring sheet to rank a wide range of marine geoengineering proposals as part of the terms of reference for the initial phase of WG 41.

4.6.5 There was considerable discussion devoted to the role of regional, basin scale and global modelling in maintaining momentum in the marine geoengineering debate; there is a danger of a vacuum hindering this debate in the absence of pilot studies, due to moratoria and other constraints surrounding research governance. Many ocean properties (temperature, salinity, density, oxygen, pH, nutrients, primary productivity) can be included in high resolution global model runs, and they provide invaluable insights, robust checks and balances, and permit 'thought experiments' across a range of geoengineering techniques. Modelling intercomparison experiments such as GEOMIP (Geoengineering Model Intercomparison Project) and CRDMiP (Carbon Dioxide Removal Model Intercomparison Project) increase confidence in the skill of models to provide consensus-based results, error estimates and hence to offer potential as a further rigorous tool for an initial quantitative assessment of proposed ocean geoengineering methods.

4.6.6 The WG recognised that models alone will be insufficient to deliver a more comprehensive assessment. Nonetheless, they have an invaluable role to play in identifying key unknowns that the models are particularly sensitive to. Model simulations could also help to provide a more quantitative comparison between metrics, which was another area the WG identified as problematic in both the development of a scoring sheet, and intercomparisons of the merits of different geoengineering approaches using such a scoring method.

4.6.7 Since the May 2016 inception meeting, WG 41 had refined the scoring sheet for assessment criteria and circulated it to the members of the working group to complete. The collated scores from this assessment will help to better define the terms of reference for 2017 activities. The co-Chair had also circulated a draft report from the inception meeting, along with an executive summary, for feedback from the WG members. The second WG 41 meeting was scheduled for May/June 2017.

4.6.8 In the discussion that followed, GESAMP noted that there was a need for better understanding of the science related to marine geoengineering, in order to better inform policy, as well as future IPCC reports. It was agreed that it would be beneficial to ensure that the work of the WG is brought to the attention of the UNFCCC and SBSTTA.

4.6.9 GESAMP noted that although the current funding may only be available through 2017, there may be a rationale for a possible extension beyond the current terms of reference and timeline. It was noted that the WG membership is currently skewed towards natural environment scientists, but that there is a desire to transition the makeup of the WG towards a balance between natural environment and social scientists.

4.6.10 There is currently a lack of a knowledge base - for virtually all marine geoengineering approaches - that will permit a robust scientific assessment. However, given the ground work that needs to be done by the natural environment scientists to overcome this knowledge void (in order to provide the best platform for assessment for the social scientists to look at other socio-economic and geopolitical aspects) the WG co-Chairman noted that a successful transition will be difficult to accomplish within the original two-year tenure of WG 41.

4.6.11 It was also noted that, following COP21 in Paris 2015, and the possibility of restricting warming to 1.5°C via negative emissions had shifted more of a focus onto geoengineering. Consequently, there is a need for input into the special IPCC reports on 1.5°C warming, oceans and cryosphere, which makes the role of WG 41 more important to various end-users. The potential role of climate intervention has already been proposed in this context by the CBD.

#### **Action by GESAMP**

4.6.12 GESAMP took note of the progress made by WG 41, and the continued support by the co-sponsoring agencies, through 2017, and requested IMO, as the lead agency, to inform UNFCCC of the work of WG.

## 5 CONTRIBUTION TO OTHER UN PROCESSES

5.1 GESAMP was informed of several ongoing UN processes with respect to marine environmental protection.

### UN Environment and the Regional Seas Programme

5.2 Dr. Lisa Svensson, Director/Coordinator, Marine/Coastal Ecosystems Branch, Ecosystems Division, UN Environment, provided an overview of work within UN Environment in relation to oceans, and the Regional Seas Programme. GESAMP was informed that the marine strategy of UN Environment was in the process of being revised, and Dr. Svensson noted that science will form a crucial basis for the future work in relation to oceans.

5.3 GESAMP noted that there were several linkages between the work of GESAMP, and the priorities identified by UN Environment in relation to the oceans.

5.4 She highlighted five areas of prioritization:

- .1 Ocean Governance at global level: An action plan for SDGs and Paris Agreement is needed, in order for these two elements to become harmonized. She also noted that UN Environment has established a working group for the development of a Regional Sea Direction 2020, a strategy for the Regional Seas Programme.
- .2 GPA Programme: Ms. Svensson highlighted the engagement with other organizations with related mandates and competencies, which would contribute to the common ambition on crucial issues of pollution, marine litter and water quality.
- .3 Economics of the Ocean: These should be built on science, mapping, evaluation and an eco-systems based approach, with a focus on the value of the ocean. This requires an engagement with policy makers on ways matters of environmental protection.
- .4 Ocean and Climate: Sargassum was highlighted as an example of how climate change affects the ocean.
- .5 Communications: Ms. Svensson stressed that communication is highly relevant, not least with respect to how to translate science into action. The way we use language is crucial in order to transfer knowledge. In capacity building, the mapping of the ocean is a significant building block. She also noted the need for harmonized approach with SDG indicators.

5.5 Dr. Svensson highlighted that ocean related issues are extensive. Decisions are not made by scientists – there are a lot of factors to be considered in the process. There is a need to avoid duplication and focus on effective partnerships to bring oceans higher on the agenda.

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

5.6 Dr. Habib El-Habr, Head, Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA), provide an informative presentation on GPA, including its current priorities, the background to its establishment in 1995, and the possible future directions. GESAMP was also informed of the three thematic partnerships under the GPA, namely the Global Partnership on Marine Litter (GPML), the Global Partnership on Nutrients Management (GPNM), and the Global Wastewater Initiative (GW<sup>21</sup>).

5.7 In addition to the ongoing cooperation on marine litter, several other possible areas of collaboration were identified, including matters related to the spread of sargassum, and the impacts of wastes originating from mining operations (see section 7, below).

### The Sustainable Development Goals and the 2030 agenda for Sustainable Development

5.8 Ms. Elisabetta Bonotto, SDGs and Indicators Unit, UN Environment, informed GESAMP of the most recent developments with the Sustainable Development Goals, and in particular the development of indicators. UN Environment has a leading role on many of the SDGs, and is the custodian agency for 30 indicators. GESAMP took note of the complex work of establishing the list of indicators, and the collection of data, as required under the 2030 Agenda for Sustainable Development.

### Regular Process for Global Reporting and Assessment of the State of the Marine Environment including Socio-economic aspects

5.9 Dr. Peter Harris, Managing Director, GRID-Arendal, provided an overview of the Regular Process for Global Reporting and Assessment of the State of the Marine Environment including Socio-economic aspects, and in particular the first World Ocean Assessment (WOA I), was now available online at: [http://www.un.org/depts/los/global\\_reporting/WOA\\_RegProcess.htm](http://www.un.org/depts/los/global_reporting/WOA_RegProcess.htm)

5.10 Dr. Harris explained the process of preparing WOA I, and outlined the contents of the report and main findings. It was also noted that the second cycle of the Regular Process had already been initiated.

## UN-Oceans

5.11 GESAMP were informed of the recent activities of UN-Oceans, provided by DOALOS as the focal point for this interagency mechanism (document GESAMP 43/5).

### Presentations by observers

#### *Secretariat of the Basel, Rotterdam and Stockholm Conventions*

5.12 Ms. Katarina Magulova, Secretariat of the Basel, Rotterdam and Stockholm Conventions (BRS), provided an overview of the activities related to the Basel, Rotterdam and Stockholm Conventions, in particular the Global Monitoring Plan for persistent organic pollutants (POPs). Following an introduction to POPs and their impacts on humans and wildlife, a description was given of strategic partnerships aiming at producing regional and global monitoring reports and data availability. More information on the subject can be found at [www.pops-gmp.org/](http://www.pops-gmp.org/).

5.13 More information on the BRS Conventions can be found at [www.brsmeas.org](http://www.brsmeas.org).

#### *Nairobi Convention*

5.14 Mr. Dixon Wariunge, (Coordinator, Secretariat for the Nairobi Convention), informed GESAMP of the work within the Nairobi Convention area, stressing that there was a role for GESAMP to play at the regional level. Noting that there were many areas of common interest, he identified a number of areas of possible collaboration, such as in relation to marine spatial planning and ocean policy/governance, regionally coordinated SEAs for oil and gas exploration, as well as the role of riverine input of sediments and litter to the oceans.

### Action by GESAMP

5.15 GESAMP expressed its appreciation for the presentations provided by, and re-iterated importance of the exchange of information with current and potential future partners.

## 6 IDENTIFICATION OF NEW AND EMERGING ISSUES

6.1 This GESAMP agenda item is intended to provide an opportunity for Members to bring new topics related to the status of the marine environment to the attention of the Sponsoring Organizations, and to discuss issues arising during the course of the current GESAMP meeting. One topic was identified and discussed during this session.

## Aquaculture growth

6.2 During the informal meeting of the GESAMP Members on the morning of 14 November (Monday) 2016, the issue of the growth of aquaculture, and its potential impacts on the marine environment, was discussed. The following drivers for further work on aquaculture were identified:

- .1 the growth in aquaculture globally is likely to surpass wild fisheries in terms of gross production within a decade
- .2 examples of forecast growth presented recently at Sustainable Growth Summit meeting in Bergen (for example, Norway seeks five-fold increase in salmon production in next decade, see [www.seafoodinnovation.no/event/27/SUSTAINABLE\\_GROWTH\\_SUMMIT\\_2016](http://www.seafoodinnovation.no/event/27/SUSTAINABLE_GROWTH_SUMMIT_2016))
- .3 among the environmental factors associated with aquaculture are: eutrophication (sediments and water); diseases and parasites; introduced species; and
- .4 access to space in ideal aquaculture sites (sheltered bays, estuaries and fjords that are well-flushed, correct temp, etc.) and trend towards open shelf installations.

6.3 GESAMP also noted earlier work on this topic and understood that it was not a new or emerging issue.

### Action taken by GESAMP

6.4 GESAMP discussed the possible development of a scoping paper in the intersessional period. However, keeping in mind that GESAMP reports were already prepared in the past two decades on related topics, it would, therefore, be imperative to go through these reports and to seek the advice of FAO on the current work in relation to the environmental aspects of aquaculture growth, and the possible role for GESAMP in addressing the issue further.

### Emerging pollutants in wastewater effluents

6.5 Dr. Birguy Lamizana, (UN Environment, GPA/Wastewater Programme), informed GESAMP of recent developments with respect to emerging pollutants, in particular pharmaceuticals and endocrine disruptors in wastewater effluents. It is a concern that these compounds may have negative impacts on aquatic ecosystems. The knowledge that exists regarding the understanding on potential human and environment health risks posed by emerging pollutants is still very limited. Most emerging pollutants are not regulated in wastewater and water quality discharge standards. There is urgent need therefore to reinforce scientific understanding and embrace suitable technological

and policy approaches for monitoring emerging pollutants in water and wastewater; this involves examining their possible risks to humans and the environment and also averting and regulating their disposal in the environment especially water resources.

#### **Action taken by GESAMP**

6.6 In the ensuing discussion, GESAMP noted the interest from in particular UN Environment and agreed to pursue the development of a scoping paper in the intersessional period, under the lead of Dr. Mogo and Ms. Lamizana (UN Environment).

## **7 SCOPING ACTIVITIES**

7.1 GESAMP was be invited to consider any proposals for issues that had previously been identified as possible new and emerging issues to be explored by GESAMP at a future stage. GESAMP was invited to consider progress made in the intersessional period with the following activities.

#### **Impacts of residues of chronic oil spills**

7.2 Dr. Felicia Chinwe Mogo described the rationale behind the proposal for a possible scoping paper on this topic. The Chair recalled that GESAMP 42 had requested that a scoping paper was developed for GESAMP to review. However, no progress had been made in this respect, and it was agreed that a full scoping paper be pursued in the intersessional period.

#### **Action taken GESAMP**

7.3 Following discussion, GESAMP agreed to establish an intersessional correspondence group, under the lead of Dr. Mogo.

#### **Disinfection by-products**

7.4 Mr. Linders informed GESAMP that the interest of WG 34 in this area was 'fading', due to the lack of expertise to take it forward. Dr. Hoefler expressed interest in pursuing the topic, since it would be relevant to compare different types of discharges, such as shipping, power plants and other activities carrying out disinfection. It was noted that WG 34 lacked the expertise pertaining to the other industries of relevance for such a comparison. Chair suggested the usefulness of having a document to use as a reference paper in the future. Thomas underscored that while we have solid information on emissions of many disinfection by-products from these other industries, we have little on BW systems so, reiterating Michael Huber's view, it could be valuable to have a global view incorporating all sources of disinfection by-products including from ballast water treatment.

#### **Action taken GESAMP**

7.5 Following discussion, GESAMP agreed to establish an intersessional correspondence group, under the lead of Dr. Hoefler.

#### **Bio-magnification**

7.6 GESAMP was informed that the Chair had contacted several potential partners looking at the links between contaminant levels and human health, but that to this point there had not been substantial interest from a potential lead agency. It was also noted that the topic in part had been covered by the WG 40. Although Members recognized that the subject was still of scientific interest, it was noted that there was not substantial interest in GESAMP or the Sponsoring Organizations to continue the development of a scoping paper at this stage.

#### **Action taken GESAMP**

7.7 Following discussion, GESAMP agreed to delete this issue from the future work programme.

#### **Arrival of pelagic *Sargassum***

7.8 UN Environment updated GESAMP on recent activities pertaining to the Sargassum challenge in the Caribbean and West Africa. A video was shown of a recent Sargassum conference in the Caribbean; scientists described the role of anomalous wind and current events and nutrient enrichment as drivers for the unexpected arrival of Sargassum in both regions. Dr. Christopher Cox from the GPA Global Nutrients Management Programme noted the economic losses of several Caribbean SIDS due to impacts on tourism. He underscored the on-going importance of best practice in nutrient management as part of an overall strategy in mitigating such Sargassum events. He expressed GPA's interest and willingness to collaborate on this issue if GESAMP decides to take the matter further. IOC indicated the need for more clear definition of the terms of reference for a possible GESAMP activity. The Chair suggested one possibility was to develop a scoping paper in the intersessional period that could explore possible terms of reference for a WG as well as a lead agency.

#### **Action taken by GESAMP**

7.9 GESAMP decided to proceed with a scoping paper, under the lead of Dr. Kershaw and Dr. Abu Hilal, with UN Environment (Dr. Christopher Cox) expressing an interest in participating in the intersessional work.

#### **Mine tailings**

7.10 GESAMP recalled the scoping paper prepared in 2015 following the workshop held in Peru on impact of mine tailings on coastal

environment. It was also noted that a parallel correspondence group had been working on this through the London Convention and Protocol, and that the governing bodies of these treaties had requested the establishment of a working group through GESAMP. IMO introduced documents GESAMP 43/7 and 43/INF.2, proposing the establishment of the working group, with draft TOR prepared in consultation with the LC/LP Parties, which aimed at providing better understanding of the potential impacts of mine tailings on marine environment.

7.11 Some Members requested a refinement of the TORs. It was therefore agreed that as a priority, the aim of the first phase would be to establish the WG in early 2017 to address the first TOR and report on the results to the next session of GESAMP. Following review of the progress made, any necessary adjustments to the remaining TORs would be made by GESAMP prior to initiating the second phase of the WG.

7.12 Other agencies were requested to join the WG, in-kind and/or sponsoring experts. In addition to IMO, the UN Environment GPA expressed interest in co-leading, but could not commit financially at this stage. GRID-Arendal offered its services, including recent reports on management of deep-sea mining and its residues.

7.13 Mr. Linders expressed concern with some technical aspects regarding the proposed TORs as well as the content of the report of the workshop (GESAMP 43/INF.2) and how that might impact/link to the proposed WG. IMO clarified that the workshop report was not providing the view of GESAMP, but is the proceedings of a workshop and therefore summarizes the discussions that took place. It was agreed that the disclaimer of the document would be made more prominent, to avoid misinterpretation by the reader and distinguish it from a scientific review by GESAMP.

7.14 A discussion ensued on the appropriate 'degree/level' of responding to reviews and comments in the peer review of GESAMP documents. The secretariat agreed to review and revert with suggested improvements for the peer review process.

### **Action taken by GESAMP**

7.15 GESAMP agreed to establish Working Group 42 on the environment impacts of wastes from mining operations disposed at sea (WG 42), under the co-lead of UN Environment and IMO. The WG would start its work focusing on the first TOR, with a view to providing a first report to the next annual session.

## **8 GESAMP SIDE EVENT: ENVIRONMENTAL ASPECTS OF SAND MINING**

8.1 On Wednesday 16 November, GESAMP and UN Environment organized a special side event entitled "Environmental aspects of sand mining". The side event was moderated by Dr. Felicia Chinwe Mogo, and attended by approximately 30 people.

8.2 Sand is the second most used natural resource on earth behind water (Claire Le Guern, Santa Aguila Foundation). Globally between 47 and 59 billion tonnes of material is mined every year (Steinberger et al., 2010) of which sand and gravel account for the largest share (68-85%) and the fastest extraction increase. Their use exceeds natural renewal rates. The amount continues to increase as a result of rapid economic growth in Asia (UNEP and CSIRO, 2011). However, the absence of global data on the issue makes environmental assessment difficult and doesn't promote awareness on the issue.

8.3 Sand was until recently extracted in land quarries and riverbeds however, due to the decline of the inland resources there has now been a shift to marine and coastal aggregates mining (UNEP GEAS, 2014). The demand for aggregates derives from the production of glass, electronics, aeronautics, with its largest use being in construction. Riverbeds, floodplains and beaches are stripped for this reason and the value of this practice is currently estimated at USD 70 billion. It is suspected that in many countries aggregate mining and dredging are not always carried out based on environmental impact assessments, and these practices may therefore have severe effects on the marine environment, coastal geomorphology, sedimentology and circulation batters, and biodiversity. There are also socio-economic aspects such as impacts on tourism, agriculture, engineering, houses and infrastructure.

8.4 This session was intended to showcase the current state of knowledge and identify the gaps in knowledge with respect to the practice of sand mining in coastal and marine environments.

**Current state of knowledge: Environmental impacts of sand mining** (Dr. Peter Harris, Managing Director, UN Environment collaborating centre for Global Resources Information Database (GRID-Arendal), Norway).

8.5 Sand is a multi-million dollar industry according to a recent report by UNEP. Sand is made of different kinds of material (shell, minerals). In areas like South Wales sand mining blamed for coastal erosion. Benthic recovery post-commercial aggregate extraction UK – Study by Boyd 2004



8.6 The speaker focused on the offshore (marine and coastal) aggregate (sand and gravel) mining industry and the geological aspects of aggregate. He highlighted the environmental footprint, rates of ecological succession and some case studies e.g. Land reclamation – including the artificial islands in Dubai — the Palm and the World which required a total of 650 million tons of sand. Dubai's stock was exhausted so some sand was shipped to the Persian Gulf from Australia. Singapore where land reclaimed (130 km<sup>2</sup>), using material obtained from quarries, the seabed, and rock purchased from Indonesian islets. Pacific Islands beach aggregate mining e. g. Marshall Islands, Tuvalu, Kiribati, Tonga and Cook Islands where sand mining is conducted by households for their own use, selling to others and to companies; Population growth is driving building demand; Lack of capital, technical skills, no alternative sources of aggregates; Mining from fringing reefs contributes to coastal erosion, interferes with food chains, biodiversity and coastal water circulation; Carbonate material tends to be 'weak' effect structures have shorter life span; Existing and future onshore sand mining sites are a short-term solution. Pits often become dumping sites and breeding grounds for mosquitoes and sand mining legislation has been largely ineffective. Anthropogenic sea level rise coupled with mining is resulting in potential loss of island area suitable for human habitation. Moreton Bay Australia, aggregate extraction with a long history of dredging operations for over 50 years, in 2015 to build Brisbane airport extension some 13 million tonnes was mined from tidal sand banks (bars). Making a case for legal versus illegal marine aggregate mining, while legal situation involved obtaining a permit (royalties), Environmental Impact Assessment, Marine spatial planning, Safety for workers, Monitoring of impact both biological and physical and putting in place a restoration plan. The illegal state of affairs is often the opposite and has criminal involvement. An example is In India, where illegal sand miners are destroying river beds, beaches and agricultural land to obtain sand for construction. A recent study estimated the value of the illegal industry to be nearly \$200 million/year (Rege 2015). The "sand mafia" is a term given to a 'violent and secretive criminal group in India, use intimidation and killings to maintain the industry' (Beiser 2015).

8.7 Some solutions were presented including the following 1) Reduce consumption of sand by optimising use of existing buildings; 2) Recycled building material can be a substitute for sand; 3) Use up to 40% of incinerator ash in place of sand; 4) Some desert sand can be used if mixed with other material; 5) Correct price and tax on sand and 6) a better knowledge of sand systems and dependent ecosystems would be useful in managing the mining of sand and aggregate. He also concluded that sand and gravel mining is a major environmental impact that has been overlooked and ignored for too long, current levels of extraction are unsustainable and have brought about the risk

of criminal activity. While some solutions exist to reduce the rate of extraction, research needed on source environments to develop better and safer practices.

**Regional case study on sand mining** (Professor Desiderius C. P. MASALU, Institute of Marine Sciences, University of Dar es Salaam)

8.8 The speaker highlighted the impact of sand mining in mainland Tanzania and the island of Zanzibar. For example the impacts of illegal sand mining in Kunduchi area has led to beach erosion and environmental degradation of the area including the beaches. Other impacts include the collapse of stream/river banks and stability of bridges; Collapse of beach properties and infrastructures e.g., houses. The effects may also have altered the hydrology of streams which may impact flora and fauna. He also outlined the socioeconomic aspects of the problem of illegal sand mining even though it creates employment for many youths and side businesses such as women vending food and other types of pet business. It has also created confrontation and hostility as mineral sand is seen as a common property resource. It was noted that sand resource supply in Dar es Salaam is rapidly becoming scarce due to the rapidly growing demand. The Department of Natural Resources in collaboration with the Department of Environment has been trying to curb the problem with little success mainly due to the fact that Illegal sand mining is a major source of income for many households and sand mining is usually done starting past mid night when law enforcers are not available.

8.9 He concluded that illegal sand mining is increasing rapidly in Tanzania both on the mainland and Zanzibar. The activity causes accelerated localized severe coastal erosion that degrades the environment and poses a threat to properties. Ditches/pits left out on the coastal hinterland become breeding places for mosquitoes. Presently sand mining is a multi-facets problem that is sensitive and difficult to eradicate by brutal force. From the African perspective he drew attention to the fact that issues in Tanzania are similarly happening in other African countries. Currently, approximately 3 billion people — about half of the world's population live within 200 kilometres of a coastline and by 2025, that figure is likely to double. (Liz Creel, 2003). By 2030 and 2060 Africa is expected to experience the highest rates of population growth and urbanisation in the coastal zone (Neumann et al. 2015). Africa is the world's second-largest and second-most-populous continent. It has an area of about 30.3 million km<sup>2</sup> (11.7 million square miles) including adjacent islands and covers six per cent of Earth's total surface area and 20.4 per cent of its total land area. Africa's population has rapidly increased over the last 40 years. The total number of people in Africa increased from 229 million in 1950 to 630 million in 1990. As of 2014, the population of Africa is estimated at 1.2 billion (for about 15%

of the world's human population). This population will need housing and other infrastructures which require sand in huge quantities. Africa must be aware now that sand resource is rapidly becoming scarce and something needs to be done.

#### **Socio-economic effects of sand mining** (Dr. Bert van der Valk, DELTARES)

8.10 The presentation by DELTARES led by Dr. Bert van der Valk, focused on the socio-economic effects of sand mining. In a comparison of the use of sand and gravel compared to other resources the speaker showed that sand and gravel are highest on the scale in order of quantity and next to oil, groundwater and hard coal in order of value. World-wide demand for sand and gravel has been increasing and would increase to about 361% for China and 377% for India from 2000 to 2020. Some of the major producers of sand and gravel around the world include United States, Italy, Germany, United Kingdom and Australia. In Africa South Africa is the highest producer. Linking sand and gravel production to the main global agendas the speaker related them to sustainable development goals 14 and 15 Conserve and sustainably use the oceans, seas and marine resources for sustainable development and protect, restore and promote sustainable use of terrestrial ecosystems respectively. The speaker outlined some of the possible socio-economic consequences of (unregulated) sand mining as follows: Damages from sand mining can disrupt economic activities (e.g. load limitations for bridges, loss of land due to erosion); Damages caused by sand mining are often paid for by public authorities; Illegal sand mining deprives public authority of income, Large industrial sand mining can conflict with traditional or artisanal sand mining activities, affecting vulnerable communities at different scales; and Unsustainable large scale sand mining can have large environmental impacts, causing economic damages through loss of land, land degradation, loss of biodiversity affecting livelihoods.

8.11 It was emphasized that sand mining area (land, river, coast and sea) needed an integrated (multi-sectoral approach as many sectors are involved. These include Economy (Tourism, Agriculture, Fisheries); Spatial planning (Housing and infrastructure) and Environment (water etc.) In conclusion the speaker outlined some remedial measures to mitigate social economic consequences of sand mining as follows:

- .1 integrated approach needed: sectoral interlinkages, combining interests of several policy sectors (people, planet, prosperity).
- .2 use system analysis (river basin and coastal zone) focused on sediment transport for sustainable use of resources.

- .3 establish regulations consequential to international treaties on sustainable management of natural resources (global agendas); develop data-collection, monitoring, enforce regulations, governance
- .4 involve communities and local land users.
- .5 propagate reduction of sand mining through recycling, replacement, use of renewables (best practices and research)
- .6 regulated and sustainable sand mining can provide building materials and economic opportunity for many stakeholders (mining companies, building contractors, road construction, workers, etc.)
- .7 re-use of dredged material (e.g. dredging of ports) can contribute substantially to reduction of sand mining. But care should be taken of potential pollution with hazardous materials especially in the fine grained particle size.

#### **Documenting global sand mining activities and their environmental impacts** (Prof. Robert S. Young, Director, Programme for the Study of Developed Shorelines, Western Carolina University, United States)

8.12 The speaker outlined the difficulty to track and quantify sand mining activities which happens at many scales from one individual to government sponsored. He also mentioned that there are many socio-economic, regulatory, structural challenges to efforts at reducing the impacts of sand mining, noting that many activities previously not designated as sand mining should be included in any effort to assess global impacts. He also introduced the database his institution has been working on which has a mission to: produce a comprehensive curriculum for children to learn about the importance of coastlines, and empower them to act to protect this crucial environment; raise awareness of the many unsustainable practices that are harming the world's beaches and coasts; educate children about the science of natural beaches and empower them to act to protect their coastal environment; advocate for sensible, science-based policies and regulations that will protect and preserve coastlines and beaches around the world; and, mobilize individuals to recognize and address global issues of coastal management.

#### **Discussion**

8.13 The ensuing discussion generated a very interesting debate on how to table policies the the national regional and global level. There were suggestions on doing a global report to bring this issue the attention it deserves and also organize a conference to review existing policies and recommend new ones. UN Environment was happy to invite the other sponsoring agencies to take a

closer look at how GESAMP can support this area in a study and develop policy to support governments to manage sand mining.

### **Action taken by GESAMP**

8.14 GESAMP noted the extensive interest in the issue and agreed to develop a scoping paper in the interessional period, under the lead of Dr. Ajao, in collaboration with UN Environment (Ms. Joana Akrofi), as well as other interested participants such as Dr. Young.

## **9 DATE AND PLACE OF GESAMP 44**

9.1 GESAMP noted the offer by WMO to host the 44th session of GESAMP in 2017, and that the exact dates would be confirmed by the ExCom as soon as possible.

## **10 FUTURE WORK PROGRAMME**

10.1 GESAMP discussed the work programme for the intersessional period including imminent tasks for each Working Group. The currently active GESAMP Working Groups, correspondence groups and task teams are listed, with their current terms of reference are set out at annex 5.

## **11 ANY OTHER BUSINESS**

11.1 The Administrative Secretary of GESAMP presented document GESAMP 43/11, highlighting the 50th anniversary of GESAMP in 2019 and welcoming suggestions or advice on ways to commemorate the anniversary. The importance of securing funding for this event, including in-kind assistance, was also noted.

11.2 GESAMP took note of the suggestions made and agreed to revisit the topic at its next session.

11.3 The Administrative Secretary noted that Dr. Michael Angelidis would be retiring from IAEA in the intersessional period, and expressed the deepest appreciation on behalf of GESAMP and ExCom for his dedication, commitment and unfailing spirit of cooperation as the IAEA Technical Secretary for GESAMP over the last three years.

## **12 ELECTION OF CHAIRPERSONS**

12.1 GESAMP unanimously re-elected Dr. Peter Kershaw as Chair and Dr. Manmohan Sarin as Vice-Chair, for the intersessional period and the forty-fourth session of GESAMP.

## **13 CONSIDERATIONS AND ADOPTION OF THE REPORT OF GESAMP 43**

13.1 The report of the forty-third session of GESAMP was considered and approved.

## **14 CLOSURE OF THE SESSION**

14.1 The Chairman of GESAMP, Dr. Peter Kershaw, closed the forty-third session of GESAMP on Thursday, 17 November 2016 at 15:30 hrs.

## **ANNEX I - Provisional agenda**

### **PROVISIONAL AGENDA**

43rd session of the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) held at UN Environment in Kenya, Nairobi from 14 to 17 November 2016

#### **Monday, 14 November**

Informal meeting of the members of GESAMP

Initial meeting of the Executive Committee of GESAMP (ExCom)

Opening of the session

- 1 Adoption of the agenda
- 2 Report of the Chairperson of GESAMP
- 3 Report of the Administrative Secretary of GESAMP
4. Planning of GESAMP activities:
  - .1 Evaluation of the hazards of harmful substances carried by ships (WG 1: IMO leading)
  - .2 Review of applications for 'active substances' to be used in ballast water management systems (WG 34: IMO leading)
  - .3 Expanded scientific review of mercury and its compounds and threats to the marine environment (WG 37: UNEP leading)
  - .4 Atmospheric input of pollutants to the oceans (WG 38: WMO leading)

#### **Tuesday, 15 November**

- .5 Establishment of trends in global pollution in coastal environments (WG 39: IAEA leading)
- .6 Sources, fate and effects of micro-plastics in the environment – a global assessment (WG 40: UNESCO/ IOC leading)

*Afternoon Session*

- .7 Marine Geoengineering (WG 41: IMO leading)
5. Contributions to other UN processes

#### **Wednesday, 16 November**

*Morning session*

6. Identification of new and emerging issues regarding the degradation of the marine environment of relevance to governments and sponsoring organizations
- 7 Scoping activities

*Afternoon Session*

- 8 GESAMP side event: Environmental aspects of sand mining

## **Thursday, 17 November**

### *Morning Session*

Presentations by observers

9 Date and place of GESAMP 44

10 Future work programme

### *Afternoon Session*

11 Any other business

12 Election of chairpersons

13 Consideration and adoption of the report of GESAMP 43

14 Closure of the session

## **Friday 18 November (closed session)**

### *Morning Session*

Concluding Meeting of the Executive Committee of GESAMP (ExCom)

## **ANNEX II - List of documents**

### **Agenda item 1**

- 43/1** Provisional agenda
- 43/1/1** Annotations to the provisional agenda
- 43/INF.1** Provisional list of participants

### **Agenda item 2**

- 43/2** Report of the Chairman of GESAMP

### **Agenda item 3**

- 43/3** Report of the Administrative Secretary of GESAMP

### **Agenda item 4**

- 43/4** Report of the Chairman of WG 1: Evaluation of the Hazards of Harmful Substances Carried by Ships
- 43/4/1** Report of the GESAMP BWWG 34: Review of applications for 'Active Substances' to be used in ballast water management systems
- 43/4/2** Report of the co-Chairmen of WG 38 : Atmospheric input of chemicals to the oceans
- 43/4/3** Report of the Chairperson of Working Group 39:  
Establishment of trends in global pollution in coastal environments
- 43/4/4** Report of the GESAMP microplastics group (WG 40 – 2<sup>nd</sup> Phase 2015-2018): Sources, fate and effects of micro-plastics in the marine environment – A global assessment
- 43/4/5** Report of the co-Chairmen of Working Group 41: Inception meeting of GESAMP WG 41 on marine geoengineering

### **Agenda item 5**

- 43/5** Contributions to other UN Processes – Briefing paper on UN-Oceans

### **Agenda item 7**

- 43/7** Scoping activities: Progress on the possible establishment of a working group on the impacts of wastes and other matter in the marine environment from mining operations, including deep-sea mining
- 43/INF.2** Scoping Activities: Pre-publication copy: Proceedings of the GESAMP international workshop on the impacts of marine tailings in the marine environment

### **Agenda item 11**

- 43/11** Any other business: Anniversary to commemorate 50 years of GESAMP

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## ANNEX 4 - ACTIVITIES AND ACHIEVEMENTS BY THE SPONSORING ORGANIZATIONS OF GESAMP DURING THE INTERSESSIONAL PERIOD

This document provides a summary of the Organizations' achievements since GESAMP 42 (31 August to 3 September 2015) from IMO, IAEA, UNESCO-IOC, UNDP, UN Environment, UN and the WMO.

### INTERNATIONAL MARITIME ORGANIZATION (IMO)

#### Implementation of the Ballast Water Management Convention

1 The Ballast Water Management 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 entry into force conditions of the BWM Convention were met on 8 September 2016 by the accession of Finland and the Convention will therefore enter into force on 8 September 2017. The number of Contracting Governments is currently 53, representing 53.28% of the world's merchant fleet tonnage.

#### Matters directly related to the GESAMP-BWWG

2 IMO's Marine Environment Protection Committee (MEPC), at its 69th and 70th sessions, granted Basic Approval to one and Final Approval to four ballast water management systems (BWMS) that make use of Active Substances, based on the recommendations of the 32nd and 33rd meetings of the GESAMP Ballast Water Working Group (BWWG). MEPC 70 further noted that there are already 69 type-approved BWMS available.

3 MEPC 69 considered the report of the Seventh Stocktaking Workshop of the GESAMP-BWWG (STW 7) and *inter alia* endorsed several recommendations by the GESAMP-BWWG and approved, in principle, amendments to the *GESAMP-BWWG Methodology for information gathering and conduct of work*.

4 MEPC 70 requested the GESAMP-BWWG to consider a proposal on the inclusion of new data on freshwater testing of BWMS with Final Approval and, if necessary, to develop a procedure for submissions of such new data as a revision of the GESAMP-BWWG Methodology. MEPC 70 also requested the GESAMP-BWWG, at their next STW, to review what kinds of precursors are involved in the process of disinfection by-product formation and TRO consumption.

#### Other matters

5 MEPC 69 had continued the work on the review of the *Guidelines for approval of ballast water management systems (G8)* and an intersessional working group held 17 to 21 October 2016 finalized

the revised Guidelines for adoption by MEPC 70. The revisions to the Guidelines update the approval procedures for BWMS, including more robust test and performance specifications as well as *inter alia* more detailed requirements for type approval reporting and control and monitoring equipment.

6 In the context of the review of Guidelines (G8), MEPC 69 considered the final report on the Study on the implementation of the ballast water performance standard described in regulation D-2 of the BWM Convention. The Study was conducted by the Secretariat in partnership with the World Maritime University.

7 MEPC 69 approved draft amendments to regulation B-3 of the BWM Convention to reflect Assembly resolution A.1088(28) on application of the Convention and to provide an appropriate timeline for ships to comply with the ballast water performance standard described in regulation D-2 of the Convention. MEPC 70 considered two submissions with alternate amendments to regulation B-3. While MEPC 70 agreed to maintain the decision of MEPC 69, it was also agreed to revisit the issue at MEPC 71. The Secretary-General will circulate the amendments upon entry into force of the Convention, followed by consideration and adoption at a future session of MEPC.

8 MEPC 70 established a correspondence group to further develop the experience building phase associated with the BWM Convention, including developing a plan for gathering and analysing data, with a view to eventually review the Convention. MEPC 70 also initiated the development of guidance on contingency measures under the BWM Convention. Furthermore, MEPC 70 *inter alia* agreed to amend the *Guidelines on ballast water exchange (G6)* and agreed that the so called "same risk area concept" can be applied when granting exemptions in accordance with regulation A-4 of the BWM Convention.

#### Future work

9 MEPC 71 is expected to revisit the amendment of regulation B-3 and it is anticipated that draft amendments will be considered and adopted at MEPC 72 in 2018. MEPC 72 is also expected to amend regulation D-3 of the BWM Convention in order to make Guidelines (G8) into a mandatory Code. Further discussions expected at MEPC 71 are *inter alia* related to guidance for contingency measures and amending the *Guidelines for risk assessment under regulation A-4 of the BWM Convention (G7)*.

#### Ship recycling

10 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. With the accession of Panama on 19 September 2016, the number of Contracting Governments to the Hong Kong Convention now is 5, representing 20.34% of the world's merchant fleet tonnage. The combined maximum annual ship recycling volume of the five States is 55,792 gross tonnage.

### **Review of MARPOL Annex V (Garbage)**

11 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.

12 MEPC 70 adopted further amendments to MARPOL Annex V related to products which are hazardous to the marine environment (HME) substances and Form of Garbage Record Book, with an expected entry into force date of 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 declared by the shipper if they are classed as harmful and are not discharged.

### **Issues related to MARPOL Annex II and IBC Code**

13 MEPC 69 adopted amendments to the appendix to MARPOL Annex II, which updated the summary table, setting out the revised GESAMP Hazard Evaluation Procedure.

14 MEPC 70, having noted the concurrent decision by MSC 96 approved a Unified interpretation which aimed to facilitating global and consistent implementation of survival requirements of the IBC Code (MSCMEPC.5/Circ.11). The Committee also approved an Example of a Certificate of Protection for products requiring oxygen-dependent inhibitors (MSC-MEPC.2/Circ.16), further to concurrent approval by MSC 96.

### **MARPOL Annex VI (Prevention of air pollution from ships)**

#### ***Fuel oil availability***

15 In accordance with regulation 14.8 of MARPOL Annex VI, a review of the standard set forth in regulation 14.1.3, i.e. 0.50% m/m maximum sulphur content fuel oil on and after 1 January 2020, shall be completed by 2018 to determine the availability of compliant fuel oil. In this regard, MEPC 68 approved the terms of reference for the review of fuel oil availability; established a Steering Committee to oversee the review; and agreed that

the Committee is the de facto "group of experts" mentioned in regulations 14.9 and 14.10 of MARPOL Annex VI.

16 MEPC 69, having considered the progress report on the review submitted by the Steering Group Coordinator, agreed, in principle, that a final decision on the date of implementation of the 0.50% sulphur limit should be taken at MEPC 70, so that maritime Administrations and industry can prepare and plan accordingly.

17 MEPC 70, having noted a final report of the Steering Committee, approved a final report of the assessment of fuel oil availability, with the main result in all scenarios being that the refinery sector has the capability to supply sufficient quantities of marine fuels with a sulphur content of 0.50% m/m or less and with a sulphur content of 0.10% m/m or less to meet demand for these products, while also meeting demand for non-marine fuels.

18 In this regard, MEPC 70 agreed to "1 January 2020" as the effective date of implementation for ships to comply with 0.50% m/m sulphur content of fuel oil requirement as set out in regulation 14.1.3 of MARPOL Annex VI and, in this connection, adopted resolution MEPC.280(70) on the effective date of implementation of the fuel oil standard in regulation 14.1.3 of MARPOL Annex VI.

#### ***Fuel oil quality***

19 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.

20 MEPC 69, having considered a report of the correspondence group, re-established the correspondence group to further develop draft guidance on best practice for fuel oil purchasers/users and Member States/coastal States and instructed it to submit a report to MEPC 71.

#### ***Emission control areas for NO<sub>x</sub> Tier III control***

21 MEPC 70 approved draft amendments to MARPOL Annex VI to designate the North Sea and the Baltic Sea as emission control areas for nitrogen oxides (NO<sub>x</sub>) Tier III control with an effective date of 1 January 2021, including exemption provisions to allow ships fitted with dual fuel engines or with only Tier II engines to be built, converted, repaired and/or maintained at shipyards located in NO<sub>x</sub> Tier III ECAs.

#### ***Black Carbon***

22 MEPC 68 agreed to a definition for Black Carbon emissions from international shipping, based on the "Bond et al." definition which describes Black Carbon as a distinct type of carbonaceous material, formed only in flames during combustion of carbon-

based fuel, distinguishable from other forms of carbon and carbon compounds contained in atmospheric aerosol because of its unique physical properties.

23 MEPC 70 noted that the Sub-Committee on pollution prevention and response at its third session (PPR 3) had developed a measurement reporting protocol for voluntary data collection of Black Carbon and had invited interested Member Governments and international organizations to use the protocol and submit data to PPR 4.

#### **EEDI review**

24 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.

25 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.

26 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. In this connection, MEPC 70, having noted the needs for further information, experience and data for ro-ro cargo ships and ro-ro passenger ships, also invited interested Member Governments and international organizations to submit concrete proposals for relevant amendments to the EEDI requirements and/or relevant guidelines for ro-ro cargo ships and ro-ro passenger ships to MEPC 71.

27 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. Currently, phase 3 requirements provide that new ships be built to be 30% more energy efficient compared to the baseline.

#### **Amendments to MARPOL Annex VI and associated guidelines**

28 MEPC 69, having considered draft amendments to MARPOL Annex VI and to the NO<sub>x</sub> Technical Code 2008, adopted:

- .1 amendments to MARPOL Annex VI on Record requirements for operational compliance with NO<sub>x</sub> Tier III emission control areas; and
- .2 amendments to the NO<sub>x</sub> Technical Code 2008 on Testing of gas-fuelled and dual fuel engines.

29 MEPC 70, having considered a number of draft amendments to MARPOL Annex VI and to existing guidelines related to air pollution measures and energy efficiency of ships, in particular:

- .1 approved draft amendments to appendix V of MARPOL Annex VI on information to be included in the bunker delivery note, taking into account the “equivalent” provisions set forth in regulation 4 thereof;
- .2 approved a MEPC circular on the Guidelines for onboard sampling and verification of the sulphur content of the fuel oil used on board ships;
- .3 approved a MEPC circular on Unified interpretations to the NO<sub>x</sub> Technical Code 2008 related to the approval of SCR systems; and
- .4 adopted amendments to the 2014 Guidelines on the method of calculation of the attained EEDI for new ships to include the calculation method for the attained EEDI for ships with dual fuel engines that use gas fuel as non-primary fuel and a correction factor for wood chip carriers.

#### **Further technical and operational measures to enhance energy efficiency**

30 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.

31 In addition, MEPC 69 established a correspondence group on the data collection system to develop relevant draft amendments to the Guidelines for the development of a ship energy efficiency management plan (SEEMP) and various guidelines relating to data verification procedures, data reporting format, development and management of the IMO Ship Fuel Oil Consumption Database, and non-party ships submitting data.

32 MEPC 70, having considered the draft amendments approved by MEPC 69, 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, 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 will be required to produce an annual report to the MEPC, summarizing the data collected.

33 MEPC 70 also adopted a revision of 2012 SEEMP Guidelines as the 2016 *Guidelines for the development of a Ship Energy Efficiency Management Plan (SEEMP)*. MEPC 70 further re-established the correspondence group to further develop draft Guidelines for Administration data verification procedures, draft Guidelines for the development and management of the IMO Ship Fuel Oil Consumption Database, and draft MEPC circular to address non-Party ships submitting data to the Database.

### **Reduction of GHG emissions from ships**

34 UNFCCC Parties attending COP 21 adopted the 2015 Paris Agreement on Climate Change. Following detailed consideration of reduction of GHG emissions from ships at MEPC 69, it was agreed to establish a working group at MEPC 70 for an in-depth debate on how to progress the matter of reduction of GHG emission from ships.

35 MEPC 70 noted the threshold for entry into force of the Paris Agreement was reached on 5 October 2016 and the Agreement would enter into force on 4 November 2016.

36 MEPC 70, following consideration, approved a Roadmap for developing a *Comprehensive IMO strategy on reduction of GHG emissions from ships*, which foresees an initial GHG reduction strategy to be adopted in 2018.

37 MEPC 70 also agreed to hold intersessional working group meetings on reduction of GHG emissions from ships. It is planned that the first intersessional meeting (subject to approval by the IMO Council) would be held back-to-back with MEPC 71.

### **London Convention and Protocol (LC/LP)**

#### **Development of a strategic plan for the London Convention and Protocol**

38 The governing bodies of the LC/LP adopted the Strategic Plan for the London Convention and London Protocol for the period 2016-2030. The Plan is intended to facilitate the implementation of the two treaties in order to contribute to the prevention of marine pollution and to advance the 2030 Agenda for Sustainable Development. The Plan also has a clear

mandate to promote the ratification and accession to London Protocol.

### **Marine geoengineering including ocean fertilization**

39 The Meetings noted that the United Kingdom had deposited its instrument of acceptance of the 2013 amendment on the regulation of the placement of matter for ocean fertilization and other marine geoengineering (resolution LP.4(8)).

40 The Meetings welcomed progress made under the new established GESAMP Working Group on Marine Geoengineering at its inception meeting held at IMO Headquarters from 23 to 25 May, 2016.

### **CO<sub>2</sub> sequestration in sub-seabed geological formations**

41 The Meetings, having noted that there were now three ratifications of the 2009 amendment to article 6 of the LP on the export of carbon dioxide waste streams (resolution LP.3(4)), encouraged Contracting Parties to the LP to do their utmost to facilitate the process to ensure entry into force as soon as possible, the acceptance of which is seen as a crucial element of the 2006 amendment to regulate CO<sub>2</sub> sequestration in sub-seabed geological formations.

### **Riverine and marine disposal of tailings and associated wastes from mining operations and deep seabed mining**

42 The Meetings agreed that the work of the bodies should continue along a scientific track, under a new, to be established, GESAMP Working Group before a decision could be taken on how best to approach the marine disposal of mine tailings around the world, in the context of the London Convention and Protocol. The Meetings also invited Contracting Parties and the Secretariat, as appropriate, to engage with the International Seabed Authority (ISA) to ensure that the LC/LP perspectives are captured for input to the draft framework for the regulation of exploitation.

### **Disposal of fibreglass vessels**

43 The Meetings, having noted the widespread and growing problem of disposing of fibreglass vessels, particularly those that have been abandoned, coupled with the lack of recycling or destruction facilities in Small Island Developing States as well as limited capacity at facilities in developed countries, agreed that more information about the construction of fibreglass vessels could play a vital role in minimizing waste at the end of life of such vessels.

44 Given the need for further exploratory work, the governing bodies:

- .1 invited delegations to submit information on best practices and/or guidance, if any, or case studies on the recycling and/or destruction of fibreglass vessels to the next joint session of the Scientific Groups in 2017 with a view to develop advice on the disposal of fibreglass vessels for consideration at the next joint session of the governing bodies in 2017; and
- .2 instructed the Secretariat to liaise with the appropriate bodies of IMO (e.g. MEPC and LEG), to inform of the ongoing work of the LC/LP Parties, and exchange information as needed.

#### ***Twenty-five-year scientific review of all radioactive wastes and other radioactive matter***

45 The governing bodies:

- .1 approved the 'Literature review performed in support of the 25-year scientific study of ocean dumping of radioactive wastes and other radioactive matter' as required under LC article 6 of annex I and LP article 3, annex 1 (2016 Literature Review);
- .2 agreed there was no need to consider commissioning any additional scientific study beyond the scope of this 2016 Literature Review;
- .3 concluded that the requirement of the 25-year review of the ban on the dumping of radioactive waste had been fulfilled for both the Convention and the Protocol; and
- .4 agreed that the ban on the dumping of radioactive wastes should remain in place.

#### ***Marine litter***

46 The Meetings were also informed about a number of activities and programmes related to plastics in the marine environment, including the outcome of the second United Nations Environment Assembly which adopted two resolutions on plastics and on Oceans and seas, as well as several national actions to regulate or ban the sale and manufacture of hygiene products containing microbeads. The Meetings, in acknowledging the significant quantity of marine litter entering the ocean and the severe and long lasting threat it poses to the marine environment, and noting that plastics are making their way into sewage sludge and dredged material and that there is firm evidence that the oceans are heavily contaminated with litter:

- .1 adopted a recommendation to encourage action to combat marine litter;

.2 encouraged parties to take into account the issue of plastics and marine litter when applying the dredged material waste assessment guidance; and

.3 invited delegations to submit their practices and experiences on this issue to the future sessions of the Scientific Groups.

#### ***Joint session of the Scientific Groups***

47 The Meetings agreed to convene the next joint session of the Scientific Groups, scheduled tentatively for 27 to 31 March 2017 to be held at IMO Headquarters.

### **INTERNATIONAL ATOMIC ENERGY AGENCY (IAEA)**

#### **Radiometrics Laboratory (RML) activities**

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

48 In the framework of the IAEA's Nuclear Safety Action Plan, the IAEA collaborates with Japan to assist in the implementation of the marine monitoring programme set in place following the 2011 earthquake, tsunami and resulting Fukushima Daiichi Nuclear Power Station nuclear accident. Activities under this project are a follow-up to the the International Peer Review Mission on Mid- and Long-Term Roadmap towards the Decommissioning of TEPCO's Fukushima Daiichi Nuclear Power Station Units 1-4, which visited Tokyo and the Fukushima Prefecture in November-December 2013. The project started in 2014 and will run for 3 years, including 2 interlaboratory comparisons and one proficiency test for radionuclides in marine samples organized each year.

##### ***IAEA's Regional Technical Cooperation project RCA RAS/07/021 "Marine Benchmark Study on the Possible Impact of the Fukushima Radioactive Releases in the Asia-Pacific Region"***

49 This was an IAEA Regional Technical Cooperation Project 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 assist Member States in the region to build capacity allowing them to assess eventual impacts of the radioactive releases from the Fukushima Daiichi Nuclear Power Station on the marine ecosystems. The project, which run between 2011-2015, was successful in training scientists and laboratory staff from the region in analytical and assessment techniques and in updating the ASPAMARD regional database with 100 000 data on radioactivity in seawater, sediment and biota. The final project meeting was held in November 2015.

## **Analytical quality services**

50 Production of Certified Reference Materials for radionuclides in marine samples Sediment from Bikini Atoll and Pacific Ocean:

- Two marine sediments (IAEA-412 and IAEA-410) were certificated in 2015 and are available for distribution.
- Two new sediment samples IAEA-465 (Baltic Sea sediment) and IAEA-469 (Ibaraki Pacific Ocean sediment) are in preparation as future reference materials.

51 Proficiency Testing: After finalising 4 PTs in between 2012 and 2015, RML will organise in 2016 a fifth PT exercise with seawater samples spiked with H-3, Sr-90, Cs-134 and Cs-137. Approximately sixty participants will take part in the 2016 proficiency test. The PT activities are carried out in the framework of the IAEA's Nuclear Safety Action Plan project for "Marine Monitoring Confidence Building and Data Quality Assurance".

## **MARIS database**

52 In 2015-2016 the IAEA's MARine information System (MARiS), an open-access global database for marine radioactivity measurements accessible on Internet (maris.iaea.org), is being upgraded and developed. Development areas include adding new data, updating and improving the website, and interacting with the wider environmental data networks. Furthermore, with the increasing need to educate the wider general audience on the topic of marine radioactivity and the issues surrounding it, MARiS is engaged with the RiO5 working group – Radioactivity in the Oceans, 5 Decades Later – that is supported by the Scientific Committee on Oceanic Research. In 2016, MARiS was updated with the 2015 HELCOM (Baltic Marine Environment Protection Commission - Helsinki Commission) MORS (Monitoring of Radioactive Substances) database.

## **IAEA's CRP K41016 project "Study of temporal trends of pollution in selected coastal areas by the application of isotopic and nuclear tools"**

53 GESAMP suggested that the IAEA supports the development and implementation of nuclear applications to coastal pollution studies. A coordinated research project (CRP), proposed in 2008 as an unfunded activity, was finally initiated in 2016. This CRP will establish a scientific platform aimed at critically reviewing and improving the existing radiometric dating methods for defining time trends of pollution, verification of improved and harmonized common approach on a broad range of case studies in potentially contaminated coastal areas with high sedimentation rates. The IAEA MSs would then be in a better position to sustainably manage their coastal marine environments through application of such improved, harmonised and globally verified environmental archive dating protocol.

## **Radioecology Laboratory (REL) activities**

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

54 The receptor binding assay for harmful algal bloom (HAB) toxin detection has been in full operation at NAEL for research and development application or for technology transfer and capacity building. This method is being used to study biotoxin food web transfer and metabolism. It is being optimized for application to the emerging ciguatera toxins and its proficiency assessed on new seafood sample matrices to broaden its regulatory application.

55 NAEL provides technical and scientific support to 40 Member States (MSs) in Latin America, Asia-Pacific and Africa to build capacity in HAB 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 8 individuals in 2016 from Indonesia, Philippines, Morocco, Tunisia, Cuba, and France). NAEL is joining efforts with other national and international organisation (IOC-UNESCO, US-NOAA, Malarde Institute in French Polynesia) to improve knowledge and enhance capabilities in HAB management.

56 A new Coordinated Research Project (CRP) on the application of the RBA technique for improving coastal management was launched in October 2015, with the participation of 5 member states (Cuba, Thailand, Brazil, France and Spain).

57 The Philippine Nuclear Research Institute was re-designated as an IAEA collaborating centre to work on HABs in the context of environmental and global changes. The plaque will be inaugurated during the 2016 General conference.

58 With the support of a PUI project (funded by the USA) on "Capacity building for the detection and quantification of PSP and CFP toxins in seafood for the management and the mitigation of HABs impacts", nine laboratories from Tunisia, Philippines, Indonesia, El Salvador, Thailand, Oman, USA, and the IAEA participated in a Quasimeme proficiency testing (PT) to assess their performance in saxitoxin detection. Shellfish test samples were delivered and analysed and the result of this first ever PT using the nuclear-based receptor binding assay should be made available in the 4th quarter of 2016.

### **Partnership with the Collaborative Research Centre, SFB 754, at the University of Kiel, Germany**

59 SFB 754 addresses the threat of ocean deoxygenation and its consequences on the global climatebiogeochemistry 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.

60 After two intensive field work campaigns in upwelling areas off the coast of Peru and Mauritania, REL participated in February 2015 in the SFB 754 science retreat to exchange and discuss recent results. REL will continue the collaboration with scientists involved in SFB 754, to further contribute with more detailed data on carbon fluxes to the ongoing studies of the climatebiogeochemistry system.

### ***Research and development of nuclear application for studying contaminants and essential elements in marine biotas***

61 During the last year, REL continued to use radiotracers to investigate bioaccumulation of contaminants and essential elements in marine organism and to also assess seafood safety. The focus for this period was on (1) Cesium in various invertebrates and fish, (2) factors affecting accumulation of trace metals in cockles consumed in West Africa, (3) effect of low pH (ocean acidification) on fish larvae and (4) the food transfer of contaminants and essentials nutrients in fish species produced in aquaculture. For caesium experiments, REL team investigated the exposure of different marine species through different exposure pathways to understand fate of accidental release of this radionuclide in the marine environment and to respond to key questions: How CS is accumulated? What is the major pathway and what is the transfer through the food chain? What is the environmental risk? The results of these studies will help to better understand for example, the high levels found in some species tissues in Fukushima using laboratory experiments and modelling.

### **Activities of the “Ocean Acidification International Coordination Centre (OA-ICC)”**

62 The IAEA OA-ICC continues to help advance international activities in ocean acidification science, capacity building and communication.

63 A regional workshop addressing the impacts of ocean acidification and adaptation strategies in the Red Sea and the Gulf of Aden was organized in Jeddah, the Kingdom of Saudi Arabia, 18-20 January 2016, in partnership with the Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA). The aim of the workshop, which gathered 30 participants representing 7 countries from the region, was to raise awareness about ocean acidification and its potential socio-economic impacts, assess needs for training, and identify opportunities for regional and international cooperation on OA monitoring. The OA-ICC also supported a practical training course on ocean acidification on the island of Inhaca, Mozambique, 8-12 February 2016. The course was organized by the University of Gothenburg (Sweden)

and the Global Ocean Acidification Observing Network (GOA-ON) and focused on ways of setting up meaningful ocean acidification experiments with limited infrastructure and resources. In addition, discussions continued to advance the development of an African ocean acidification network (OA-AFRICA) as initiated at the OA-ICC training course in South Africa (Cape Town, 2-6 November 2015). Fifteen students from 9 African countries participated in the course.

64 In addition to training, the OA-ICC continued to provide support for scientists from developing IAEA Member States to be able to attend international conferences and discuss their work with peers. The project supported 4 scientists from 3 IAEA developing Member States to attend a special session on ocean acidification and its interaction with other ocean change drivers at the MARES Conference “Marine Ecosystems Health and Conservation”, Olhão, Portugal, 1-5 February 2016.

65 The OA-ICC co-sponsored the largest international gathering on ocean acidification - the 4th International Symposium on the Ocean in a High-CO<sub>2</sub> World - hosted in Hobart, Australia, 3-6 May 2016, by the University of Tasmania, Institute for Marine and Antarctic Studies (IMAS), New Zealand, and the Commonwealth Scientific and Industrial Research Organization (CSIRO), Australia. The event, held only every four years, discussed the key latest developments in ocean acidification science, identified future research needs and trends, and offered prime networking opportunities to hundreds of scientists working on ocean acidification from all over the world. Thanks to the support of the OA-ICC, 16 scientists from 11 developing IAEA Member States were able to attend the Symposium and present their research. The OA-ICC also provided an exhibition booth showcasing the project’s work and resources provided to the ocean acidification community.

66 The OA-ICC co-organized the 3rd GOA-ON Science Workshop, which followed the Symposium on the Ocean in a High-CO<sub>2</sub> World (8-10 May). The workshop brought together more than 100 scientists from 40 countries and discussed GOA-ON national and regional status, linkages to other global programmes, data management, capacity building etc. Sponsored by the OA-ICC, six researchers from IAEA Members States had the opportunity to present their work and explore opportunities for cooperation with GOA-ON members from across the globe.

67 The Fourth Annual Meeting of the OA-ICC Advisory Board took place on 2 May 2016 in Hobart, Australia, taking advantage of the presence of many of its members on the occasion of the 4th International Symposium on the Ocean in a High-CO<sub>2</sub> World. The Board discussed the project’s activities and achievements over the past year, and identified areas for improvement and priorities for the future.

68 After two OA-ICC expert meetings on international data management in 2015, work have

progressed with partners to advance data portals on both observing (via GOA-ON) and biological response OA data. Prototypes were show-cased at the various Hobart meetings mentioned above.

69 Finally, work on the online OA-ICC resources continued on a day-to-day basis with updates of the OA-ICC News Stream and Website, as well as the OA-ICC Bibliographic Database, now containing 3700 references, and the OA-ICC Data Compilation on the Biological Response to Ocean Acidification, now offering access to data sets from 700 scientific articles. An article describing the data compilation was published in the journal «Earth System Science Data» in February 2016.

### **Marine Environmental; Studies Laboratory (MESL) Activities**

#### ***Production of Certified Reference Materials and Interlaboratory Comparison exercises***

70 Two Certified Reference Materials (CRM) are under finalisation: i) Characterisation and homogeneity studies of CRM IAEA-459 (persistent organic contaminants in sediment) are on-going; ii) Characterisation and homogeneity studies for trace elements and Methyl Mercury (MeHg) in the CRM IAEA-436 (biota) are on-going. Also a characterization study on trace elements and MeHg in biota sample material for assigning values (MED POL Proficiency Test material) and a homogeneity study of the same PT material, are underway. IAEA's CRMs are produced to assist Member States improving 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.

MESL participated in the 10th Round Robin test organised by the Bonh OSINet Group for the identification of oil spills, using biomarkers and compound specific stable carbon isotopes ratios.

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

71 MESL provided technical support for strengthening the capability of Mediterranean laboratories to accurately analysing contaminants in marine samples, the framework of the MED POL marine pollution monitoring programme (MED POL is the Programme for the Assessment and Control of Pollution in the Mediterranean Region of UNEP/Mediterranean Action Plan). Designated national monitoring laboratories in Mediterranean countries benefit by being able to use the analytical support of MESL in the development in their quality assurance programs for determination of trace elements and organic contaminants in marine environment.

72 MESL organised 5 Proficiency Tests to assist Member States strengthening data quality

assurance in laboratories participating in marine pollution monitoring programmes. In total 56 laboratories from 19 Member States participated in these exercises:

- .1 Analytical Performance Study for MEDPOL: Determination of trace elements in marine sediment sample: 25 laboratories from 11 Mediterranean Member States (Bosnia & Herzegovina, Croatia, Cyprus, Israel, Italy, Lebanon, Montenegro, Morocco, Slovenia, Tunisia, Turkey)
- .2 Analytical Performance Study for MEDPOL: Determination of chlorinated pesticides, PCBs and petroleum hydrocarbon in marine biota sample: 23 laboratories from 11 Mediterranean Member States (Bosnia & Herzegovina, Croatia, Greece, Italy, Lebanon, Montenegro, Morocco, Slovenia, Spain, Tunisia, Turkey)
- .3 Analytical Performance Study for the Black Sea Commission: Determination of trace elements in marine sediment sample: 4 laboratories from 4 Black Sea Member States (Bulgaria, Georgia, Turkey, Ukraine)
- .4 Analytical Performance Study for the Black Sea Commission: Determination of chlorinated pesticides, PCBs and petroleum hydrocarbon in sediment sample: 2 laboratories from 2 Black Sea Member States (Bulgaria, Romania)
- .5 Analytical Performance Study in the framework of the IAEA Technical Cooperation Project RAS7025 (ARASIA region): Determination of trace elements in marine sediment sample: 2 laboratories from 2 Member States (Jordan, Oman)

73 MESL 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, 26/10-6/11/2015 (6 trainees from 6 Mediterranean Member States)
- .2 Training workshop on the analysis of Organic Contaminants in marine samples for laboratory practitioners in MEDPOL countries, 26/10-6/11/2015 (5 trainees from 5 Mediterranean Member States)

74 Four scientists from Sri Lanka Atomic Energy Authority and the Marine Environmental Protection Authority (MEPA) visited MESL laboratory to be trained on the analysis of stable isotopes of Carbon Nitrogen using Isotopic Ratio Mass Spectroscopy (IRMS) for assessing coastal eutrophication processes. The training was provided in the framework of the IAEA's Technical Cooperation Project SRL7005 (Sri Lanka). Also 2 scientists from Greece and 1 scientist from Poland made short scientific visits to MESL to be



informed on issues related to the analysis of trace elements using ICP-MS.

75 In the framework of an agreement signed between IAEA/NAEL and the Regional Organisation for the Protection of the Marine Environment of the Gulf (ROPME), MESL, RML and REL assisted the Gulf Member States implementing the regional ROPME Mussel Watch Programme, by jointly analysing oyster and sediment samples from the coastal zone of the Gulf Member States, for trace elements, organic contaminants, radionuclides and Harmful Algal Blooms related biotoxins. The analyses were completed in 2015 and 7 relevant reports were submitted to the ROPME Secretariat.

76 A new agreement was signed on June 2016 between IAEA/NAEL and UNEP/MAP to continue the collaboration on strengthening data quality assurance in marine pollution monitoring in the Mediterranean region. Already 2 Proficiency Tests and 2 Training Courses are under preparation. The project is on-going and will be completed within 2016.

77 A Practical Arrangements was signed between IAEA/NAEL and the South Asia Co-operative Environment Programme on May 2016, to collaborate on data quality assurance with respect to the analysis of contaminants in the South Asia marine and terrestrial environments.

#### ***Developing tools for assisting MSs to analyse contaminants and long lived radionuclides in marine samples and to identify their sources***

78 MESL continued the development and validation of monitoring methods, which were published in peer reviewed journals and presented in International Conferences.

79 Several analytical methods are under validation including: i) low level trace elements, Hg and MeHg in seawater; ii) petroleum hydrocarbons and organochlorinated compounds in sediments and biota. Also methods are under development including: i) nitrogen and carbon stable isotopes in sediment and biota. ii) analytical procedures to isolate PCBs from PBDEs contaminants iii) gel permeation chromatography for lipid removal of biota samples for persistent organic pollutants (POPs); iv) Isolation of organochlorine compounds from petroleum hydrocarbons by normal phase in HPLC.

### **INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (IOC of UNESCO)**

#### **Global Ocean Science Report (GOSR)**

80 The drafting process for the Global Ocean Science Report (GOSR), which will inform on ocean science human and technical capacity globally; ocean science funding situation and the scientific output, is well underway. An interdisciplinary IOC Editorial Board for the GOSR is established to analyze

data, identify data gaps, review chapters drafted. The first Global Ocean Science Report is to be launched June 2017.

#### **Ocean acidification**

81 Ocean acidification (OA) is a global concern and is a risk to marine biodiversity, ecosystems and human society. The development of improved recommendations regarding biological observation to measure the impact of ocean acidification is strongly supported by the IOC-UNESCO. One element is the co-leadership in the biological working group of the Global Ocean Acidification Observing Network (GOA-ON). During the 3rd GOA-ON workshop, held in Hobart, Australia in May 2016, co-organized by IOC-UNESCO, several breakout groups focused on aligning measurements, updating recommendations and including new parameters, ecosystems to measure ocean acidifications and its impacts. The ideas compiled during the meeting focusing on biological measurements will be discussed in October 2016, when together with IAEA and other experts of GOA-ON IOC is currently organizing a workshop discussing this topic.

82 Since 2016 GOA-ON has 245 members, from 45 countries (2015: 150 scientists, 31 countries). New members from Latin America (members from: Chile, Venezuela, Ecuador, Nicaragua) and the Western Pacific (members from: Philippines, Malaysia, South Korea, Thailand, China) joined the network. In addition, a strong increase in African scientists joining the network was noticed. While before only experts from South Africa participated in the network now researchers from: Senegal, Egypt, Ivory Coast, Congo, Namibia, South Africa, Mauritius, Tanzania and Nigeria are part of the group.

83 Further IOC supported the inauguration meeting of the Latin-American Ocean Acidification Network (LAOCA Network) in December 2015. During two days a group of scientists 24 from seven Latin-American countries, including Argentina, Brazil, Colombia, Ecuador, Peru, Mexico, and Chile meet at the city of Concepcion, Chile to discuss the strengths and weaknesses of each country in relation to ocean acidification' research, and also defining the mission and goals of LAOCA Network. In addition, IOC is currently establishing an Ocean Acidification Observing Network in the Western Pacific, to detect the effects of increasing CO<sub>2</sub> concentrations on coral growth and survival.

84 Following the World Oceans Day in June 2015, the platform of the UNFCCC COP21 was used to raise awareness for ocean acidification, highlighting the anthropogenic impact on marine environment, which going to lose its capacity to act as a carbon sink. During the conference several high-level side events and workshops were organized with the support of IOC, resulting in an improved profile of IOC within the scientific and political community.

85 The IOC further supported the Ocean Acidification international Reference User Group (OA-iRUG). Following a meeting co-organized by IOC in July 2015 at UNESCO HQ 'Acting on Ocean Acidification: Improving prospects by planning ahead' was published with contribution from IOC.

86 The IOC also co-organized the XVI LATIN AMERICAN CONGRESS OF OCEAN'S SCIENCES (COLACMAR) AND XVI NATIONAL SEMINARY OF OCEAN'S SCIENCES AND TECHNOLOGIES (SENALMAR) 2015, in Santa Marta Colombia. The IOC representation included chairing the Ocean Acidification Symposium and also presenting the keynote: Ocean Acidification - Connecting scientists to transfer knowledge at local, regional, global levels.

87 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**

88 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. Priority research of the Scientific Working Group functions in close partnership with the Initiative's Policy Working Group. Internationally applicable standards for quantifying and monitoring carbon storage, sequestration, and emissions in coastal ecosystems on regional and local scales were identified. The in 2014 published manual is widely used, e.g. in Indonesia, Costa Rica, Philippines, USA, Indonesia, Australia, Kenya, Tanzania, Brazil, UAE, and Spain. The 2015 annual workshop of the scientific working group of the Blue Carbon Initiative with the support of IOC-UNESCO, took place in Zanzibar, Tanzania, September 2015. Furthermore, IOC participated in a workshop to establish a Global Science and Data Network for Coastal Blue Carbon (SBC), to support carbon and greenhouse gas cycle science in coastal ecosystems and the application of high quality carbon data to conservation, sustainable management and related policy of those ecosystems in January 2016 in San Francisco.

### **De-oxygenation**

89 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 and finally ocean and human health an IOC expert group – the Global Ocean Oxygen Network- was formed. The IOC Executive Council decided to support this activity during its 49th session. Currently a first draft of a technical brief, summarizing the threat of decreasing oxygen concentrations in the coastal seas and open ocean, is under review by the group of experts. The publication is envisaged to be published late 2016.

### **Time Series**

90 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. IGMETS has delivered several products as a global map, a global assessment, and an interactive visualizer. This group of experts was decided to be supported during the 49th session of the IOC Executive Council. IGMETS focuses on ship based time series globally, analyzing phyto- and zooplankton together with nutrients and physical information (temperature, salinity), and couples these global observations with synoptic satellite data to obtain spatially distributed information. The information provided addresses new scientific questions and serves a well-established community of practice related to ship-based time series. The IGMETS report will publish its report in September 2016.

91 As from 2016 an affiliated group will work specifically to investigate Climate Change and Global Trends of Phytoplankton in the ocean, in particular the coastal ocean (TrendsPO). The Group will continue the comparative analysis and synthesis of long time series data sets compiled by SCOR WG137, and the focus will expand 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 will also examine the land and sea connectivity using long time series of available data.

### **Harmful Algal Blooms**

92 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.

93 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).

94 The long term focus of the IOC Harmful Algal Bloom (HAB) programme is on improved understanding of the factors controlling HAB events and thereby to improve management and mitigation options. The scientific key questions were for a decade addressed through the joint IOC-Scientific Committee on Oceanic Research (SCOR) research programme GEOHAB (Global Ecology and Oceanography of HAB), which through IOC decision IOC-XXVIII, Dec.8.3 was transformed and continued as a new decadal research programme jointly with SCOR to meet societal needs in a changing world. This initiative, entitled GlobalHAB, held its first Scientific Steering Committee meeting in Oban, UK, March 2016.

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

95 The ICES/IOC/IMO Working Group on Ballast and Other Ship Vectors (WGBOSV) critically 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. 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. The ICES/IOC/IMO Working Group on Ballast and Other Ship Vectors (WGBOSV) met at the Marine Protected Area of Tavolara Punta Coda Cavallo in Olbia, Italy, 14 –16 March 2016, including a joint meeting on 16 March with the Working Group on Introductions and Transfers of Marine Organisms (WGITMO). WGBOSV connected with the GloBal TestNet organization (a consortium of ballast water treatment system testing organizations working together to standardize test procedures) by videoconference, to identify areas of coordination and collaboration under ToR c. Jointly with WGITMO, WGBOSV responded to a direct request received from ICES Bureau regarding development of questions that could direct the development of demonstration

advice on “risk management of nonindigenous species associated with shipping in the Arctic”. In addition, jointly with WGITMO, WGBOSV identified key external researchers to invite to next year’s meeting in order to expand expertise on biofouling issues. Two recommendations were developed at the meeting: (i) to initiate discussion/coordination with other Arctic organisations (e.g. Arctic Council working groups on the protection of the Arctic Marine Environment (PAME) and the Conservation of Arctic Flora and Fauna (CAFF)) with a view to jointly address non-native species issues in the Arctic; and (ii) to consider the following three questions as material for development of demonstration advice:

- How will climate change impact the risk of introduction, survival and/or establishment of marine non-native species in the Arctic?
- What management measures currently available in other marine environments are applicable for the Arctic?
- What future activities should be prioritized to manage marine NIS in the Arctic?

96 The report can be accessed at <http://www.ices.dk/community/groups/Pages/WGBOSV.aspx>

#### **Nutrient’s coastal Impacts research**

97 Nutrient over-enrichment of coastal ecosystems is a major environmental problem globally, 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 strategy is a four-year Joint UNEP-IOC Global Environment Facility (GEF) Project ‘Global foundations for reducing nutrient enrichment and oxygen depletion from land-based pollution’ which was launched in March 2012. The IOC is leading the Project research component which delivers 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**

98 IOC has been involved in the establishment and conduct of the Regular Process (RP) from the beginning. In 2005 the General Assembly, by resolution 60/30, requested IOC and the UN Environment Programme (UNEP) to serve as the lead agencies to carry out a three-year start-up phase, in cooperation with all relevant UN agencies and Programmes of the UN, to conduct an “Assessment of Assessments”. This was done through the work of an independent Group of Experts set up in 2006, that delivered its report to the UNGA in 2009. The report identified factors central to the quality of assessments, such as scientific credibility, policy relevance and legitimacy. The report also identified best practices, thematic, geographic or data gaps, scientific uncertainties, as well as research and capacity-building needs, particularly in the developing world. In 2010, the Ad Hoc Working Group after having considered the “Assessment of Assessment” report, recommended the launch of the 1st cycle of the Regular Process. Through UN Resolution 65/37 (adopted by the UNGA in December 2010), IOC together with UNEP, IMO, FAO were invited to provide scientific and technical support to the Regular Process.

99 From 2011 to 2015, the IOC Secretariat provided support to the Regular Process and the WOA report was finalized by Group of Experts in September 2015 and considered by the UN Ad Hoc Working Group of the Whole at that time. UN Member States also decided that prior to launching a second cycle of assessment under the Regular Process, an evaluation of the 1st cycle of the Regular Process implementation should be conducted, reviewing the effectiveness of the arrangements and drawing lessons for improving the next cycle of the Regular Process. Member States and relevant UN bodies were invited to provide their views which the IOC Secretariat did in March 2016. Those pertain primarily to the scoping process of the WOA, the nomination process to the Pool of Experts/ Group of Experts and working procedure of the Group of Experts; communication aspects, capacity building and the involvement of the UN technical agencies, bodies and programmes, as well as non-UN scientific bodies. [Ref. IOC/INF-1335: Views from the Intergovernmental Oceanographic Commission of UNESCO on lessons learned from the first cycle of the Regular Process (WOA-I)].

100 In August 2016, the UN Ad Hoc Working Group decided to launch the second cycle of the Regular Process (2016-2020). It is recalled that the General Assembly that in the first cycle, the scope of the Regular Process would focus on establishing a baseline. In subsequent cycles, the scope would extend to evaluating trends and identifying gaps. The assessment(s) prepared during the second cycle will play a decisive supporting role for other United Nations processes. Overall, the outcome of the

assessment(s) should support policy development and decision-making at national, regional and global levels.

101 Two major outputs are foreseen under the second cycle, (i) a Second World Ocean Assessment(s) to be initiated through a scoping exercise starting in 2017 supported through regional workshops which will, inter alia, help identify regional priorities; (ii) support provided by the Regular Process to support ocean-related intergovernmental processes, as appropriate (for eg BBNJ process, Agenda 2030, UNFCCC process, UNICPOLOS). A draft report presenting the recommendations for the second cycle is available at the following link. [http://www.un.org/depts/los/global\\_reporting/7th\\_adhoc\\_2016/RP\\_Advance\\_Unedited\\_2016.pdf](http://www.un.org/depts/los/global_reporting/7th_adhoc_2016/RP_Advance_Unedited_2016.pdf)

### **Transboundary Water Assessment Programme**

102 IOC completed the implementation of the marine components of the Transboundary Water Assessment Programme (TWAP) funded by GEF. From the IOC perspective, TWAP is the first integrated and global marine assessment that the Commission is leading, and the results produced have the potential to inform a number of ocean governance mechanisms; these include the GEF, other UN agencies with an ocean mandate, other global assessment processes such as WOA and Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services (IPBES), regional seas organizations, and LME commissions, as well as Member States. In order to conduct this assessment, IOC established a consortium of institutional partners and experts for the current Open Ocean and LMEs assessments (these include for e.g. NOAA, IGBP, GESAMP, UNEP-WCMC, University of British Columbia, National Center for Ecological Analysis and Synthesis (NCEAS), amongst others).

103 The final TWAP deliverables released in July 2016, include a set of technical assessment reports for LMEs and Open Oceans, as well as summary for decision-makers, and a data portal where indicators can be visualized and data downloaded ([www.onesharedocean.org](http://www.onesharedocean.org)).

104 The TWAP Full size project was implemented by UNEP as Implementing Agency, UNEP's Division of Early Warning and Assessment (DEWA) as Executing Agency, and the following lead agencies for each of the water system categories: the International Hydrological Programme (IHP) of the UNESCO for transboundary aquifers including groundwater systems in small island developing states (SIDS); the International Lake Environment Committee Foundation (ILEC) for lake basins; UNEP-DHI Partnership - Centre on Water and Environment (UNEP-DHI) for river basins; and the IOC/UNESCO for large marine ecosystems (LMEs) and the open ocean. The institutional partnerships forged in this assessment are envisioned to seed future transboundary assessments.

## OBIS

105 In 2014 the Ocean Biogeographic Information System (OBIS) grew with 3.5 million records, between July 2015 and April 2016, to a total of 46 million records, and not less than 29 publications have cited OBIS in the first 3 months of 2016. OBIS is organized around national, regional and thematic OBIS nodes, which are responsible for the data flow from data providers to the central OBIS node, including ensuring the quality of the data. The OBIS secretariat at the IODE project office integrates all the data in a central, open-access database. Two important new OBIS nodes were established. The international secretariat of the Conservation of Arctic Flora and Fauna (CAFF) has become the Arctic node of OBIS. CAFF ([www.caff.is](http://www.caff.is)) is the biodiversity working group of the Arctic Council and has the mandate in the Arctic region to coordinate and support open access to marine biodiversity data and to support marine biodiversity assessments and monitoring. The other group that joined OBIS is the Oceans Past Initiative (OPI), which is a global research network for marine historical research. Their goal is to enhance knowledge and understanding of how the diversity, distribution and abundance of marine life in the world's oceans has changed over the long-term to better indicate future changes and possibilities, and to contribute to the sustainable use of marine systems. OBIS continues to be an important information source for the identification of Ecologically or Biologically Significant Areas (EBSAs) of the Convention on Biological Diversity (CBD).

## UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)

### Summary of ocean-related activities during the intersessional 2015-16 period

106 During the 2015-16 intersessional period, UNDP's Ocean Governance programme continued implementation of a broad portfolio of projects including management of Large Marine Ecosystems, 'greening' the shipping industry, integrated coastal management, and support to SIDS in applying 'ridge to reef' integrated natural resources management approaches.

107 UNDP/GEF LME projects under implementation include the Caribbean Sea and N. Brazil Shelf project (CLME+; [www.clmeproject.org](http://www.clmeproject.org)) and the Humboldt Current LME project ([www.humboldt.iwlearn.org](http://www.humboldt.iwlearn.org)); the latter achieved the ministerial endorsement by Chile and Peru of the Strategic Action Programme for the HCLME (<http://www.undp.org/content/undp/en/home/presscenter/pressreleases/2016/08/25/chile-and-peru-sign-landmark-agreement-to-sustain-world-s-largest-single-species-fishery.html>). With UNDP/GEF support, PEMSEA ([www.pemsea.org](http://www.pemsea.org)) continued to support East Asian countries in scaling up ICM in the region and to meeting their commitments under the Sustainable Development Strategy for the Seas of East Asia. Recently approved UNDP/GEF projects

supporting implementation of agreed regional LME action programmes will commence shortly in the Benguela Current LME, Agulhas & Somali Currents LME, and the Timor and Arafura Seas.

108 The new UNDP/GEF global marine commodities project also commenced implementation; working in Ecuador, Philippines, Indonesia and Costa Rica, the project aims to mainstream sustainability into seafood supply chains through market and policy mechanisms and partnerships with the overarching goal of rebuilding and protecting fish stocks and livelihoods. The GEF/UNDP/FAO Oceanic Fisheries Management project (<https://www.ffa.int/node/1732>) continued efforts to support Pacific SIDS in meeting their obligations to implement and effectively enforce global, regional and sub-regional arrangements for the conservation and management of transboundary oceanic fisheries thereby increasing sustainable benefits derived from these fisheries. A new UNDP project under the GEF's Coastal Fisheries Initiative will support Peru and Ecuador to demonstrate holistic, ecosystem-based management and improved governance of fisheries in the SE Pacific.

109 UNDP/GEF continued to work closely with IMO on several initiatives: GloBallast ([globallast.imo.org](http://globallast.imo.org)), which celebrated receipt of the latest ratification of global ballast water management convention which formally bring the convention into force in 2017. (<http://www.undp.org/content/undp/en/home/presscenter/pressreleases/2016/09/08/international-community-rallies-to-address-major-threat-to-oceans-.html>). The GEF-UNDP-IMO GloMEEP project (<http://glomeep.imo.org/>) supported a dozen lead pilot countries in advancing governance reforms towards sector compliance with the new IMO EEDI ship energy efficiency standards under MARPOL. Lastly, a new project was prepared and submitted to the GEF, GloFouling Partnerships, aimed, via replication of the Glo-X 'model', at piloting and scaling up national and private sector responses to address the issue of invasive species transferred on ship hulls and other mobile marine infrastructure.

110 Several UNDP/GEF projects under the GEF Pacific SIDS "Ridge to Reef" programme commenced implementation over the period. UNDP is supporting 12 Pacific Islands countries to achieve the project objective to maintain and enhance Pacific Island countries' (PICs) ecosystem goods and services (provisioning, regulating, supporting and cultural) through integrated approaches to land, water, forest, biodiversity and coastal resource management that contribute to poverty reduction, sustainable livelihoods and climate resilience. UNDP's partner SPC (SOPAC) implements the regional component of R2R which supports coordination, mainstreaming, diagnostics, monitoring, knowledge management and capacity building for the overall 14 country R2R programme.

111 The GEF International Waters community, including UNDP Water & Oceans team and portfolio,

convened in Sri Lanka in May 2016 for the biennial 8<sup>th</sup> GEF International Waters conference [http://iwlearn.net/abt\\_iwlearn/events/conferences/iwc8-2016/index\\_html](http://iwlearn.net/abt_iwlearn/events/conferences/iwc8-2016/index_html) . The GEF LME: LEARN project, implemented by UNDP through its partner UNESCO on behalf of the GEF family of agencies, commenced implementation in late 2016. The project objective is to improve global ecosystem-based governance of Large Marine Ecosystems and their coasts by generating knowledge, building capacity, harnessing public and private partners, and supporting south-to-south learning and north-to-south learning.

112 UNDP also participated in and contributed to a number of global ocean conferences and related meetings and symposia, including the Blue Economy Summit (Abu Dhabi, January 2016); 10x20 Initiative Conference on MPAs (Rome, March); Nexus Global Youth Summit (New York, July 2016); World Water Week (Stockholm, September 2016), East Asian Seas Congress (Nov 2015); Seafood and Social Development Conference (Annapolis, Sept 2015), and UN-Oceans.

## **WORLD METEOROLOGICAL ORGANIZATION (WMO)**

113 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 and monitoring of the ocean, climate and the composition of the atmosphere; research on the climate and Earth systems; development and delivery of services for disaster risk reduction, including marine hazards; and provision of science-based information and tools for ecosystem effects assessments, policymakers and the general public at regional and global levels.

### **Marine observations and applications**

114 WMO continues to strengthen the global observing systems through implementation of the WMO Integrated Global Observing System (WIGOS) and WMO Information System (WIS), and observing networks with partners. The WMO-ICSU-IOC-UNEP Global Climate Observing System (GCOS) provides comprehensive, continuous, reliable climate data and information, for climate monitoring, research, projections and assessments, and to promote sustainable development. 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.

115 Today's global ocean observing system relies on composite observing networks comprising meteorological and oceanographic satellites, coastal high frequency radars, and thousands of observing platforms in the global ocean and coastal regions. WMO is collaborating with partner organizations such

as the IOC of UNESCO to further develop, optimize and maintain in complement to satellite observations and remote sensing technology, in situ marine meteorological and oceanographic (metocean) observing networks in support of applications such as weather forecasting and operational meteorology, monitoring, understanding and prediction of climate variability and climate change at various time scales, ocean forecasting and marine services activities, the protection and sustainable development of the ocean and marine environment, and the efficient management of marine resources, including disaster risk reduction in coastal regions.

116 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) 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 sustainable management of natural resources, with due focus on Polar Regions.

117 The 17<sup>th</sup> World Meteorological Congress (Geneva, 25 May – 12 June 2015) approved the creation of a Programme for WMO Small Island Developing States (SIDS) and Member Island Territories. The new Programme will consolidate existing WMO activities to support improved weather and climate services in SIDS and Member Island Territories, with a view to increase their resilience to extreme weather events and other adverse climate change impacts.

### **Climate science and the oceans**

118 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).<sup>1</sup> 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 of society and the environment in which we live – such as predictive experiments for the future state of climate system and project how it will evolve under different emission scenarios.

119 WCRP continues to coordinate the Coupled Model Intercomparison Experiment Project (CMIP) that is one of the foundational elements of climate science, to better understand past, present and future climate changes arising from either natural, unforced

<sup>1</sup> See <http://www.wcrp-climate.org/>.

variability or in response to changes in radiative forcing in a multi-model context. The 5th phase of CMIP (CMIP5, 2010–2013) provided essential dataset to support research compiled in the Report of IPCC entitled “Climate Change 2013: The Physical Science Basis”<sup>2</sup> (September 2013). The 6th phase, CMIP6<sup>3</sup>, is structured to address three broad scientific questions in support of the WCRP Grand Scientific Challenges<sup>4</sup>: (1) how the Earth System responds to forcing; (2) the origins and consequences of systematic model biases; and (3) modality to assess future climate changes given climate variability, predictability and uncertainties in scenarios.

120 Development of scientific methods for treatment of uncertainty in climate-related decision-making is one of key subjects of research conducted by WCRP; a WCRP Grand Science Challenge on “Regional Sea Level Change and Coastal Impacts”<sup>5</sup> 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 “Understanding and Predicting Weather and Climate Extremes”<sup>6</sup> invigorates community-wise efforts to improve understanding, assessment and prediction of weather and climate extremes, such as coastal storms.

### Monitoring and mitigating climate change

121 The Global Atmosphere Watch (GAW) continues its contribution on the latest trends and atmospheric burdens of the most influential, long-lived greenhouse gases (LLGHGs). The 12th WMO/GAW Annual GHG Bulletin<sup>7</sup> reports results of the latest analysis of observations from marine and terrestrial ground based stations contributing to the GAW Programme. Globally averaged surface mole fractions calculated from this in-situ network for carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>) and nitrous oxide (N<sub>2</sub>O) reached new highs in 2015, with CO<sub>2</sub> at 400.0±0.1 ppm, CH<sub>4</sub> at 1845±2 ppb and N<sub>2</sub>O at 328.0±0.1 ppb. The increase of CO<sub>2</sub> from 2014 to 2015 was again larger than the annual increase averaged over the past 10 years. Variability due to the El Niño event in 2015 illustrates the two-way interactions between climate change and the carbon cycle and it highlights the need for high quality, long-term observations. The National Oceanic

and Atmospheric Administration (NOAA) Annual Greenhouse Gas Index<sup>8,9</sup> shows that from 1990 to 2015 radiative forcing by LLGHGs increased by 37%, with CO<sub>2</sub> accounting for about 80% of this increase.

122 CO<sub>2</sub> concentrations recorded in the northern hemisphere (Mauna Loa Observatory) and southern hemisphere (Cape Grim and Casey Station) reached the 400ppm mark in 2015 and 2016, respectively. This jump in CO<sub>2</sub> was probably driven by increased emissions from fossil fuels as well as the impact of the recent El Niño, which reduced the capacity of plant life and other terrestrial systems to absorb CO<sub>2</sub>.<sup>10</sup> Despite the increasing emissions from fossil fuel energy, ocean and land biosphere still take up about half of the anthropogenic emissions. There is however potential that these sinks might become saturated, which will increase the fraction of emitted CO<sub>2</sub> that stays in the atmosphere and thus may accelerate the CO<sub>2</sub> atmospheric growth rate.

123 To ensure better coordination of CO<sub>2</sub> observations between atmospheric and ocean communities, a special session on measurements of dissolved greenhouse gases and related ocean tracers was held at the 18th WMO/IAEA Meeting on Carbon Dioxide, Other Greenhouse Gases, and Related Measurement Techniques (GGMT-2015), on 13–17 September, 2015 in La Jolla, California. Requirements for network compatibility and recommendations for QA/QC procedures and ocean observations were reviewed.

124 At the 17<sup>th</sup> World Meteorological Congress, WMO adopted a resolution on the implementation of the Integrated Global Greenhouse Gas Information System (IG<sup>3</sup>IS)<sup>11</sup> with the aim to expand the observational capacity for GHGs, extend it to the regional and urban domain, and develop the information systems and modelling frameworks to provide information about GHG emissions to society. The implementation of IG<sup>3</sup>IS fundamentally relies on the globally harmonized observations of GHGs and will require the development of high resolution and complex observing systems, modelling tools and data assimilation techniques.

125 At the 17<sup>th</sup> World Meteorological Congress, WMO members considered the issues related to climate engineering and agreed with a conclusion of the Commission for Atmospheric Sciences (CAS)

<sup>2</sup> See <http://www.ipcc.ch/>.

<sup>3</sup> See <http://www.wcrp-climate.org/wgcm-cmip/wgcm-cmip6>.

<sup>4</sup> See <http://www.wcrp-climate.org/grand-challenges/grand-challenges-overview>.

<sup>5</sup> See <http://www.wcrp-climate.org/grand-challenges/gc-sea-level>.

<sup>6</sup> See <http://www.wcrp-climate.org/grand-challenges/gc-extreme-events>.

<sup>7</sup> WMO Greenhouse Gas Bulletin No. 12 (November 2016) Available at [http://www.wmo.int/pages/prog/arep/gaw/ghg/ghgbull06\\_en.html](http://www.wmo.int/pages/prog/arep/gaw/ghg/ghgbull06_en.html)

<sup>8</sup> Butler, J.H., and Montzka, S.A., 2016. “THE NOAA Annual Greenhouse Gas Index (AGGI)”, <http://www.esrl.noaa.gov/gmd/aggi/html>

<sup>9</sup> NOAA ESRL, 2016: NOAA’s Annual Greenhouse Gas Index. <http://www.esrl.noaa.gov/gmd/aggi/>

<sup>10</sup> See WMO’s Press Release (18 May 2016) “CO<sub>2</sub> breaches milestone, drives warming” (<http://public.wmo.int/en/media/news/southern-hemisphere-breaches-co2-milestone>).

<sup>11</sup> WMO, 2016. “Integrated Global Greenhouse Gas Information System (IG<sup>3</sup>IS)”. <http://www.wmo.int/pages/prog/arep/gaw/ghg/IG3IS-info.html>

that further research is needed to adequately understand the potential feasibility, the effectiveness and risks associated with various climate engineering techniques. WMO is of the opinion that the future could require a UN-wide framework to govern these activities as consequences could be global and irreversible, involving the atmosphere, land and oceans. The Congress requested CAS to assess the gaps in scientific understanding on climate engineering and appropriate research to address such gaps, and to do so in close cooperation with IMO, IOC/UNESCO, IPCC, WCRP and other relevant international, academic and science bodies.

126 At its 42nd session, the Joint Group of Experts on the Scientific Aspects of Marine Environmental Protection (GESAMP) agreed to establish a new working group (WG 41) on marine geoengineering under the lead of IMO with support from IOC/UNESCO and WMO and co-chaired by independent experts. The goal of the WG is to carry out an assessment of a wide range of marine geoengineering approaches for their potential environmental and socio/economic impacts on the marine environment (and the atmosphere where appropriate) as well as their potential scientific practicality and efficacy for climate mitigation purposes. The WG held its first workshop at IMO Headquarters, London, UK, 23-25 May 2016.

#### **Atmospheric composition information in support of marine ecosystem research and assessment**

127 GAW is the only existing long-term international global programme that coordinates observations and analysis of atmospheric composition changes, with a view to help improve understanding of interactions between the atmosphere, the oceans and the biosphere. The new GAW Implementation Plan for 2016-2023 will place an increased emphasis on the delivery of value-added and cross-cutting products and services that are relevant to society, including climate, weather forecasting, ecosystem sustainability, human health, mega-city development, agricultural productivity and many more.

128 One of GAW's upcoming activities is the production of global maps of total atmospheric deposition, aerosols and gases for a number of atmospheric chemicals of importance for aquatic and terrestrial ecosystems and human health (e.g. sulfur, ozone, nitrogen and other nutrients) through the application of the emerging technique of measurement-model fusion. A workshop<sup>12</sup> will be held at the WMO Headquarters in Geneva on 28 February to 2 March, 2017 to review existing knowledge and information and to develop a project plan.

129 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. WG 38 is also embarking on two new activities approved by GESAMP at its 42<sup>nd</sup> session: 1) an investigation of the changing atmospheric acidity and the oceanic solubility of nutrients, and 2) an investigation of the impact of ocean acidification on fluxes of non-CO<sub>2</sub> climate-active species. See the report from the co-chairman of Working Group 38 submitted to GESAMP 43 for details.

130 WMO is also actively pursuing additional coordination and collaboration with the marine research community through the Surface Ocean-Lower Atmosphere Study (SOLAS). WCRP has been a long-term sponsor of SOLAS. Scientists from the SOLAS community are well-engaged in the work of GESAMP Working Groups 38 and 41. WMO/GAW will participate in the SOLAS Science and Society workshop taking place in Brussels on October 26 and 27, 2016. The workshop will bring together researchers in the field of ocean-atmosphere interactions and social scientists with the goal to explore the following topics: 1) Valuing carbon and the ocean's role, 2) (In) Forming policy across the air-sea interface, and 3) The shipping industry and air-sea interactions.

#### **Prediction and monitoring on shorter time scales**

131 The Subseasonal-to-seasonal Prediction Project<sup>13</sup>, established as a joint initiative of WCRP and the WMO World Weather Research Programme focuses on improving forecast skill and understanding on the subseasonal to seasonal timescale with special emphasis on high-impact weather events. Progressing the development of coupled systems for atmosphere-ocean and sea ice are in the scope of the project, as are the representation of teleconnections in numerical models. A database provides access to multi-model subseasonal forecasts and hence fosters research activities on these aspects.

132 The Polar Prediction Project (PPP<sup>14</sup>), another joint initiative of WWRP and WCRP aims on improving 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. The upcoming Year of Polar Prediction (YOPP, mid 2017-mid 2019) is one of the key initiatives of PPP and will cover an extended period of coordinated intensive observational and modelling activities in order to improve polar prediction capabilities on a wide range of time scales in both polar regions.

133 Improving the predictions of high-impact events in coastal regions on timescales from minutes to two weeks, in particular in an urban environment, will be addressed by the recently established WWRP's

<sup>12</sup> See <http://www.wmo.int/pages/prog/arep/gaw/WorkshopMeasurementModelFusion.html>

<sup>13</sup> See <http://www.s2sprediction.net>

<sup>14</sup> See <http://www.polarprediction.net>



High Impact Weather (HIWeather<sup>15</sup>) Project. Improved monitoring on ocean conditions, coupled atmosphere-land-ocean modelling and research on early warning systems are some of the planned activities.

## UN Environment

### Marine and Coastal Strategy<sup>16</sup>

134 The work on the marine and coastal ecosystems at UN Environment is conducted based on the marine and coastal strategy. 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. UN Environment work focuses on using sound science to apply ecosystem management to the factors that cause decline of ecosystem services in marine and coastal areas.

135 The strategy cuts across the seven sub-programme areas of the UN Environment work programme: climate change, disasters and conflicts, ecosystem management, environmental governance, chemicals and waste, resource efficiency and sustainable consumption and production, and environment under review.

136 The Ecosystems Division is the lead Division for UN Environment marine and coastal programme. Activities are supported by other Divisions such as the Science, Law and Economics Divisions, as well as UN Environment collaborating Centres such as UN Environment World Monitoring and Conservation Centre (UN Environment-WCMC) and the Global Resources Information database (GRID-Arendal). A key strength of the marine and coastal ecosystem work at UN Environment is its ability to facilitate cooperation at global, regional and national levels through the Regional Seas Programme and the Global Programme of Action for the Protection of Marine Environment from Land-based Activities (GPA).

137 The key areas of work include management of marine litter, wastewater and nutrients, and environmental aspects of fisheries; integrated management of marine protected areas; marine biodiversity and ecosystems; green economy for oceans; and impacts of climate change on the marine environment.

138 UN Environment 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. In particular, 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. There is also extensive collaboration 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.

139 Through paragraph 17 of the resolution 2/10 Oceans and Seas of the Second Sessions of the United Nations Environment Assembly (UNEA), Member States requested the Executive Director of UN Environment to assess the effectiveness of the current marine and coastal strategy. Based on the assessment, UN Environment will submit a proposal for its updates, revision or replacement to the Third Session of the Environment Assembly to be held in 2017.

### Regional Seas Programme<sup>17</sup>

140 UN Environment has been coordinating the UN Environment 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 programmes<sup>18</sup>.

141 Member States 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.

142 The UN Environment Regional Seas Programme is renewing its commitments to address degradation of oceans and seas in the context of the Agenda 2030 for Sustainable Development. The Regional Seas programmes adopted the new

<sup>15</sup> See [https://www.wmo.int/pages/prog/arep/wwrp/new/high\\_impact\\_weather\\_project.html](https://www.wmo.int/pages/prog/arep/wwrp/new/high_impact_weather_project.html)

<sup>16</sup> [http://www.unep.org/esm/Portals/50159/docs/em\\_water/UNEPs\\_Marine\\_Coastal\\_Strategy\\_Executive\\_Summary.pdf](http://www.unep.org/esm/Portals/50159/docs/em_water/UNEPs_Marine_Coastal_Strategy_Executive_Summary.pdf)

<sup>17</sup> <http://www.unep.org/regionalseas/>

<sup>18</sup> Abidjan Convention, Barcelona Convention, Cartagena Convention, East Asian Seas Action, Nairobi Convention, Plan, Northwest Pacific Action Plan, and Tehran Convention

Regional Seas Strategic Directions (2017-2020)<sup>19</sup> in 2015 focusing on four key thematic areas: pollution, climate change, extraction of living and non-living resources, and ocean governance. Cooperation with relevant multilateral environmental agreements and regional bodies continues to be one of the core strategies for the UN Environment Regional Seas Programme.

143 In order to move towards more inter-sectoral management, UN Environment, in partnership with FAO, has been working to foster dialogues between Regional Seas programmes and Regional Fisheries Bodies. Inspired by successful cooperation examples in the North East Atlantic region and the Mediterranean, many regions started discussing possibility of cooperation and coordination. Such regions include: West African region, East African region, ROPME Sea Area and the Wider Caribbean.

144 The first global dialogue between the Regional Seas programmes and Regional Fisheries Bodies was organised by the Secretariat of the Convention on Biological Diversity from 26 to 29 September 2016 in Seoul, Republic of Korea. The Sustainable Ocean Initiative (SOI) Global Dialogue with Regional Seas Organizations and Regional Fisheries Bodies on accelerating progress towards the Aichi Biodiversity Targets recognised the importance of inter-sectoral cooperation at the regional level for achieving the Sustainable Development Goals and Aichi targets.

145 The 18th Global Meeting of the Regional Seas Conventions and Action Plans was held in Incheon, Republic of Korea from 30 September to 1 October 2016. At the meeting, the Regional Seas programmes welcomed the outcome from the SOI meeting and agreed to continue cooperating with relevant bodies in order to assist participating countries with achieving the ocean-related SDGs.

## Activities in the regions

### **Cartagena Convention**<sup>20</sup>

146 The Secretariat successfully completed the GEF Wastewater Management (CReW) Project and a second phase of the project (CReW+) has been developed in collaboration with the Inter-American Development Bank, the main partner on this programme. Awareness of wastewater management issues at ministerial levels has increased through the engagement of Ministers of Environment in High Level Sessions. Guyana, Antigua and St. Lucia have new and updated national policies, legislation and regulations for wastewater management. Wastewater Baseline Assessments have been completed and more than 400 persons were trained in various aspects of wastewater management.

<sup>19</sup> [http://www.unep.org/ecosystemmanagement/water/regionalseas40/Portals/50221/WBRS18\\_INF8\\_RSSD2017\\_2020.pdf](http://www.unep.org/ecosystemmanagement/water/regionalseas40/Portals/50221/WBRS18_INF8_RSSD2017_2020.pdf)

<sup>20</sup> <http://www.cep.unep.org/cartagena-convention>

147 A new project developed by the Secretariat, "Implementing Integrated Water, Land and Ecosystems Management in Caribbean SIDS (IWEco)," was officially launched in September 2016. It includes ten participating Caribbean Small Island Developing States. Other projects developed and supported by the Secretariat in the Wider Caribbean Region include the Caribbean Large Marine Ecosystem Projects, CLME and CLME+, and the GEF-UNDP-IMO GloBallast Partnership Project which benefited the Bahamas, Jamaica, Trinidad and Tobago and Venezuela. The Secretariat is also working towards the development of the first State of the Convention Area Report (SOCAR).

148 The Specially Protected Areas and Wildlife (SPAW) Sub-Programme saw the completion of its Mentorship Programme during 2014, with three mentorship agreements and capacity-building activities successfully concluded between mentors of at least three Marine Protected Areas (MPA) sites (Bonaire Marine Park; La Caleta, Dominican Republic; and Hol Chan, Belize) which are listed under the SPAW Protocol. A Cooperation Programme was launched to provide small grants to support listed Protected Areas (PAs), and assist with additional nominations. By the end of 2014, 13 PA listed sites were added under the SPAW Protocol, bringing the total to 31 areas from the Wider Caribbean Region listed by Parties. Parties have also applied the Protocol's criteria for species listing and included four coral reef species as fully protected under Annex II.

149 The project "Biodiversity for Sustainable Development in the Caribbean through Ecosystem Based Management" moved into the full implementation phase in 2016. It builds on the outcomes of regional support provided during 2011-2013 for the Caribbean Challenge Initiative. This new project is supporting capacity building and pilot activities for SPAW Parties aiming at the successful application of Ecosystem Based Management (EBM) approaches and tools as a contribution to the conservation and sustainable management of coastal and marine resources, including the application of Marine Spatial Planning (MSP) and Decision Support Systems (DSS) tools, piloted in the Dominican Republic. The Guidelines for Management of Protected Areas continues to be implemented and the Guidelines on Species Conservation and Management have also been developed.

150 The Regional Action Plan on Marine Litter Management in the WCR (RAPMaLI) was revised and will form the basis for new Marine Litter projects in the Wider Caribbean Region. In collaboration with the United States Environmental Protection Agency (US EPA) and the Peace Corps, the Secretariat is working with Jamaica and Panama on piloting the Trash Free Partnership International, an initiative to reduce land-based sources of trash in local communities. The focus is on approaches that can drive national policy on solid waste and marine litter.

151 Under the auspices of the Caribbean Platform for Nutrient Management, the US Department of State recently approved a sustainable nutrient management project, with Jamaica and Costa Rica as beneficiary countries. Support to Nutrients Management is also expected through the GEF CLME+ Project which will involve the following:

- a. Assessment of Nutrients (Loading and Impacts) as part of the development of the State of Convention Area Report;
- b. Development and implementation of a pilot project on Ecosystem Based Management in the Southern Caribbean which will look at the interconnection between habitat degradation and pollution including from nutrients;
- c. Development of "Regional Action Plan for the reduction of impacts from excess nutrient loads on marine ecosystems"
- d. Development of baseline and (pre-) feasibility assessment report on the needs and opportunities for investments to reduce the impacts of pollution on human well-being and to safeguard the goods & services delivered by marine ecosystems and associated living resources to human society.
- e. Development of investment plans (incl. specifications for private sector and civil society involvement) to deal with key issues identified under the CLME+

#### **Coordinating Body on the Seas of East Asia (COBSEA)**<sup>21</sup>

152 COBSEA together with UN Environment is currently implementing the GEF Project Preparation Grant (PPG) to formulate the full project document of the UN Environment/GEF Project "Implementing the Strategic Action Programme for the South China Sea (SCS SAP)". The COBSEA Secretariat will act as the Executing Agency for this project which aims to assist countries in meeting the targets of the coastal and marine environment components (mangroves, coral reefs, seagrass and wetlands) of the approved Strategic Action Programme (SAP) for the South China Sea through implementation of the National Action Plans in support of the SAP, and strengthening the regional co-ordination for the SCS SAP implementation. The project is a USD 15 Million Grant from GEF with indicative co-financing of USD 56 Million from six participating countries – Cambodia, China, Indonesia, Philippines, Thailand and Vietnam, to be implemented by UN Environment/COBSEA. Technical support missions were conducted in participating countries to initiate the national level activities and requirements of the project, and national consultations for the development of local project management arrangements and work plans. The full project document has been formulated and validated by participating countries during a regional workshop in July 2016. The required Memorandum of Understanding and Co-financing Commitment

<sup>21</sup> <http://www.unepmap.org/index.php?module=content2&catid=001001004w.cobsea.org/>

Letters from participating countries have also been signed and secured.

153 COBSEA is also developing its New Strategic Direction document which will set COBSEA's direction in addressing the challenges and emerging issues for the next five years taking into consideration the participating country needs and priorities, the strategic direction of UN Environment Regional Seas Programme and other UN Environment-related strategies. The new strategic direction document will be presented in the 23rd COBSEA Intergovernmental Meeting (IGM) scheduled early 2017.

#### **Mediterranean Action Plan (Barcelona Convention)**<sup>22</sup>

154 The 19th Ordinary Meeting of the Contracting Parties to the Barcelona Convention (COP 19) held in Athens, Greece, on 9-12 February 2016 adopted a considerable package of strategic and action oriented policies addressing issues of relevance not only for the region but also at global level such as the Mediterranean Strategy for Sustainable Development (2016-2025), the Action Plan for the Implementation of the Offshore Protocol of the Barcelona Convention, the Regional Strategy for Prevention of and Response to Marine Pollution from Ships (2016-2021), the Regional Action Plan on Sustainable Consumption and Production in the Mediterranean, the Regional Climate Change Adaptation Framework, the Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria, the updated National Action Plans (NAPs), etc.

155 The revised Mediterranean Strategy for Sustainable Development (MSSD) 2016-2025 represents the first effort to translate at regional level the recently agreed global SDGs. It provides an integrated policy framework for achieving the vision of a sustainable Mediterranean region and for the elaboration of national sustainable development strategies in riparian countries. It aims to harmonise the interactions between socio-economic and environmental goals, adapt international commitments to regional conditions, guide national strategies for sustainable development, and stimulate regional cooperation between stakeholders in the implementation of sustainable development.

156 The Action Plan for the Implementation of the Offshore Protocol of the Barcelona Convention will support this unique and pioneering legal instrument that entered into force in 2011. The Action Plan aims at defining measures which, if applied at regional level and by each Contracting Party within their jurisdiction will ensure the safety of offshore activities and reduce their potential impact on the marine environment and its ecosystem. The Regional Strategy for Prevention of and Response to Marine Pollution from Ships (2016-2021) is an update

<sup>22</sup> <http://www.unepmap.org/index.php?module=content2&catid=001001004>

of the previous Strategy adopted by the COP 14 in 2005.

157 The preparation of the Regional Action Plan on Sustainable Consumption and Production (SCP) in the Mediterranean was mandated by COP 18. The absence of a common regional action framework identifying SCP priorities and tools has contributed to the dispersion of the different actions undertaken to foster the shift towards SCP in the Mediterranean, with scarce coordination and communication between the different actors. The duplication of efforts, lack of synergies and insufficient dissemination and replication of the results and outputs obtained in the projects developed were some of the shortcomings. The Action Plan is a forward-looking framework, to complement and work in full synergy with existing national and regional policy frameworks in general, and to support the implementation of the Barcelona Convention and its Protocols in particular.

158 The Regional Climate Change Adaptation Framework aims to define a regional strategic approach to increase the resilience of the Mediterranean marine and coastal natural and socioeconomic systems to the impacts of climate change, assisting policy makers and stakeholders at all levels across the Mediterranean in the development and implementation of coherent and effective policies and measures.

159 Monitoring and assessment based on scientific knowledge is the indispensable basis for the management of human activities, in view of promoting sustainable use of the seas and coasts and conserving marine ecosystems and their sustainable development. The Integrated Monitoring and Assessment Programme of the Mediterranean Sea and Coast and Related Assessment Criteria (IMAP) describes the strategy, themes, and products that the Contracting Parties are aiming to deliver through collaborative efforts within the MAP system over the second cycle of the implementation of the Ecosystem Approach Process, i.e. over 2016-2021, in order to assess the status of the Mediterranean sea and coast, as a basis for further measures.

160 The Mediterranean Action Plan (MAP) adapted the framework of the UN Environment/MAP Barcelona Convention to establish a Regional Plan on Marine Litter, with legally-binding measures and operational targets to be adopted by 2025 in order to minimize and prevent marine litter.

### **Nairobi Convention** <sup>23</sup>

161 The Nairobi Convention has prepared a Regional State of the Coast Report (RSOCR) which responds to the requirements of the Nairobi Convention and contributes to the United Nations-led production of the World Ocean Assessment (WOA) reports and to other global and regional processes,

<sup>23</sup> <http://www.unep.org/nairobiconvention/>

such as the Global Environment Outlook coordinated by UN Environment.

162 The Nairobi Convention Secretariat is partnering with UN Environment, UNDP and Global Environmental Facility (GEF) to implement two projects namely: the Strategic Action Programme for the protection of the Western Indian Ocean from land-based sources and activities (WIO-SAP) and the Western Indian Ocean Large Marine Ecosystems Strategic Action Programme Policy Harmonization and Institutional Reforms (SAPPHIRE). The WIO-SAP project builds on previous work completed under the UN Environment-supported and GEF-financed 'Addressing Land Based activities in the Western Indian Ocean' (WIO-LAB) project and aims at reducing impacts from land based-sources and activities and sustainably managing critical coastal –riverine ecosystems through the implementation of the Strategic Action Programme and the identified priorities. SAPPHIRE project builds on previous work under the UNDP-supported and GEF-financed Agulhas Somali Current Large Marine Ecosystems (ASCLME) project and aims at helping governments and intergovernmental bodies deliver aspects of the Large Marine Ecosystems Strategic Action Programme (LME-SAP) and ensuring the sustainability of SAP implementation through strong institutional arrangements and partnerships.

163 The Nairobi Convention Secretariat in collaboration with the Western Indian Ocean Marine Scientists Association prepared the Climate Change Strategy for the Nairobi Convention Area. The Strategy was presented and discussed by the Contracting Parties at the Eighth CoP in June 2015. The strategy will enable the Contracting Parties to the Nairobi Convention integrate relevant recommendations of the Climate Change Strategy into their national climate change strategies and develop policies, programmes and projects on climatic variability and climate change.

164 The Nairobi Convention is working in partnership with UN's Food and Agriculture Organization to support and implement the project 'Sustainable Fisheries Management and Biodiversity Conservation of Deep Sea –Living Marine Resources and Ecosystems in the Areas Beyond National Jurisdiction'. In addition, the parties to the Convention in collaboration with IUCN have decided to support the conservation and sustainable exploitation of seamount and hydrothermal vent ecosystems of the South West Indian Ocean in the Areas Beyond National Jurisdiction (ABNJ) and to collaborate in the management of activities in the adjacent waters.

165 The Convention is working with GRID-Arendal, Institute for Sustainable Development and International Relations (IDDRI) and UN Environment's World Conservation Monitoring Centre (UN Environment-WCMC) to prepare regional guidelines on environmental management for oil and gas development in the Western Indian Ocean region. The guidelines will include a regionally coordinated Strategic Environmental Assessment of the social and

environmental sustainability of oil and gas extraction in the region.

166 From the Contracting Parties to the Nairobi Convention Decision CP8/12 of the Eighth Conference of Parties to the Nairobi Convention held on 22-24 June 2015 the Secretariat, in collaboration with partners, negotiated and developed terms of reference, mode of operation and composition of the Science to Policy platform during the Science to Policy forum meeting on 11-12 October. Participants agreed to form a multi-stakeholder platform comprising of formal and informal knowledge generating institutions, practitioners, policy makers, communities and the private sector to serve as an intermediary body to bridge the gaps between policy and practice. The platform will deliver thematic and assessment reports, synthesis reports, summary for policymakers, technical summary, technical papers, recommendations for decision making and assessment tools.

167 An Area Based Planning tools workshop was organized on 13-14 October as a follow up to Decision CP8/10 of the Contracting Parties the Nairobi Convention on governance of Areas Beyond National Jurisdiction (ABNJ). The meeting was organized by the Nairobi Convention Secretariat, in collaboration with UN Environment-WCMC as part of the implementation of the project on Sustainable fisheries management and biodiversity conservation of deep-sea living resources and ecosystems in ABNJ. The workshop explored the applicability of area-based planning tools to ABNJ and provided an opportunity to review necessary regional cooperation to implement the 2030 Agenda and Sustainable Development Goals (SDG). The session was a follow-up to the Contracting Parties of the Nairobi Convention Decision CP8/1.2 on implementation of Sustainable Development Goals in the Convention's work programme for 2018-2022 with specific reference to SDG14 on marine and coastal environment. The session was organized in collaboration with the Institute of Advanced Sustainability Studies (IASS), Institute of Sustainable Development and International Relations (IDDRI), German Corporation for International Cooperation (GIZ), and the German Federal Ministry for Economic Cooperation and Development (BMZ).

168 The Nairobi Convention continues to foster partnerships regionally and internationally for the implementation of the SDG14 on Oceans. In partnership with WWF-Madagascar, the Nairobi Convention will on 25 November 2016 bring together Contracting parties and partners working in the Northern Mozambique Channel (NMC) to explore the options for partnerships and role of NMC in implementation of SDG14.

169 Development of the Protocol on Integrated Coastal Zone Management (ICZM) will promote sustainable management of coastal and marine resources in the Western Indian Ocean region. To achieve this, the Nairobi Convention has partnered

with the Indian Ocean Commission (IOC) to review, negotiate and conclude the draft ICZM protocol pursuant to Decision CP8/3 of the Eighth Conference of Parties to the Nairobi Convention (June 2015) on the Protocol. The third negotiations meeting on the ICZM protocol will be held on 21-24 November 2016 to address outstanding issues and finalize all the key elements of the protocol.

### **Northwest Pacific Action Plan (NOWPAP)** <sup>24</sup>

170 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. Within the framework of the NOWPAP Medium-term Strategy (MTS) 2012-2017, 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 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.

171 In May 2016, NOWPAP focal points agreed on the list of EQOs common to the four NOWPAP countries, including: (1) Biological and habitat diversity are 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. Over the next two years, NOWPAP partners will develop indicators and targets for each EQOs that would become a basis for the next NOWPAP Medium Term Strategy 2018-2023.

172 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. NOWPAP is a member of the Global Partnership on Waste Management (GPWM) and is hosting the NW Pacific regional node of the Global Partnership on Marine Litter (GPML) since 2014.

<sup>24</sup> <http://www.nowpap.org/>

173 NOWPAP continues developing and strengthening partnerships with the relevant organizations and programmes in the region, including North-East Asian Subregional Programme for Environmental Cooperation (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) 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.

### **Global Programme of Action for the Protection of the Marine Environment from Land-based Activities (GPA)**<sup>25</sup>.

174 The GPA focused 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.

175 The wastewater portfolio has strengthened the normative basis for better wastewater management. The GPA is coordinating activities under the UN-Water Task Force on Wastewater. The key activity of the Task Force was publication of an Analytical Brief on Wastewater, launched in February 2015. The Brief encourages governments to view treated wastewater as a valuable resource, and a priority for the post-2015 development agenda. It also warns that untreated wastewater, if not addressed, will increasingly pose a threat to human health, economic activity and water security.

176 The programme also completed an economic valuation of the impacts of wastewater, published in June 2015. GPA provided support to the Regional Organization for the Conservation of the Environment of the Red Sea and Gulf of Aden (PERSGA) in developing Regional Guidelines on Wastewater Management in Coastal Cities on the Red Sea and Gulf of Aden. These guidelines are based on information collected from all PERSGA member states. Present status of Wastewater treatment in the Red Sea and the Gulf of Aden countries is described as an entry to the Guidelines. The guidelines discuss in some detail the political will for investment in wastewater management, technical and economic aspects. Suitable technologies for the region and disinfection as well as capacity building have also been discussed. The guidelines have been adopted and are a useful tool for better wastewater management.

177 The Swiss Government gave approval for the initiative on the development of a Global monitoring mechanism for wastewater, water quality, and water resource management, with substantial financial

support from the Swiss Development Cooperation (SDC). This Global Enhanced Monitoring Mechanism (GEMI) is expected to be a capacity building initiative, both in terms of assistance to countries to help them in monitoring and reporting to fulfil their commitment in implementing the 2030 Agenda on sustainable development goals and targets. A monitoring methodology has been developed and is being rolled in selected countries for the proof of concepts phase. The GPA is also working in close collaboration with the UN-Habitat on the Greener Cities Partnership which was launched at the World Urban Forum in April 2014. Focusing on wastewater activities, the partnership was set up in response to the call of the Executive Directors of UN Environment and UN-Habitat to raise the visibility and profile of the inter-agency cooperation.

178 The Global Wastewater Initiative (GW2I), launched by the Executive Director in 2013, provides a platform to address and work under thematic groups on major issues, challenges and potentialities of wastewater such as wastewater reuse and promoting wastewater as a resource. This partnership remains a valuable and flexible tool to achieve various goals and targets set by the international community on sustainable wastewater management. It provides capacity building support & technology transfer; by collecting and documenting good practices on wastewater treatment approaches and technologies for reuse, as well as supporting policies and financial instruments, a number of publications have been developed in this regard and are available on the GPA website. Working with partners, it is engaged in several demonstration projects Wastewater Treatment Technologies on the ground and also developed guidelines and checklist summarize key issues, challenges and opportunities for gender mainstreaming in wastewater management.

179 Since the inception of the UN Environment GPA Wastewater Programme, 14 demo projects have been developed with partners and are in different stages of implementation. One project in Georgia for example, implemented by Women in Europe for Common Future (WECF), aims to reduce the pollution load in the Black Sea, by introducing sustainable wastewater and nutrient management in rural Georgian communities. Knowledge products have been generated for decision-makers and practitioners, including a technology matrix on wastewater treatment technologies and supportive policies and financial instruments for integrated wastewater management and reuse. The future of the GW2I seeks to focus more on promoting engagement of stakeholders in emerging Issues Endocrine disrupting compounds (EDCs), Wastewater as an energy source, and also promoting increase in quality and quantity of data on wastewater. Another area of focus will be on establishing more regional platforms acknowledging that they are best placed to facilitate the implementation of GW2I objectives at the regional level.

<sup>25</sup> <http://www.gpa.unep.org/>

180 The Global Partnership on Nutrient Management (GPNM) launched in 2009 is hosted by the GPA and its work is embedded within the agency Programme of Work. Regional GPNM platforms for Asia and Caribbean have been launched with active follow-up in strengthening government representation and articulation and endorsement of actions plans. The Regional Platforms will operate under the aegis of the Regional Seas Programmes. A 'one-stop' online resource on nutrient management of the GPNM, "Nutrientchallenge.org" has been developed and is being upgraded to enhance functionality. The GPNM, in collaboration with the GW2I supported through the GPA, is developing a Massive Open Online Course (MOOC) on nutrients and wastewater management to assist in the outreach and availability of web-based resources. Concordia University of Montreal, Canada is developing the MOOC sourcebook and online platform.

181 A significant body of knowledge related to quantitative modelling approaches (based on tools such as Global NEWS model), on coastal nutrient enrichment has now been generated with several published scientific journal articles available on the topic. This work has been undertaken under the GEF-funded Global Nutrient Cycling Project in which IOC-UNESCO has been leading in association with University of Utrecht, Washington State University and University of the Philippines. The nutrient load data is now 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. Validation of the toolbox functionality with stakeholders has been ongoing through familiarization and training activities with agricultural advisory professionals and farmers (events held in India, Viet Nam and Sri Lanka in July 2015, November 2015 and May 2016 respectively).

182 Watershed-based nutrient flux modelling has been on-going for the Manila Bay watershed under the GEF-GNC Project, led by the University of the Philippines, to support the design of watershed BMPs and strategies for addressing nutrient loading into the receiving environment. Work on various decision support products such as the Environmental Atlas of Manila Bay, the Laguna de Bay ecosystem health report card (Philippines), the Chilika Lake ecosystem health report card (India) and the Management plan for the Manila Bay is on-going. Other key collaborators include the Chilika Lake Authority and the Laguna Lake Development Authority.

183 The GEF has also recently approved (October 2016) a US\$6 million grant for the implementation of the International Nitrogen Management System (INMS) Project. This is a science-policy support process that will 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.

184 There has been heightened concern over the impact of climate change related to ocean temperatures and influences on the proliferation and persistence of harmful algal blooms. The general indication is that HABs could become more widespread and persistent under warmer ocean temperatures, compromising marine ecosystems, and leading to adverse human health impacts from toxic blooms. 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.

185 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. Two additional nodes are in the pipeline for the Mediterranean as well as the South Pacific. These nodes provide regional platforms for the global partnership, identifies stakeholders and priority areas and coordinate with UN Environment to raise the profile of marine litter within the region through regionally appropriate approaches. Regional priorities are identified in collaboration with the nodes based on any existing marine litter action plans and concept notes are developed for fundraising purposes.

186 A variety of activities ranging from capacity building and awareness rising to the development of municipal action plans have for example been carried out in Panama, Colombia, Ecuador, Peru, and Chile. The latest UN Environment GPA supported activity carried out by the CPPS in August 2016 was a training activity to assess the prevalence of microplastics on fishing resources in Southeast Pacific countries (Chile, Colombia, Ecuador, Panama and Peru). Fourteen persons participated in the course from six different countries and were trained on protocols to

assess microplastics in water, sand and marine fish. Based on the proposals submitted by the training participants, this activity will also lead to the formation of local and regional pilot programmes.

187 The First Session of the United Nations Environment Assembly (UNEA-1, 2014) adopted resolution 1/6 on Marine plastic debris and microplastics. The resolution requested the Executive Director to support countries to develop and implement national or regional action plans to reduce marine litter; more specifically, the resolution requested UN Environment to present a study on marine plastic debris and microplastics, building on existing work and taking into account the most up-to-date studies and data, to the Second Session of UNEA (UNEA-2). An Advisory Group was established within the framework of the GPML, including 29 Government and Major Groups and Stakeholder nominated experts (including Marion Gust, France), to articulate the needs and interest of decision-makers and ensure that all components are policy relevant. In line with Resolution 1/6, the study also contained recommendations for the most urgent action and specification of areas especially in need of more research, including key impacts on the environment and human health. All regional seas were invited to be part of the peer review of the study and many valuable comments were received. These final recommendations were presented in all UN languages in UN Environment/EA.2/5: Report of the Executive Director on marine plastic debris and microplastics<sup>26</sup> to the UNEA-2.

188 The study itself, "Marine plastic debris and microplastics – Global lessons and research to inspire action and guide policy change"<sup>27</sup>, was presented to the Second Session of UNEA in May 2016 and informed the development and subsequent adoption of resolution 2/11 "Marine plastic litter and microplastics" which mandated UN Environment and the GPA through the (GPML) to: in close cooperation with other relevant bodies and organizations, undertake an assessment of the effectiveness of relevant international, regional and sub-regional governance strategies and approaches to combat marine plastic litter and microplastics, taking into consideration the relevant international, regional and sub-regional regulatory frameworks and identifying possible gaps and options for addressing them; including through regional cooperation and coordination, and to present the assessment to the next session of UNEA, within available resources for this purpose; and continue providing support to the development and implementation of action plans

189 In addition to the Study on Marine plastic debris and microplastics, publications have been developed with various partners including the

<sup>26</sup> <http://www.unep.org/about/sgb/Portals/50153/K1600817%20Doc%205%20Eng.pdf>

<sup>27</sup> [http://www.unep.org/gpa/documents/publications/Marine\\_Plastic\\_Debris\\_and\\_Microplastic.pdf](http://www.unep.org/gpa/documents/publications/Marine_Plastic_Debris_and_Microplastic.pdf)

International Maritime Organization and the UN Food and Agriculture Organization to inform global discussions: Plastics in Cosmetics<sup>28</sup>; Biodegradable Plastics and Marine Litter<sup>29</sup>; MARPOL Annex V Training Package (with IMO), Abandoned, lost or otherwise discarded gillnets and trammel nets - Methods to estimate ghost fishing mortality, and the status of regional monitoring and management (with FAO)<sup>30</sup>, Review of the Current State of Knowledge Regarding Marine Litter in Wastes Dumped at Sea Under the London Convention and Protocol (IMO)<sup>31</sup>, Vital Graphics Marine Litter<sup>32</sup>, and Marine Litter Legislation – A Toolkit for Policymakers.

190 Capacity building activities include the first Massive Open Online Course on Marine Litter (MOOC), developed with the Open Universiteit of the Netherlands. It consisted of a leadership track and an experts/practitioners track. UN Environment is currently revising the MOOC somewhat to include hotspot assessment, risk-based assessment and financing aspects of marine litter interventions. Two MOOCs are planned for 2017, one in English and the second one in Spanish.

#### UN Environment coral reef-related work

191 The second session of the UN Environment Assembly, held in Nairobi, Kenya 23-27 May 2016, adopted resolution 2/12 on Sustainable Coral Reefs Management. The resolution, inter alia, calls for initiatives, cooperation and commitments to conserve and sustainably manage coral reef, including cold-water coral reefs, and mangrove forests; recognizes that education, capacity-building and knowledge transfer is crucial; and encourages integrated, ecosystem-based and comprehensive approaches including partnerships with industry, as well as establishment of MPAs and other spatial and relevant sectoral approaches to enhance climate change resilience. The resolution further requests UN Environment to pursue a number of actions, inter alia in relation to awareness raising, including through the Global Environment Outlook (GEO); knowledge transfer and development of tools for coral reef climate change resilience; conducting an analysis of global and regional coral reef policy instruments; supporting development and implementation of national or regional measures and action plans; development of indicators and support towards assessment of coral

<sup>28</sup> [http://apps.unep.org/publications/pmtdocuments/Plastic\\_in\\_cosmetics\\_Are\\_we\\_polluting\\_the\\_environment\\_through\\_our\\_personal\\_care\\_-2015Plas.pdf](http://apps.unep.org/publications/pmtdocuments/Plastic_in_cosmetics_Are_we_polluting_the_environment_through_our_personal_care_-2015Plas.pdf)  
Plastics in Cosmetics: Factsheet: <http://unep.org/gpa/documents/publications/PlasticinCosmetics-2015Factsheet.pdf>

<sup>29</sup> <http://unep.org/gpa/documents/publications/BiodegradablePlastics.pdf>

<sup>30</sup> <http://www.fao.org/3/a-i5051e.pdf>

<sup>31</sup> [www.imo.org/en/OurWork/Environment/LCLP/newandemergingissues/Documents/Marine%20litter%20review%20for%20April%202016\\_final\\_ebook\\_version.pdf](http://www.imo.org/en/OurWork/Environment/LCLP/newandemergingissues/Documents/Marine%20litter%20review%20for%20April%202016_final_ebook_version.pdf)

<sup>32</sup> <http://staging.unep.org/docs/MarineLitter.pdf>



reef status and trends through the Global Coral Reef Monitoring Network (GCRMN).

192 A Consultation Meeting was held in Manado, Indonesia, 28 and 29 June 2016, as a first step towards implementation of resolution EA/2/12 and strengthened communication between UN Environment and Member States on this. Organized by UN Environment and Indonesia and attended by representatives from countries in all main reef regions, including several small island developing states, the meeting identified opportunities for implementing action as called for in resolution EA/2/12; provided guidance on follow-up actions by UN Environment, including prioritization of support provided to Member States in implementing the resolution; and identified technical, operational and financial needs in implementation of the resolution. Implementation of the resolution will be pursued primarily through the Global Coral Reef Partnership with Regional Seas.

193 UN Environment launched two new products prepared through the Global Coral Reef Partnership with Regional Seas, and a UN Environment press release, "Coral reefs face bleak future – but "lifeboats" may help them survive" was issued on 24 May 2016. Statistically downscaled climate model projections for coral bleaching conditions were made available through a new coral reef theme on UN Environment-Live<sup>33</sup> This provides full access to the data which provides critical information for prioritization of reef management in the context of climate change. A journal article and a report with regional summaries will be published in 2016. A report entitled "*Mesophotic reefs – a lifeboat for coral reefs?*" was developed and published in collaboration with GRID-Arendal, NOAA and other partners.

194 A Science to Policy Brief on Wastewater Pollution on Coral Reefs, developed jointly with the GPA Global Waste Water Initiative, is in final draft form and will be published in 2016. Targeted at local and national government policy makers and the private sector, this will provide management and policy recommendations on addressing wastewater in coral reef areas and will also be used in support of capacity building efforts at the regional level.

195 UN Environment continues development and implementation of the Green Fins initiative for Sustainable Dive Tourism, originally established by UN Environment, COBSEA and ReefWorld Foundation in 2004. Green Fins has been introduced to seven countries in Asia and the total membership has stands at over 400 diving and snorkelling operators who are continuously and measurably improving their business practices to mitigate negative environmental impacts. A comprehensive Green Fins 'Toolbox' was launched in April 2016 providing a consolidated, comprehensive and standardized set of guidance materials and tools that cover Green Fins implementation, learning and outreach. A '2 Minutes

<sup>33</sup> <http://uneplive.unep.org/theme/index/19#.WBDUR-jHMayl>

on Oceans' video on sustainable recreational diving is also being developed with UN Environment RONA. These tools will be utilized in the further implementation and geographic expansion of Green Fins.

196 In collaboration with ECRE Blue Finance and IFRECOR (the French Initiative for Coral Reefs), Guidelines for Coral Reef Environmental Impact Assessment and Compensation Schemes are being developed during 2016. Based on initial work by IFRECOR, a guide will be prepared that address (i) how to conduct adequate Environmental Impact Assessments (EIA) in or around coral reef ecosystems and (ii) how to design/implement/monitor compensation schemes for impacts of development. The guide will initially be prepared in English and Spanish, in addition to the French version currently targeting French reef jurisdictions.

197 Preparation of a Global Coral Reef Monitoring Network (GCRMN) Regional Report on Coral Reef Status and Trends is being supported in the Pacific Islands. A Workshop was held 12 to 14 October, in Honolulu, USA to review data, agree on regional and national analyses and data management. The overall objectives of the process are to create a comprehensive inventory of reef data in the region and improve access to such data; to identify key drivers of reef change and provide actionable management and policy recommendations as well as recommendations for future monitoring; and to revitalize the regional GCRMN network and strengthen regular reporting. The workshop was jointly organized by UN Environment, the Secretariat for the Pacific Regional Environment Programme (SPREP) and Centre de Recherches Insulaires et Observatoire de l'Environnement (CRIOBE). The activity directly contributes to implementation of UN Environment Assembly resolution 2/12 paragraph 14.

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

198 World Oceans Assessment (WOA), with its secretariat (UN DOALOS) and member states completed the implementation of first phase of assessment cycle 2010-2015 at the end of 2015. On 23 December 2015, the United Nations General Assembly adopted resolution 70/235 on "Oceans and the law of the sea," in which it welcomed with appreciation the first global integrated marine assessment<sup>34</sup> and approved its summary.

199 UN Environment in collaboration with GRID Arendal and the Secretariat produced a Story Map of the World Ocean Assessment report. The first (WOA is a report on the state of the planet's oceans. The story map<sup>35</sup> highlights some of the elements of

<sup>34</sup> [http://www.un.org/Depts/los/global\\_reporting/WOA\\_RegProcess.htm](http://www.un.org/Depts/los/global_reporting/WOA_RegProcess.htm)

<sup>35</sup> <http://www.grida.no/publications/story-maps/map/6705.aspx>

the WOA using a combination of graphics, images and interactive maps. The related overview of the WOA was published and launched during the first Science Policy Forum of the UNEA which was held 19-20 May 2016 in Nairobi, Kenya. The overview looks at the results of the first WOA in a framework that distinguishes driving forces, pressures, states, impacts and responses (called the “DPSIR framework”). The DPSIR framework provides a conceptual model with which to examine the state of the world’s oceans including the relationship between the marine environment and human activity.

200 The second phase of the WOA has been launched in January 2016. UN Environment and other relevant United Nations system organizations, bodies, funds and programmes, have been invited to assist in the implementation of the second cycle of the Regular Process with regard to the following activities: awareness-raising, identification of 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. While the first cycle of the Regular Process focused on establishing a baseline it has been decided that the scope of the second cycle would extend to evaluating trends and identifying gaps. The second cycle will cover a period of five-years and two principal outputs have been proposed in the work plan. UN Environment is expected to provide scientific and technical support to the Group of Experts, the bureau and the secretariat.

### **The GEF Transboundary Waters Assessment Programme (TWAP)**

201 Recognizing the value of transboundary water systems, and the reality that many of them continue to be overexploited and degraded, and managed in fragmented ways, the Global Environment Facility (GEF) approved the Transboundary Waters Assessment Programme (TWAP) Full Size Project in December 2012 following the completion of the Medium Size Project (MSP) “Development of the Methodology and Arrangements for the GEF Transboundary Waters Assessment Programme” in 2011. The TWAP FSP began in April 2013 and was 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.

202 The five water-category specific assessments have been completed in 2016 for 199 transboundary aquifers and groundwater systems in 42 small island developing states, 204 transboundary lakes and reservoirs, 286 transboundary river basins; 66 large marine ecosystems and the Western Pacific Warm Pool; and the open ocean, a total of 756 international water systems. The assessed surface waters cover over 71% of the planet’s surface, and

transboundary aquifers underlay about 16% of the earth’s landmass. As a first global comparative assessment of transboundary waters, TWAP has delivered the first baseline assessment of all the planet’s transboundary water resources, providing benchmarks of the current state of water systems to inform policy, encourage knowledge exchange, and to identify and classify water bodies at risk. Most importantly, the global assessment aims to increase awareness of the importance to protect transboundary waters at relatively low risk and mitigate the states of those at moderate to highest risk.

203 The TWAP assessment is the first global assessment that uses quantified indicators of system states, pressures and impacts under three broad themes: biophysical, socioeconomic, and governance. Results are summarized into five relative levels of system risk - lowest, low, moderate, high, and highest - which are amenable to system and regional scale comparisons. As such, TWAP is poised to help identify core indicators to support national monitoring and reporting of targets required to realize the Sustainable Development Goals for the period 2015 – 2030. TWAP freshwater indicators map to SDG 6 on Clean Water and Sanitation, notably Target 6.6 (protection and restoration of mountains, forests, wetlands, rivers, aquifers and lakes). TWAP marine indicators support SDG 14 on Oceans, Seas and Marine Resources, and all its targets.

204 The assessment results are organized into five technical reports and a sixth volume that provides a cross-category analysis of status and trends:

- Volume 1: Transboundary Aquifers and Groundwater Systems of Small Island Developing States: Status and Trends
- Volume 2: Transboundary Lakes and Reservoirs: Status and Trends
- Volume 3: Transboundary River Basins: Status and Trends
- Volume 4: Large Marine Ecosystems: Status and Trends
- Volume 5: The Open Ocean: Status and Trends
- Volume 6: Transboundary Water Systems: Crosscutting Status and Trends

205 A Summary for Policy Makers accompanies the first five volumes. All TWAP publications are available at [www.geftwap.org](http://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.

206 The execution of the TWAP is 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).

### ***UN Environment's activities in support of Small Islands Developing States (SIDS)***

- UN Environment has been following the implementation of the SAMOA Pathway to support the development of Small Island Developing States. The following are some of the achievements with the relevant paragraphs in SAMOA Pathway in parenthesis:
  - UN Environment has supported the production of policy papers on the Green Economy for Haiti, Jamaica and Saint Lucia. The studies identified key challenges and opportunities for greening key economic sectors such as energy, water and waste management, agriculture, tourism, construction and manufacturing. Under the Regional Seas Programme, UN Environment organised the regional workshops on blue economy in the Caribbean and Western Indian Ocean regions towards advancing blue economy transition in SIDS with the blue economy paper developed for the former workshop in June 2015. (para. 25)
  - Under the 10 Year Framework of Programmes on Sustainable Consumption and Production (10YFP), UN Environment has designed a project "Transforming tourism value chains in developing countries and Small Island Developing States (SIDS) to accelerate more resilient, resource efficient, low carbon development", which will support the countries in reducing GHG emissions and improving resource efficiency in key tourism sector value chains with high resource use i.e. accommodation, food and beverage, and meetings, incentives, conferences and events (MICE). This project will support some priority activities identified by SIDS in the Sustainable Tourism Programme of the 10YFP. (paras 30 (e) (f) and 69)
  - The Climate Technology Centre and Network (CTCN) organized four regional trainings for national focal points of SIDS countries, on the deployment and financing of climate technologies: (i) in Samoa on 19-20 September 2014; (ii) in Barbados on 30 September- 2 October 2014; (iii) in Barbados on 28-30 October 2015 and (iv) in Tonga 24-26 February 2016. The CTCN is currently supporting five SIDS regarding climate technologies, through 6 requests submitted to the CTCN by Dominican Republic, Mauritius, Guinea Bissau, Tonga, and Antigua and Barbuda. (para 39).
- Eight SIDS (Dominica, Antigua & Barbuda, Fiji, Seychelles, Papua New Guinea, Sao Tome & Principe, Maldives, and Nauru) were supported for Climate Change Adaptation related financing. All these SIDS submitted their Intended Nationally Determined Contributions to the UNFCCC Secretariat prior to the UNFCCC COP21. (para 39)
- The project on Building Capacity for Coastal Ecosystem based Adaptation (EbA) in SIDS is under implementation in Seychelles and Grenada to restore degraded coral reef systems and improve local coastal zone management. (para 44a)
- An approach for regional coral reef reporting has been established for the Caribbean, encompassing creation of comprehensive data inventories, regional analyses and establishing recommended indicators and methods. (para 44 (b))
- UN Environment is supporting Fiji in obtaining direct access to financial resources in the Green Climate Fund (GCF) and in preparing concrete GCF proposals for submission and in assisting the country strengthen coordination for climate finance and prioritize national adaptation and mitigation activities. (para 44 (d)).
- All 38 SIDS are Parties to the Montreal Protocol (MP). UN Environment's Ozone Action through its Compliance Assistance Programme (CAP) is supporting the implementation of the Montreal Protocol in all the SIDS through direct country compliance support services and management of Regional Networks for Ozone officers. Currently, UN Environment CAP services for the SIDS are focused on Hydrochlorofluorocarbons (HCFC) phase down as per the Montreal Protocol agreed phase-down schedule and assisting the countries to sustain compliance of ODS phase out. Many have exceeded their 10% HCFC reductions targets for 2015 from established baselines. For example in the 12-country Pacific regional project, there is a reported 80% reduction in HCFC use. As per recent decisions of the Meeting of the Parties to the Montreal Protocol (MOP Decision XXVI/9), UN Environment Ozone Action was nominated as Implementing Agency by governments of

30 SIDS countries to undertake non ODS surveys (HFCs).

- The following SIDS have been supported for the development and adoption of policies/standards on Efficient lighting, appliances and equipment: Belize, Cape Verde, Dominican Republic, Fiji, Haiti, Kiribati, Maldives, Palau, St Lucia, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu. Further Jamaica and Mauritius were supported to develop vehicle fuel efficiency standards. (para 50 (f))
- Under the Global Partnership on Marine Litter, a Caribbean regional node was established in October 2015. (para 57 (c)) The Global Partnership on Nutrient Management (GPNM) launched the GPNM Caribbean Nutrient Platform in 2012. The meeting in February 2016 contributed to the formulation of a work plan and strengthened regional partnerships within the Caribbean Regional Seas Programme framework. The Global Programme of Action for the Protection of the Marine Environment from Land-based Activities provided support to the South Asia Cooperative Environment Programme (SACEP) in a scoping study (2014) on nutrient loading and eutrophication of coastal waters of the South Asian Seas, including Maldives. (para. 57d)
- The guidance on the use of economic instruments based on the ecosystem services provided by coral reefs is being prepared for publication in 2016, based on a pilot project in Barbados. (para. 57 (e))
- Under the Strategic Approach to Integrated Chemical Management (SAICM), the Quick Start Programme Trust Fund has supported capacity building projects for sound management of chemicals in 24 SIDS since 2006. (para 71 (a))
- Mauritius and Saint Lucia are participating in capacity building workshops on Framework Law on Waste Management leading to developing national and city waste management strategies. The regional waste management outlooks for Asia Pacific, Africa and Latin America and the Caribbean will cover SIDS in respective regions. (para 71 (d))

207 UN Environment has supported the mainstreaming of environment sustainability into several UNDAFs, UN Common Country Frameworks, and most recently an innovative Multi-Country Sustainable Development Framework (MSDF) for SIDS. Specifically in the Caribbean Sub-region, SIDS were assisted in preparing a MSDF, which replaces individual UNDAFs. In the Pacific UN Environment has supported the Maldives UNDAF and in Africa region, support was provided to Sao Tome and Principe and Seychelles. ( paras 116 and 117)

## **Global Resources and Information Data Centre (GRID-Arendal)**

208 GRID-Arendal a centre collaborating with the UN Environment, supporting informed decision making and awareness-raising through: a) Environmental information management and assessment; b) Capacity building services; and c) Outreach and communication tools, methodologies and products.

209 GRID-Arendal has been actively involved in building capacity in ecosystem-based marine management and enabling of sustainable blue economies in developing countries. Marine spatial planning, state of the environment reporting, sound management of the deep seabed, the ocean and climate change (e.g. blue carbon) and promoting and replicated demonstrated 'blue solutions' are some of the other areas of focus of marine and coastal activities for GRID-Arendal.

210 GRID-Arendal helped UN Environment draw up a global support programme for monitoring the state of the marine environment in the Regional Seas; this is now being tested in West Africa. Additionally a presentation of the method was recently given to the Caribbean countries in Kingston, Jamaica in a workshop organized by the UN Environment Caribbean Regional Coordinating Unit and Secretariat.

211 Having worked with UN Environment and key partners to produce a Vital Graphics on Marine Litter, work is now progressing to develop target awareness raising and capacity building efforts to mitigate and reverse the impacts of marine litter, plastics and microplastics on the ocean. Initial discussions with potential partners in Africa, with support from the Government of Norway and UN Environment, aims to produce a concrete action plan during 2017.

212 In partnership with UN Environment, GIZ and IUCN, GRID-Arendal has developed and implemented the Blue Solutions Initiative which provides a global platform to collate, share and generate knowledge and capacity for sustainable management and equitable governance of our ocean. Through different formats and cooperation with various Partner institutions Blue Solutions seeks to enhance capacities for scaling up success, provide learning opportunities and support policy processes to facilitate the putting into practice of viable and valuable solutions.

213 GRID-Arendal continued to support the Regional Seas Conventions and Action Plans and their member states on a number of fronts. The Interim Secretariat of the Tehran Convention continues to be supported in its work to establish a fully functioning Secretariat. The first national State of the Marine Environment (SoME) report for Sierra Leone was completed using an Expert Elicitation participatory approach to properly integrate the observations of

experts with concrete (although limited) data; the final report was endorsed by the President of Sierra Leone. A synthesis report on “The Socioeconomics of the West, Central and Southern African Coastal Communities” will soon be published for the Abidjan Convention. Additionally, a “Blue Carbon Financing of Mangrove Conservation in the Abidjan Convention Region: A Feasibility Study” will help set the stage for more active work on enabling blue carbon approaches in the Abidjan Convention region.

214 As part of an ongoing formal partnership with the Secretariat of the Abidjan Convention, GRID-Arendal is the executing agent for a multi-year capacity enhancing ecosystem-based management programme for Abidjan Convention region. The Mami Wata project will be applied in the countries of the Abidjan Convention region, which covers 22 countries and a combined EEZ of approximately 4.8 million km<sup>2</sup> in size. It is funded by the German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety (International Climate Initiative), and implemented by GRID-Arendal, the Abidjan Convention Secretariat and UN Environment.

215 Following the joint submission by 7 coastal countries in West African (Mauritania, Senegal, The Gambia, Guinea, Guinea-Bissau, Cabo Verde and Sierra Leone) to the UN Commission on the Limits of the Continental Shelf (CLCS) in August 2015, GRID-Arendal, with support from the Government of Norway has committed to design and implement a process to maintain national expert capacity on continental shelf delineation while countries await their turn to present and discuss the joint submission with the CLCS. A first ‘capacity maintenance’ workshop will take place in early 2017 in Cabo Verde.

216 Blue carbon initiative: The international GEF/UN Environment Blue Forests Project, executed by GRID-Arendal for UN Environment, is now in its second year of implementation. The effort is anchored by interventions and project work in five countries spanning 5 continents. The effort continues to detail and demonstrate the methodologies required for carbon sequestered by key ocean habitats to be recognized under the UNFCCC and REDD+ protocols.

217 GRID-Arendal is executing the international IW/Learn GEF Project in partnership with UN Environment, UNESCO-IOC, Conservation International, The Global Water Partnership, The International Commission for the Protection of the Danube River, The International Union for the Conservation of Nature, The Nature Conservancy, The United Nations Economic Commission for Europe, The International Hydrological Programme of UNESCO, The United Nations Industrial Development Organization and The World Wildlife Fund.

218 GRID-Arendal is a partner in the international Areas Beyond National Jurisdiction (ABNJ) GEF Project, executed by the World Conservation Monitoring Commission (UN Environment/WCMC).

This project aims to deliver improved capacity in the Nairobi Convention and CPPS Regional Seas to undertake area based planning in areas beyond national jurisdiction.

### **UN Environment-World Conservation Monitoring Centre (WCMC)**

219 UNEP-WCMC is the specialist biodiversity assessment arm of the UNEP based in Cambridge, UK. The focus of Marine Programme of the UNEP-WCMC is to develop and share data, tools, and analyses to inform decisions regarding the conservation of marine and coastal biodiversity. During the period under review, the Programme focused on four main areas: Improving and enhancing data, the effective use of data through analysis and interpretation, supporting marine spatial planning for improved conservation and resource use, and the application of area-based planning techniques in areas beyond national jurisdiction.

220 UNEP-WCMC has continued to enhance the Ocean Data Viewer (<http://wcmc.io/ODV>), which is an online portal that provides easy and free access to a range of marine biodiversity-related datasets drawn from internationally-respected scientific institutions and organizations. The quality of datasets has been improved with detailed metadata and background information that accompany them. UNEP-WCMC’s ‘Manual on marine and coastal datasets of biodiversity importance’ (<http://wcmc.io/MarineDataManual>), which is an inventory of 128 online marine and coastal data resources, was updated.

221 UNEP-WCMC is the executing agency for Component 4 of the FAO/UNEP GEF Project entitled ‘Sustainable fisheries management and biodiversity conservation of deep-sea living resources and ecosystems in Areas Beyond National Jurisdiction’ (known as the ABNJ Deep Seas Project). Through this project, UNEP-WCMC and project partners, have initiated four studies: a review of existing uses of area-based planning in ABNJ; a review of the institutional arrangements in ABNJ in the Western Indian Ocean and South-East Pacific; an analysis of the applicability to ABNJ of area-based planning tools conventionally used within territorial waters; and an analysis of the functional cross-border connectivity between ABNJ and the territorial waters in the Western Indian Ocean and South-East Pacific. In addition, UNEP-WCMC has worked with the project’s two pilot regions (Nairobi Convention and CPPS) to build awareness and capacity in ABNJ matters. This has included two in-region workshops in Q4 2016.

222 As part of a project to explore legal options for the conservation of biodiversity beyond national jurisdiction (BBNJ) UNEP-WCMC hosted a workshop attended by marine biodiversity, law, and marine industry experts and specialists. The results of the workshop, which identified a series of possible new legal approaches to protect biodiversity in the deep ocean, were presented at a UNEP-WCMC-led side event at the BBNJ Prep Com meeting in New York

in September 2016. This project is supported by the Cambridge Conservation Initiative with the University of Cambridge, Birdlife International and IUCN.

223 UNEP-WCMC contributed to marine discussions during the UNEA2 Science-Policy Forum. The Head of the Marine Programme presented the case for integrated and inter-disciplinary approaches to ocean governance during an invited presentation and highlighting importance of citizen behaviour in the sustainable use and conservation of marine resources as an invited panellist.

224 UNEP-WCMC is continuing to explore effective practices in marine spatial planning (MSP). The Centre remains working closely with UN Environment on the MSP in Practice Initiative. A substantial analysis of MSP practices has been undertaken to identify the underlying enablers of MSP practices that deliver social, economic and environmental benefits and has supplemented the results of a large international survey with workshops during the ITMEMS and IMCC conferences. UNEP-WCMC is also reviewing cross-border (between countries) MSP practices to draw out effective practices. MSP was also highlighted as a potential vehicle to support coastal ecosystem based adaptation to climate change through a project undertaken by UNEP-WCMC. The project resulted in an online toolbox to support coastal adaptation: (<http://web.unep.org/coastal-eba/>).

225 UNEP-WCMC is involved in several other projects relevant to GESAMP initiated in this reporting period, including: a H2020 project titled 'Marine Ecosystem Services in Changing European Seas' (MERCES). UNEP-WCMC's role will be to undertake an assessment of ecosystem service change resulting from marine restoration; an International Resource Panel study examining how land-based activities affect marine resources; and providing support for the island of Alderney to develop a community-based marine plan.

### **UN Environment's Mercury Programme**

226 UNEA has charged UN Environment with updating its 2013 Global Mercury Assessment (GMA) within a period of 6 years, i.e. for delivery no later than 2019. Preparatory work has been initiated, including the identification of resources and the development of the plan for implementation.

227 The Main focus of the assessment is to update the global emissions and releases inventory components (for the target year of 2015), especially for sectors of relevance for the Minamata Convention. The assessment will also be expanded with respect to quantification of releases and discharges of mercury to the aquatic environment, and include an overview of mercury levels in humans and biota. Developed inventory estimates will be compared with nationally reported emissions and releases estimates, including those being developed through ongoing Minamata Initial Assessments (MIAs), and information from the

planned update of the "Summary of Supply, Trade and Demand, 2006".

228 This work will facilitate a dialog regarding future improvement of emission and release estimates. Additional sections of the GMA 2018 will address mercury environmental fate and transport. Planned products will include the GMA 2018 policy-makers summary report which will be about 50 pages and include a 2-page executive summary. This report will reflect the content of a comprehensive technical background document to be prepared through collaboration between UN Environment and the Arctic Monitoring and Assessment Programme (AMAP). Development of the technical background report for the GMA 2018 will take place between January 2016 and December 2018 and the GMA 2018 summary report prepared for delivery to UNEA in 2019.

### **DIVISION FOR OCEAN AFFAIRS AND THE LAW OF THE SEA,(DOALOS) OFFICE OF LEGAL AFFAIRS (October 2014 to September 2016)**

#### **Introduction**

229 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 October 2014.

#### **Informal Consultative Process**

230 The United Nations Open-ended Informal Consultative Process on Oceans and the Law of the Sea (the Informal Consultative Process) held its sixteenth meeting from 6 to 10 April 2015 and, pursuant to General Assembly resolution 69/245, focused its discussions on the topic entitled "Oceans and sustainable development: integration of the three dimensions of sustainable development, namely, environmental, social and economic". Pursuant to resolution 70/235, the seventeenth meeting of the Informal Consultative Process, held from 13 to 17 June 2016, focused its discussions on the topic "marine debris, plastics and microplastics". As in the past, the meetings were organized around panel presentations by experts representing developed and developing countries and reflecting various perspectives and disciplines, followed by interactive discussions. At the seventeenth meeting, Mr. Peter Kershaw, Chairman of GESAMP and Chairman of the GESAMP Working Group on Microplastics, made

a presentation, entitled “Marine debris, plastics and microplastics – an overview: Insights from the GESAMP report(s) on microplastics”.

231 Prior to the sixteenth and seventeenth meetings of the Informal Consultative Process, the reports of the Secretary-General on oceans and the law of the sea were prepared, with a view to facilitating discussions on the topics of focus at these meetings. In particular, the report prepared for the seventeenth meeting makes extensive references to the work of GESAMP on the topic of topic of the meeting, in particular its recent report “Sources, Fate and Effects of Microplastics in the Marine Environment: A Global Assessment”, which was welcomed by the General Assembly in its resolution 70/235 on “Oceans and the law of the sea”.

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

232 The Ad Hoc Open-ended Informal Working Group to study issues relating to the conservation and sustainable use of marine biological diversity beyond areas of national jurisdiction completed its work in January 2015 by making recommendations to the General Assembly. Subsequently, on the basis of the recommendations of the Working Group, the General Assembly adopted by consensus resolution 69/292 entitled “Development of an international legally binding instrument under the United Nations Convention on the Law of the Sea on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction” on 19 June 2015.

233 In this resolution, the Assembly decided to develop an international legally binding instrument under UNCLOS on the conservation and sustainable use of marine biological diversity of areas beyond national jurisdiction. To that end, the General Assembly decided to establish a Preparatory Committee to make substantive recommendations to the Assembly on the elements of a draft text of such an instrument. The Preparatory Committee has started its work in 2016 and, by the end of 2017, it will report to the Assembly on its progress. The Assembly also decided that the Preparatory Committee shall meet for no less than two sessions of 10 working days duration each in 2016 as well as in 2017.

234 The General Assembly further decided that, before the end of its seventy-second session, and taking into account the aforementioned report of the Preparatory Committee, it will decide on the convening and on the starting date of 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 the Convention.

235 The negotiations are to address 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.

236 As requested by the General Assembly, DOALOS provides the Preparatory Committee with the necessary assistance for the performance of its work.

237 At the first session, held from 28 March to 8 April 2016, the Preparatory Committee focused its discussions on the following topics: scope of an international legally binding instrument and its relationship with other instruments; guiding approaches and principles of an international legally binding instrument; 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. While these topics were considered in plenary, Informal working groups were also established to consider 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.

238 The meeting also considered a road map for the second session of the Preparatory Committee.

239 As agreed at the first session of the Preparatory Committee, the Chair of the Preparatory Committee prepared a Chair’s summary presenting his reflections on the discussions as well as an indicative list of issues raised during the discussions (available on the DOALOS website at: <http://www.un.org/Depts/los/biodiversity/prepcom.htm>).

240 The second session of the Preparatory Committee, from 26 August to 9 September 2016, focused its work on identifying elements on which a convergence of views appeared to have emerged and which could, without prejudice to future discussions, be set aside temporarily, or “parked”, so that the Preparatory Committee could focus on more difficult issues. This work primarily took place within the four Informal working groups established at the first session. A fifth Informal working group on cross-cutting issues was established at the second session. The discussions within the Informal working groups were guided by indicative suggestions of clusters of issues and questions prepared by the Chair. Based on discussions in the Informal working groups, the Chair prepared documents on each of the five issues dealt with by the Informal working groups, setting out his understanding of possible areas of convergence of views and possible issues for further discussion emanating from the discussions. The Chair’s understandings for the first four Informal working groups were further refined during discussions in

plenary. Due to lack of time, it was decided that the Chair's understanding on cross-cutting issues would be circulated interessionally and addressed at the third session of the Preparatory Committee.

241 The Preparatory Committee also considered a road map for the third session, scheduled in 2017, at a date to be decided during the upcoming informal consultations on the annual General Assembly resolution on oceans and the law of the sea. It was agreed that the Chair would prepare a compilation of proposals for draft elements submitted by delegations on various issues, as well as a Chair's non-paper on draft elements based on the proposals received, the possible areas of convergence that emanated from the discussions during the second session, and the issues and ideas which have benefited from extensive discussions. As for the first session, the Chair will also prepare his reflections on the Chair's assessment of the second session looking forward to the third session.

242 It is recalled that in his letter dated 18 December 2015, the Chair has invited delegations who wish to do so to submit their views to him, with a copy to DOALOS, on the elements of a draft text of an international legally binding instrument under the Convention. This is an ongoing invitation and States, intergovernmental organizations and non-governmental organizations have made such submissions which are available on the Division's website at: <http://www.un.org/Depts/los/biodiversity/prepcom.htm>.

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

243 The first cycle of the Regular Process for Global Reporting and Assessment of the State of the Marine Environment, including Socioeconomic Aspects has culminated in the completion of the First Global Integrated Marine Assessment, also known as the first World Ocean Assessment (WOA-1), in 2015. It is expected to provide a baseline for the state of the marine environment, including socioeconomic aspects, and contribute to building a better science-policy interface for sound decision-making, as well as identify capacity-building gaps. The information in the Assessment can contribute, inter alia, to the General Assembly's review of ocean issues, including the consideration of the topic of focus by the Informal Consultative Process. The Assessment draws on a number of GESAMP documents and contributions.

244 In its resolution 70/235, the General Assembly welcomed with appreciation the World Ocean Assessment and approved its summary. The General Assembly also decided through that resolution, to launch the second cycle of the Regular Process.

245 The seventh meeting of the Ad Hoc Working Group of the Whole on the Regular Process was held

from 3 to 9 August 2016. The meeting focused its discussions on lessons learned from the first cycle of the Regular Process and the consideration of the Programme of Work and resource requirements of the second cycle. The Ad Hoc Working Group of the Whole adopted a set of recommendations on the follow-up to the WOA-1 and the implementation of the second cycle of the Regular Process. A Programme of Work 2017-2020 for the second cycle of the Regular Process forms part of the recommendations, which will be considered by the General Assembly at its seventy-first session. Relevant information is available on the Division's website at: [http://www.un.org/Depts/los/global\\_reporting/global\\_reporting.htm](http://www.un.org/Depts/los/global_reporting/global_reporting.htm).

### **World Oceans Day celebrations**

246 By its resolution 63/111, the General Assembly designated 8 June as World Oceans Day. The United Nations celebrated World Oceans Day 2015 and World Oceans Day 2016, and recognized the winners of the Annual World Oceans Day Oceanic Photo Competitions at the United Nations Headquarters. The theme for World Oceans Day in 2015 and 2016 was "Healthy Oceans, Healthy Planet."

### **Sustainable fisheries**

247 2015 marked the twentieth anniversary of the opening for signature of the United Nations Fish Stocks Agreement. The Secretary-General convened an event to commemorate the anniversary on 17 March 2015 during the eleventh round of the informal consultations of States Parties to the United Nations Fish Stocks Agreement. In this regard, DOALOS organized a round-table discussion featuring two segments, involving presentations and a general discussion among participants. The participants included representatives of States Parties to the Agreement, States non-parties and relevant intergovernmental and non-governmental organizations invited to attend the eleventh round of informal consultations in accordance with General Assembly resolution 69/109.

248 In its resolution 69/109, General Assembly decided to resume the Review Conference on the United Nations Fish Stocks Agreement in 2016. The Conference was convened four years after the entry into force of the Agreement pursuant to article 36 of the Agreement, and resumed in 2010, with a view to assessing the effectiveness of the Agreement in securing the conservation and management of straddling fish stocks and highly migratory fish stocks. In this regard, pursuant to resolutions 69/109 and 70/75, the eleventh and twelfth rounds of informal consultations of States Parties to the United Nations Fish Stocks Agreement were held from 16 to 17 March 2015 and from 22 to 23 March 2016, respectively, serving primarily as preparatory meetings for the resumed Review Conference. Furthermore, pursuant to resolution 69/109, the Secretary-General submitted to the resumed Review Conference an updated



report, prepared in cooperation with the Food and Agriculture Organization of the United Nations (FAO).

249 Pursuant to resolutions 69/109 and 70/75, the Review Conference was resumed from 23 to 27 May 2016 at United Nations Headquarters. In its outcome, the resumed Review Conference determined that implementation of the Agreement should be further strengthened by recommendations that build on the 2006 and 2010 outcomes and also address new issues relevant to strengthening the implementation of the Agreement, such as labour conditions and avoidance of the transfer of a disproportionate burden of conservation action to developing States. The resumed Review Conference also recommended that the informal consultations of States Parties to the Agreement be dedicated to the consideration of specific issues arising from the implementation of the Agreement on an annual basis, with a view to improving understanding, sharing experiences and identifying best practices. It also agreed to keep the Agreement under review through the resumption of the Review Conference at a date not earlier than 2020.

250 In its resolution 69/109, the General Assembly decided to conduct in 2016 a further review of the actions taken by States and regional fisheries management organizations and arrangements (RFMO/As) in response to paragraphs 113, 117 and 119 to 124 of resolution 64/72 and paragraphs 121, 126, 129, 130 and 132 to 134 of resolution 66/68 on sustainable fisheries, addressing the impacts of bottom fishing on vulnerable marine ecosystems and the long-term sustainability of deep-sea fish stocks, with a view to ensuring effective implementation of the measures therein and to make further recommendations, where necessary. The review will be conducted in the context of the informal consultations of the General Assembly on the draft resolution on sustainable fisheries in November 2016.

251 In this regard, the report of the Secretary-General on the actions taken by States and RFMO/As in response to relevant paragraphs of resolutions 64/72 and 66/68 was prepared in cooperation with FAO, pursuant to resolution 69/109. Furthermore, a two-day multi-stakeholder workshop was held on 1 and 2 August 2016, to discuss the implementation of these provisions, pursuant to resolutions 69/109 and 70/75. Relevant reports and other documents are available on the Division's website at: <http://www.un.org/Depts/los/index.htm>

## ANNEX V – Current working groups and their terms of reference

### WG 1: Evaluation of the hazards of harmful substances carried by ships

Lead Agency:	IMO
Co-sponsors:	None
Chairperson:	Thomas Höfer (Germany)
Members:	Stéphane le Floch (France), Thomas Höfer (Germany), Derek James (United Kingdom), Wenxin Jiang (China), Richard Luit (Netherlands), Michael Morrisette (United States), Haito Saito (Japan), Patricio H. Rodriguez (Chile), (one vacancy), Kenneth McDonald (consultant)
Products:	Hazard profiles of new substances and correspondence with the industry. Maintenance and update of 900 GESAMP hazard profiles
Planning:	4th session in 2017

#### Terms of Reference for WG 1

The terms of reference of the GESAMP EHS Working Group, as given by GESAMP at its 6<sup>th</sup> session in Geneva (1974) (96) and amended at its 8<sup>th</sup> session in Rome (1976) (97) are:

*“To examine and evaluate data and to provide such other advice as may be requested, particularly by IMO, for evaluating the environmental hazards of harmful substances carried by ships, in accordance with the rationale approved by GESAMP for this purpose”.*

These terms of reference remain unchanged.

### WG 34: Review of applications for “Active Substances” to be used in ballast water management systems

Lead Agency:	IMO
Co-sponsors:	None
Chairpersons:	Jan Linders (Netherlands)
Vice-Chair:	Annette Dock (Sweden)
Members:	Teresa Borges (Portugal), Barbara Werschkun (Germany), Sinichi Hanayama (Japan), Kitae Rhie (Republic of Korea), David J. D. Smith (United Kingdom), Gregory Ziegler (United States), Claude Rouleau (Canada) Flavio da Costa Fernandes (Brazil).
Consultants:	Annette Dock (dual function)
Product(s):	Evaluation of the risks to the environment, human health and the ships' crew from ballast water management systems Completion of the methodology in Reports & Studies following external and GESAMP peer review (draft by September 2017)
Planning:	Two meetings of the BWWG are planned prior to the 44rd session of GESAMP: the 34th meeting of the BWWG is planned for 5-9 December 2016; and the Eighth Stocktaking Workshop (STW 8) is planned for 6-10 February 2017.

#### Terms of Reference for WG 34

- 1 Consideration of development of necessary methodologies and information requirements in accordance with the “Procedure for approval of ballast water management systems that make use of Active Substances (G9)” (adopted by resolution MEPC 169(57)) for consideration by MEPC 65.
- 2 For Basic Approval, the Group should review the comprehensive proposal submitted by the Member of the Organization along with any additional data submitted as well as other relevant information available to the Group and report to the Organization.

In particular, the Group should undertake:

- .1 scientific evaluation of the data set in the proposal for approval (see paragraphs 4.2, 6.1, 8.1.2.3, 8.1.2.4 of Procedure (G9));
  - .2 scientific evaluation of the assessment report contained in the proposal for approval (see paragraph 4.3.1 of Procedure (G9));
  - .3 scientific evaluation of the risks to the ship and personnel to include consideration of the storage, handling and application of the Active Substance (see paragraph 6.3 of Procedure (G9));
  - .4 scientific evaluation of any further information submitted (see paragraph 8.1.2.6 of Procedure (G9));
  - .5 scientific review of the risk characterization and analysis contained in the proposal for approval (see paragraph 5.3 of Procedure (G9));
  - .6 scientific recommendations on whether the proposal has demonstrated a potential for unreasonable risk to the environment, human health, property or resources (see paragraph 8.1.2.8 of Procedure (G9)); and
  - .7 preparation of a report addressing the above-mentioned aspects for consideration by MEPC (see paragraph 8.1.2.10 of Procedure (G9)).
- 3 For Final Approval, the Group should review the discharge testing (field) data and confirm that the residual toxicity of the discharge conforms to the evaluation undertaken for Basic Approval and that the previous evaluation of the risks to the ship and personnel including consideration of the storage, handling and application of the Active Substance remains valid. The evaluation will be reported to the MEPC (see paragraph 8.2 of Procedure (G9)).
  - 4 The Group should keep confidential all data, the disclosure of which would undermine protection of the commercial interests of the applicant, including intellectual property.

### **WG 38: Atmospheric input of chemicals to the oceans**

Lead Agency: WMO

Co-sponsors: IMO, US National Science Foundation

Chairpersons: R. Duce (United States), T. Jickells (United Kingdom)

Members: Katie Altieri (United States), Alex Baker (United Kingdom), Doug Capone (United States), Frank Dentener (Italy), Katja Fennel (Canada), Jim Galloway (United States), Tim Jickells (United Kingdom), Maria Kanakidou (Greece), Julie LaRoche (Canada/Germany), Kitack Lee (Korea), Jack Middelburg (Netherlands), Keith Moore (United States), Slobodan Nickovic (Serbia), Greg Okin (United States), Andreas Oschlies (Germany), Joseph Prospero (United States), Manmohan Sarin (India), Sybil Seitzinger (Sweden), Jonathan Sharples (United Kingdom), Parv Suntharalingam (United Kingdom), Mitsuo Uematsu (Japan), Lauren Zamora (United States)

Product(s): preparation of a summary of the working groups' publications arising from the 'Atmospheric Deposition of Nitrogen and its Impact on Marine Biogeochemistry' workshop to be published in the GESAMP and Studies series (draft by September 2017).

Terms of Reference for WG 38

- 1 Update the geographical estimates of anthropogenic nitrogen deposition to the global ocean made in the SCOR-sponsored 2008 paper in Science (Duce, R.A., et al., "Impacts of atmospheric anthropogenic nitrogen on the open ocean", Science, 320, 893-897, 2008), which were based on data from 2005 or earlier. This would utilize newer and more geographically distributed data on anthropogenic atmospheric nitrogen concentrations and deposition over the global ocean as well as improved models of these processes and impacts;
- 2 Considering issues related to Task 1 above, re-evaluate the impact of atmospheric nitrogen deposition on marine biogeochemistry, including re-estimating the amount of CO<sub>2</sub> that could be drawn down from the atmosphere into the ocean as a result of the increased productivity in the ocean derived from the additional anthropogenic nutrient nitrogen deposited. This would allow an update on the impact of the atmospheric nitrogen deposition on atmospheric radiative properties outlined in the 2008 Science paper;
- 3 Provide a more reliable estimate of the impact of atmospheric anthropogenic nitrogen deposition on the production of additional nitrous oxide in the ocean and its subsequent emission to the atmosphere. This was one of the greatest uncertainties in the 2008 Science paper;

- 4 Evaluate the extent to which anthropogenic nitrogen delivered to the coastal zone via rivers, atmospheric deposition, etc. is transported to the open ocean, in which regions this may happen, and what its impact is there. In the 2008 Science paper it was assumed that all nitrogen delivered to the coastal zone was sequestered there and did not reach the open ocean, but this may not be true in all locations; and
- 5 Make a more detailed estimate of the input and impact of anthropogenic nitrogen in the area of the Northern Indian Ocean (Arabian Sea, Bay of Bengal) and the South China Sea - the areas that are expected to show the greatest increase of anthropogenic nitrogen deposition over the next few decades.

### **WG 39: Global trends in pollution of coastal ecosystems: retrospective ecosystem assessment**

Lead Agency: IAEA

Co-sponsors: UNIDO

Chairpersons: Ana Carolina Ruiz-Fernandez (Mexico)

Members: Ms. Roberta Delfanti (Italy), Mr. José Marcus Godoy (Brazil), Mr. Elvis Nyarko (Ghana), Mr. Joan-Albert Sanchez-Cabeza (Mexico), Mr. José L. Sericano (United States), Ms. Elvira Sombrito (Philippines), Mr. Norbert Theobald (Germany)

Product(s): Complete the analysis of the data and prepare a draft substantive report in time to be presented at GESAMP 44, 4-8 September 2017.

Terms of Reference for WG 39

- 1 Bibliographic Review, definitions, methodologies
- 2 Critical review of existing methodologies on suitable environmental archives, dating methods, pollution indicators, analytical techniques and trend analysis. Review existing data, including data quality
- 3 Database of global trends of pollution
- 4 Global assessment and evaluation of global trends of pollution
- 5 Dissemination activities: Website, press releases, preparation of educational materials, presentation at stakeholder meetings

### **WG 40: Sources, fate and effects of micro-plastics in the marine environment: a global assessment**

Lead Agency: UNESCO-IOC

Co-sponsors: IMO, UNEP, FAO Plastics Europe, American Chemistry Council,

Co-chair: Peter Kershaw (United Kingdom), Chelsea Rochman (United States)

Members: Anthony Andrady (United States), Won Joon Shim (Republic of Korea), Shige Takada (Japan), Richard Thompson (United Kingdom), Alexander Turra Sabine. Pahl (United Kingdom), Amy Lusher (United Kingdom), Erik Zettler (United States), Linda Amaral Zettler (United States), Valeria Hidalgo Ruz (Chile), Martin Thiel (Chile), Dick Vethaak (Netherlands), Joni Seager (United States), Lisbeth van Cauwenberghe (Belgium), Ramani Naryan (United States), Patrizia Ziveri (Spain), Joan Fabres (Norway), Patrick ten Brink (Belgium), Sheck. A. Sherif (Liberia), Denise Hardesty (Australia), Paula Sobral (Portugal), Sarah Dudas (Canada), Kayleigh Wyles (United Kingdom), Laurent Lebreton (New Zealand), Francois Galgani (France), Sunny Hong (Republic of Korea), James Potemra (United States), Erik van Sebille (Netherlands).

Product(s): Revised Terms of Reference intersessionally

Planning: Secure funding to complete the agreed programme of work under the ToRs, up to the end of 2018.

Terms of reference for WG 40

- 1 To assess the main sources and categories of plastics and microplastics entering the ocean.
- 2 To assess and utilize a range of physical and chemical models to simulate the behaviour of plastics and microplastics in the ocean in order to improve current assessment technologies.
- 3 To assess the occurrence and effects of microplastics in commercial fish and shellfish species, including associated additive chemicals and contaminants in the edible fractions.
- 4 To assess local, regional and global scales of accumulation of plastics and associated chemicals (additives and absorbed contaminants), including SIDS and regional hotspots.
- 5 To assess the effects of nano-sized plastics on marine organisms

- 6 To assess the risk of physical and chemical effects of ingested microplastics on marine organisms.
- 7 To assess the significance of plastics and microplastics as a vector for organisms, facilitating the spread of non-indigenous (alien) species.
- 8 To develop guideline covering terminology and methodologies: i) size and shape definitions of particles; ii) sampling protocols for the whole spectrum of particle sizes in surface and sub-surface seawater, seabed sediments, shorelines and biota; and, iii) methodologies for physical and chemical identification and analysis of polymers and associated chemicals.
- 9 To assess social and economic aspects influencing both the entry of plastics/microplastics into the ocean and the potential consequences from the resulting contamination.
10. To develop and utilize effective mechanisms for communicating the progress and conclusions of the Working Group to a wide audience (public and private sector).

#### **WG 41: Marine Geoengineering**

Lead Agency: IMO

Co-Sponsors UNESCO-IOC and WMO

Chairpersons: Chris Vivian (United Kingdom), Philip Boyd (Australia)

Members: Richard Lampitt (United Kingdom), Andreas Oschlies (Germany), Greg Rau (United States), Alex Baker (United Kingdom), Katherine Ricke (United States), Fei Chai (United States), Ros Rickaby (United Kingdom), Timo Goeschl (Germany), John Cullen (Canada), Miranda Boettcher (Australia)

Product(s): Report on first phase of ToR will provide an overview to GESAMP Agencies and their Member States of a wide range of proposed marine geoengineering techniques and their potential implications and based on published literature. Final report of both phases including the detailed review of marine geoengineering techniques is due by end January 2018. The report will be made available on the website. It may include some outreach material as well.

Planning: Next meeting to be held at WMO from 26 to 28 April, 2017. Draft report on first phase to be completed before next session of GESAMP (4-8 September 2017).

Terms of Reference for WG 41

The GESAMP study should provide an overview to GESAMP Agencies and their Member States of a wide range proposed marine geoengineering techniques and their potential implications by:

- 1 Providing an initial high level review of a wide range of proposed marine geoengineering techniques, based on published information, addressing:
  - .1 The main rationale, principle and justification of the techniques
  - .2 Their potential scientific practicality and efficacy for climate mitigation purposes
  - .3 The potential impacts of different marine geoengineering approaches on the marine environment and the atmosphere where appropriate
  - .4 Identifying those techniques:
    - i. that appear unlikely to have the potential for climate mitigation purposes, and
    - ii. that appear to be likely to have some potential for climate mitigation purposes and that bear further detailed examination
- 2 Providing a detailed focused review of a limited number of proposed marine geoengineering techniques that are likely to have some potential for climate mitigation purposes addressing:
  - .1 The potential environmental and social/economic impacts of those marine geoengineering approaches on the marine environment and the atmosphere where appropriate.
  - .2 An outline of the issues that would need to be addressed in an assessment framework for each of those techniques, using the London Protocol Assessment Framework for Scientific Research Involving Ocean Fertilization as a template.
  - .3 Their potential scientific practicality and efficacy for climate mitigation purposes.
  - .4 An assessment of monitoring and verification issues for each of those marine geoengineering techniques.
  - .5 Identification of significant gaps in knowledge and uncertainties that would require to be addressed to fully assess implications of those techniques for the marine environment and the atmosphere where appropriate.

Product(s): Produce reports on the above work at appropriate points as reflected in the workplan. Produce final report by end January 2018 and make provisions for publication, dissemination and outreach.

**WG: 42: Impacts of wastes and other matter in the marine environment from mining operations, including deep-sea mining**

Lead Agency: IMO, UN Environment

Co-Sponsors: tbc

Chairperson: tbc

Members: tbc

Planning:

Terms of reference for WG 42

The working group on the impacts on tailings from mining operations on the marine environment is requested to undertake a literature review on the following aspects:

1. Identify and provide a better understanding of potential environmental impacts of marine disposal of tailings and associated wastes from land-based mining operations (hereinafter referred to as "mine tailings"), taking into account potential linkages between deep water ecosystems at the disposal site and other (e.g., ecological, biological) resources in the water column. The impacts could include, but are not limited to, those identified in the report of the workshop on mine tailings provided to GESAMP at its last meeting (GESAMP 42/7/1);
2. Review the extent and suitability of baseline assessments (prior to any construction or discharge) conducted to date and identify the key elements for comprehensive surveys of baseline conditions from which abiotic and biotic impacts can be assessed, taking into account the latest detection technologies of marine pollution and its impact to the organisms;
3. Review and identify the best practices in modeling the physical and chemical behavior of discharged mine tailings (e.g. slurries), including the shearing and upwelling of both the solids and soluble fractions, as well as the significance of tidal dispersion and potential for long-range transport of fine materials, and determine whether existing models are adequate or further development is needed;
4. Review and evaluate the processes of exposure and effect and the pathways for mine tailings disposal operations, including those related to the physical presence of the wastes, exposure to associated contaminants, their accumulation, and the potential effects at community level;
5. Implications arising from the fact that marine organisms normally used for toxicity testing are from upper layers of marine water, not the deep sea;
6. Review and identify physical and ecological models to estimate the recovery processes of deep sea ecosystems around the possible impacted area; and
7. Produce a report on the above work under a time frame and any other reporting requirements to be agreed between LC/LP and the GESAMP.]

Product(s): Produce a report addressing first term of reference to be presented at the next annual session. This will be followed by a review of the rest of the terms of reference in order to allow for further work on the issue.

## **CORRESPONDENCE GROUPS**

The following activities will continue during the intersessional period:

### **Correspondence Group on disinfection by-products**

Lead: Thomas Hofer (Germany)

The Correspondence Group to prepare a revised scoping document, and the interest to pursue the issue through a working group will be discussed intersessionally. Emphasis should be given on discharge from power plants, sewage plants and cooling facilities in conjunction with other industrial activities.

### **Correspondence Group on the impact of residues of chronic oil spills**

Lead: F. Mogo (Nigeria)

The Correspondence Group to develop a scoping paper in the intersessional period ensuring its viability and involve potentially interested Sponsoring Organizations.

### **Correspondence Group on the issue of the arrival of pelagic Sargassum**

Lead: Peter Kershaw (United Kingdom), Ahmad Abu Hilal (Jordan) Christopher Cox (UN Environment)

The Correspondence Group will develop a scoping paper in the intersessional period for consideration at the next annual session.

### **Correspondence Group on the issue of emerging pollutants in wastewater**

Lead: Felicia Mogo (Nigeria) and Birguy Lamizana (UN Environment)

The Correspondence Group will develop a scoping paper in the intersessional period for consideration at the next annual session.

### **Correspondence Group on the extent and impacts of inshore and offshore sand mining**

Lead: Emmanuel Ajao (Nigeria) and Joana Akrofi (UN Environment).

The Correspondence Group will develop a scoping paper in the intersessional period for consideration at the next annual session.

## **ANNEX VI – Template for new GESAMP working groups**

### **Background and Context**

The subject:

Brief description subject of the study

The nature of the issue:

Why the subject is of concern or interest to the international community from the perspective of marine environmental protection

The justification:

Why a GESAMP study is needed (e.g., synthesis of scattered information, assessment of environmental status/impacts, development of new methodologies, establishment of standards or guidelines, identify requirements for research, monitoring, management, and/or policy development)

### **Terms of Reference**

The Terms of Reference should:

1. Be specific, concrete, point-by-point tasks to be carried out by the WG, and/or specific information to be included in the report
2. Define the scope: what will and won't be done
3. Avoid being open-ended: focus on a specific product to be produced (usually a report)
4. Focus on the specific task being proposed
5. Identify the expertise required for the WG

### **Work Plan**

Describe the proposed work programme and methods to carry this out, such as workshops, inter-sessional activities, electronic communications and on-line platforms.

Devise a provisional timeline, including:

1. Meeting dates
2. Milestones (drafts, reviews, revisions, etc.)
3. Deliverables and delivery date (usually publication of a report)
4. Provisions for peer review
5. Provisions for publication, dissemination and outreach (PR)

### **Conflicts of Interest**

GESAMP depends on members of working groups acting in an independent capacity, and for the assessment and advice it provided to be reliable, authoritative and independent of any interest groups. To ensure that this process is transparent, it is necessary for each lead agency, in consultation with the working group Chair, to identify potential conflicts of interest and take action to address these, if required

### **Administrative Arrangements**

The following information should be provided:

1. Sponsor agencies
2. Additional supporting organisations
3. Proposed budget & funding sources
4. WG Chairperson(s) & members if available at time of proposal
5. Proposed Technical Secretary for the WG



## ANNEX VII - GESAMP Reports and Studies publications

The following reports and studies have been published so far. They are available from the GESAMP website: <http://gesamp.org>

1. Report of the seventh session, London, 24-30 April 1975. (1975). Rep. Stud. GESAMP, (1):pag.var. Available also in French, Spanish and Russian
2. Review of harmful substances. (1976). Rep. Stud. GESAMP, (2):80 p.
3. Scientific criteria for the selection of sites for dumping of wastes into the sea. (1975). Rep. Stud. GESAMP, (3):21 p. Available also in French, Spanish and Russian
4. Report of the eighth session, Rome, 21-27 April 1976. (1976). Rep. Stud. GESAMP, (4):pag.var. Available also in French and Russian
5. Principles for developing coastal water quality criteria. (1976). Rep. Stud. GESAMP, (5):23 p.
6. Impact of oil on the marine environment. (1977). Rep. Stud. GESAMP, (6):250 p.
7. Scientific aspects of pollution arising from the exploration and exploitation of the sea-bed. (1977). Rep. Stud. GESAMP, (7):37 p.
8. Report of the ninth session, New York, 7-11 March 1977. (1977). Rep. Stud. GESAMP, (8):33 p. Available also in French and Russian
9. Report of the tenth session, Paris, 29 May - 2 June 1978. (1978). Rep. Stud. GESAMP, (9):pag.var. Available also in French, Spanish and Russian
10. Report of the eleventh session, Dubrovnik, 25-29 February 1980. (1980). Rep. Stud. GESAMP, (10):pag.var. Available also in French and Spanish
11. Marine Pollution implications of coastal area development. (1980). Rep. Stud. GESAMP, (11):114 p.
12. Monitoring biological variables related to marine pollution. (1980). Rep. Stud. GESAMP, (12):22 p. Available also in Russian
13. Interchange of pollutants between the atmosphere and the oceans. (1980). Rep. Stud. GESAMP, (13):55 p.
14. Report of the twelfth session, Geneva, 22-29 October 1981. (1981). Rep. Stud. GESAMP, (14):pag.var. Available also in French, Spanish and Russian
15. The review of the health of the oceans.(1982). Rep. Stud. GESAMP, (15):108 p.
16. Scientific criteria for the selection of waste disposal sites at sea. (1982). Rep. Stud. GESAMP, (16):60 p.
17. The evaluation of the hazards of harmful substances carried by ships. (1982). Rep. Stud. GESAMP, (17):pag.var.
18. Report of the thirteenth session, Geneva, 28 February - 4 March 1983. (1983). Rep. Stud. GESAMP, (18):50 p. Available also in French, Spanish and Russian
19. An oceanographic model for the dispersion of wastes disposed of in the deep sea. (1983). Rep. Stud. GESAMP, (19):182 p.
20. Marine pollution implications of ocean energy development. (1984). Rep. Stud. GESAMP, (20):44 p.
21. Report of the fourteenth session, Vienna, 26-30 March 1984. (1984). Rep. Stud. GESAMP, (21):42 p. Available also in French, Spanish and Russian
22. Review of potentially harmful substances. Cadmium, lead and tin. (1985). Rep. Stud. GESAMP, (22):114 p.
23. Interchange of pollutants between the atmosphere and the oceans (part II). (1985). Rep. Stud. GESAMP, (23):55 p.
24. Thermal discharges in the marine Environment. (1984). Rep. Stud. GESAMP, (24):44 p.
25. Report of the fifteenth session, New York, 25-29 March 1985. (1985). Rep. Stud. GESAMP, (25):49 p. Available also in French, Spanish and Russian
26. Atmospheric transport of contaminants into the Mediterranean region. (1985). Rep. Stud. GESAMP, (26):53 p.
27. Report of the sixteenth session, London, 17-21 March 1986. (1986). Rep. Stud. GESAMP, (27):74 p. Available also in French, Spanish and Russian
28. Review of potentially harmful substances. Arsenic, mercury and selenium. (1986). Rep. Stud. GESAMP, (28):172 p.
29. Review of potentially harmful substances. Organosilicon compounds (silanes and siloxanes). (1986). Published as UNEP Reg. Seas Rep. Stud., (78):24 p.

30. Environmental capacity. An approach to marine pollution prevention. (1986). Rep. Stud. GESAMP, (30):49 p.
31. Report of the seventeenth session, Rome, 30 March - 3 April 1987. (1987). Rep. Stud. GESAMP, (31):36 p. Available also in French, Spanish and Russian
32. Land-sea boundary flux of contaminants: contributions from rivers. (1987). Rep. Stud. GESAMP, (32):172 p.
33. Report on the eighteenth session, Paris, 11-15 April 1988. (1988). Rep. Stud. GESAMP, (33):56 p. Available also in French, Spanish and Russian
34. Review of potentially harmful substances. Nutrients. (1990). Rep. Stud. GESAMP, (34):40 p.
35. The evaluation of the hazards of harmful substances carried by ships: Revision of GESAMP Reports and Studies No. 17. (1989). Rep. Stud. GESAMP, (35):pag.var.
36. Pollutant modification of atmospheric and oceanic processes and climate: some aspects of the problem. (1989). Rep. Stud. GESAMP, (36):35 p.
37. Report of the nineteenth session, Athens, 8-12 May 1989. (1989). Rep. Stud. GESAMP, (37):47 p. Available also in French, Spanish and Russian
38. Atmospheric input of trace species to the world ocean. (1989). Rep. Stud. GESAMP, (38):111 p.
39. The state of the marine environment. (1990). Rep. Stud. GESAMP, (39):111 p. Available also in Spanish as Inf.Estud.Progr.Mar.Reg. PNUMA, (115):87 p.
40. Long-term consequences of low-level marine contamination: An analytical approach. (1989). Rep. Stud. GESAMP, (40):14 p.
41. Report of the twentieth session, Geneva, 7-11 May 1990. (1990). Rep. Stud. GESAMP, (41):32 p. Available also in French, Spanish and Russian
42. Review of potentially harmful substances. Choosing priority organochlorines for marine hazard assessment. (1990). Rep. Stud. GESAMP, (42):10 p.
43. Coastal modelling. (1991). Rep. Stud. GESAMP, (43):187 p.
44. Report of the twenty-first session, London, 18-22 February 1991. (1991). Rep. Stud. GESAMP, (44):53 p. Available also in French, Spanish and Russian
45. Global strategies for marine environmental protection. (1991). Rep. Stud. GESAMP, (45):34 p.
46. Review of potentially harmful substances. Carcinogens: their significance as marine pollutants. (1991). Rep. Stud. GESAMP, (46):56 p.
47. Reducing environmental impacts of coastal aquaculture. (1991). Rep. Stud. GESAMP, (47):35 p.
48. Global changes and the air-sea exchange of chemicals. (1991). Rep. Stud. GESAMP, (48):69 p.
49. Report of the twenty-second session, Vienna, 9-13 February 1992. (1992). Rep. Stud. GESAMP, (49):56 p. Available also in French, Spanish and Russian
50. Impact of oil, individual hydrocarbons and related chemicals on the marine environment, including used lubricant oils, oil spill control agents and chemicals used offshore. (1993). Rep. Stud. GESAMP, (50):178 p.
51. Report of the twenty-third session, London, 19-23 April 1993. (1993). Rep. Stud. GESAMP, (51):41 p. Available also in French, Spanish and Russian
52. Anthropogenic influences on sediment discharge to the coastal zone and environmental consequences. (1994). Rep. Stud. GESAMP, (52):67 p.
53. Report of the twenty-fourth session, New York, 21-25 March 1994. (1994). Rep. Stud. GESAMP, (53):56 p. Available also in French, Spanish and Russian
54. Guidelines for marine environmental assessment. (1994). Rep. Stud. GESAMP, (54):28 p.
55. Biological indicators and their use in the measurement of the condition of the marine environment. (1995). Rep. Stud. GESAMP, (55):56 p. Available also in Russian
56. Report of the twenty-fifth session, Rome, 24-28 April 1995. (1995). Rep. Stud. GESAMP, (56):54 p. Available also in French, Spanish and Russian

57. Monitoring of ecological effects of coastal aquaculture wastes. (1996). Rep. Stud. GESAMP, (57):45 p.
58. The invasion of the ctenophore *Mnemiopsis leidyi* in the Black Sea. (1997). Rep. Stud. GESAMP, (58):84 p.
59. The sea-surface microlayer and its role in global change. (1995). Rep. Stud. GESAMP, (59):76 p.
60. Report of the twenty-sixth session, Paris, 25-29 March 1996. (1996). Rep. Stud. GESAMP, (60):29 p. Available also in French, Spanish and Russian
61. The contributions of science to integrated coastal management. (1996). Rep. Stud. GESAMP, (61):66 p.
62. Marine biodiversity: patterns, threats and development of a strategy for conservation. (1997). Rep. Stud. GESAMP, (62):24 p.
63. Report of the twenty-seventh session, Nairobi, 14-18 April 1997. (1997). Rep. Stud. GESAMP, (63):45 p. Available also in French, Spanish and Russian
64. The revised GESAMP hazard evaluation procedure for chemical substances carried by ships. (2002). Rep. Stud. GESAMP, (64):121 p.
65. Towards safe and effective use of chemicals in coastal aquaculture. (1997). Rep. Stud. GESAMP, (65):40 p.
66. Report of the twenty-eighth session, Geneva, 20-24 April 1998. (1998). Rep. Stud. GESAMP, (66):44 p.
67. Report of the twenty-ninth session, London, 23-26 August 1999. (1999). Rep. Stud. GESAMP, (67):44 p.
68. Planning and management for sustainable coastal aquaculture development. (2001). Rep. Stud. GESAMP, (68):90 p.
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